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**MOTHER-FATHER-ADOLESCENT TRIADIC RELATIONSHIP DYNAMICS AND
THEIR ASSOCIATIONS WITH ADOLESCENTS' POSITIVE AND NEGATIVE
ADJUSTMENT**

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ABSTRACT

Families are complex and dynamic systems and are critical contexts for adolescent development. Relationship structures (i.e., organization of multiple dyadic family relationships) and dynamics (i.e., change or fluctuations between structures over time) are two main aspects of families that depict essential information about the holistic functioning and changing processes in family systems, which has rarely been empirically tested. This dissertation aimed to (1) identify potential mother-father-adolescent (MFA) triadic relationship structures and dynamic configurations on a daily basis, and (2) further examine the implications of these MFA triadic dynamics on adolescent adjustment. Using a sample of 145 mother-father-headed two-parent families with daily diary data up to 21 days, a latent profile model on the day-level was used to exam possible mother-father-adolescent (MFA) triadic relationship structures across all families and all days. Then a multilevel latent profile model based on the solution of the day-level model was used to further identify potential subgroups of MFA triadic relationship dynamics at the between-family level. After modal assigning families into each MFA dynamic subgroup that they were most likely to belong to, the demographic and family conflict characteristics between subgroups were assessed and compared. Finally, I examined the associations between identified MFA triadic dynamics and six indicators of adolescent positive and negative adjustment, which acted as an initial step to study individual development in an integrative family dynamic system.

In the day-level latent profile analysis, there were six MFA triadic relationship structures identified across all the families and all days: Cohesive, Mother-Centered, Adolescent-Centered, Mother-Adolescent Coalition, Disengaged, and Average structures. When considering the dynamic configurations of identified triadic structures for each family, four stable (families exhibited the same structure most days) and one changing (families exhibited meaningfully

different structures across days) dynamic subgroups were found at the between-family level: Stable Cohesive, Stable Disengaged, Stable Mother-Adolescent Coalition, Stable Average, and Variable dynamics. Regarding characteristics of families with different MFA triadic dynamics, there were significant differences on parent relationship status, mother's education level, family-level conflict, interparental conflict, and parent-adolescent conflict among families in the five identified dynamics. In terms of association between MFA triadic dynamics and adolescent adjustment, adolescents from different MFA triadic dynamics had significantly different levels of depression, anxiety, positive affect, life satisfaction, and a sense of purpose six month later. Strengths, limitation, future directions, and implications for intervention were discussed.

TABLE OF CONTENTS

LIST OF FIGURES.....	vi
LIST OF TABLES.....	vii
ACKNOWLEDGMENTS.....	viii
Chapter 1: Introduction.....	1
Chapter 2: Method.....	35
Chapter 3: Results.....	46
Chapter 4: Discussion.....	69
REFERENCES.....	89
APPENDIX A: Measures Used in the Study.....	121
APPENDIX B: Example Syntax for Aim 1 and Aim 2 Analysis.....	126

LIST OF FIGURES

Figure 1. Eight MFA Triadic Relationship Structures.....	34
Figure 2. Example Family Trajectory for Each MFA Triadic Dynamic.....	68

LIST OF TABLES

Table 1. Conceptualization and Classification of MFA Triadic Relationship Structures.....	33
Table 2. Model Fit Information and Selection Criteria for Latent Profile Models at Level-1.....	57
Table 3. Parameter Estimates for the Six-Profile Model at Level-1.....	58
Table 4. Model Fit Information and Selection Criteria for Multilevel Latent Profile Models.....	59
Table 5. Parameter Estimates for the Level-2 5-Class Level-1 6-Profile Model.....	60
Table 6. Descriptive Statistics for Families' Demographics and Family Conflict Characteristics.....	61
Table 7. Demographics Comparison Among Five MFA Triadic Dynamics.....	62
Table 8. Effect Sizes for Pairwise Comparison of MFA Triadic Dynamics on Demographic Characteristics.....	63
Table 9. Family Conflict Characteristics Comparison Among Five MFA Triadic Dynamics.....	64
Table 10. Effect Sizes for Pairwise Comparison of MFA Triadic Dynamics on Family Conflict Characteristics.....	65
Table 11. Associations Between Five MFA Triadic Dynamics and Adolescent Adjustment Outcomes.....	66
Table 12. Effect Sizes for Pairwise Comparison of MFA Triadic Dynamics on Adolescent Adjustment Outcomes.....	67

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CHAPTER 1: INTRODUCTION

Overview

Adolescence is an important transition period during which individuals have tremendous biological, cognitive, and psychosocial changes. Adolescents who adjust well to these developmental changes are more likely to have better adjustment in their later life (e.g., Call et al., 2002; Grant & Dawson, 1997; Merikangas et al., 2010; Vanya Hamrin & Pachler, 2005). So far, many studies have focused on adolescent maladjustment, problems, and deficits; however, beyond the absence of problematic symptoms, adolescent adjustment also includes the presence of positive subjective feelings and the fulfilling of one's potential (Damon, 2004; Huta & Waterman, 2014; Seligman, 2011). To provide a more complete picture of adolescent adjustment, it is important to consider both positive and negative indicators (Moore, Lippman, & Brown, 2004).

Adolescent adjustment is largely influenced by their family context (e.g., Alderson & Henry, 1994; Fosco & Lydon-Staley, 2017; Shek, 2007). A family that simultaneously provides enough warmth and support and maintains distinct roles for each family member would promote adolescent adjustment (e.g., Fosco, Caruthers, & Dishion, 2012; Kerig, 2015; Sturge-Apple, Davies, & Cummings 2010). In the contrary, families with distant relationships among family members or with allied structures (e.g., one parent allies to the adolescent to fight against the other parent), either do not provide enough connection in the family or provides a sense of connection at the cost of sacrificing adolescents' individual space, which undermine adolescent psychological development (e.g., Bell & Bell, 2009; Buchanan & Waizenhofer, 2001; Marsiglia, Parsai, & Kulis, 2009).

In two-parent families, the mother-father-adolescent (MFA) triad is a central unit to reflect the organization of family relationships and how family members work together as a system. However, few studies examined beyond one dyadic subsystem (e.g., mother-adolescent relationships) to focus on the family structure on a triadic level. Even fewer studies have accounted for the changes in family structures on daily time scale to explore MFA triadic relationship dynamics over time. By looking at triadic relationship dynamics in family systems, we can gain a better understanding on how stable the triadic relationship structures are across time and whether the fluctuation in relationship structures with time would have additional implications for adolescent adjustment. This study was designed to 1) identify dynamic configurations of MFA triadic relationship structures (i.e. MFA triadic dynamics) on a daily basis, and 2) further investigating the associations between MFA triadic dynamics and adolescent adjustment. Given the difficulties of capturing the complexity in MFA triad in the system processes, other components in the family systems (e.g., siblings, grandparents, aunt and uncles) and families in diverse forms (e.g., single-parent families, LGBTQ families, and intergenerational families) are out of the scope of the current study.

In this introduction, I first summarize key indicators of negative and positive adolescent adjustment, and then review literature on the influences of family relationships on adolescent adjustment. In the third section, I focus on the associations between MFA triadic dynamics and adolescent adjustment. Specifically, I first illustrate eight possible triadic relationship structures. Then I introduce two dynamic properties of MFA triads from the dynamic system perspective and demonstrate five potential MFA triadic relationship dynamics. Next, I integrate the relevant literature to propose the hypothetical association between MFA triadic relationship dynamics and positive and negative aspects of adolescent adjustment. Finally, I list four aims for the current

study to sequentially identify potential MFA triadic relationship structures and dynamics, describe and compare their family characteristics, and examine their associations with each positive and negative indicators of adolescent adjustment.

Positive and Negative Indicators of Adolescent Adjustment

Research on individual adjustment has long been steered toward a problem-focused approach that emphasized treatment for reducing mental illness, such as affective disorders, anxiety disorders, and substance use disorders (e.g., Black & Krishnakumar, 1998; Gurin, Veroff, & Feld, 1960; Slade, Johnston, Oakley Browne, Andrews, & Whiteford, 2009). With the growing attention that has been paid to virtues, characters, and strengths in positive psychology, scholars' focus has been extended from avoiding maladjustment to approaching flourishing. In this way, well-adjusted individuals are not only absent from mental health problems, but also able to help themselves and society as a whole to thrive (Diener et al., 2010; Keyes, 2002; Seligman, 2011). Therefore, it is important to consider both negative and positive indicators to get a more comprehensive understanding of individual adjustment (Moore, Lippman, & Brown, 2004). This study focus on three negative aspects—(1) depression, (2) anxiety, (3) substance use—and three positive aspects—(4) positive affect, (5) life satisfaction, (6) having a purpose in life—of adolescent adjustment.

Negative Aspects of Adolescent Adjustment

Depression and anxiety symptoms and substance use behaviors are three common indicators of individual maladjustment, and they have profound negative influence on individuals' life quality. Specifically, individuals with depressive symptoms tend to feel helpless, use negative and pessimistic explanatory styles, obtain low social status, and have a higher risk of suicide (Angst, Angst, & Stassen, 1999; Nolen-Hoeksema, Girgus, & Seligman, 1992;

Wickrama, Conger, Lorenz, & Jung, 2008). Individuals with anxiety symptoms are more likely to experience low levels of social acceptance, more negative interpersonal relationships, educational under-achievement, impaired work performance (Ginsburg, La Greca, & Silverman, 1998; Mazzone, Ducci, Scoto, Passaniti, D'Arrigo, & Vitiello, 2007; Waghorn, Chant, White, & Whiteford, 2005), as well as a high risk of physical illness (Brenes, 2003; Mehta et al., 2007; Roest, Martens, de Jonge, & Denollet, 2010). And substance use experience would undermine individuals' brain functioning, increase the ratio of having accidental injury or death caused by high-risk driving behaviors, and increase the risk of infection with blood-borne virus, such as HIV, hepatitis C and hepatitis B (SAMHSA, 2013; Shope, Waller, Raghunathan, & Patil, 2001; Squeglia, Jacobus, & Tapert, 2009). Except for their respective negative implication for life quality, depression, anxiety, and substance use are highly likely to co-occur with each other during adolescence and develop into comorbidity of mental disorders and substance use disorders in adulthood (Valentiner, Mounts, & Deacon, 2004; Degenhardt, Hall, Lynskey, 2001; Grant et al., 2004).

During adolescence, there is a sharp rise of prevalence rates in depression, anxiety, and substance use, and these symptoms and behaviors have significant long-term implications for individuals' later life (Call et al., 2002; Grant & Dawson, 1997; Merikangas et al., 2010; Vanya Hamrin & Pachler, 2005). Epidemiological studies showed that the prevalences for anxiety disorders were 31.9%, mood disorders were 14.3%, and substance use disorders were 11.4% for adolescents in the USA (Merikangas et al., 2010). Most mental disorders begin during 12-24 years old, and roughly half of lifetime mental disorders started by age 14 years and three fourths by age 24 (Kessler et al., 2005; 2007; Patel, Flisher, Hetrick, & McGorry, 2007). Moreover, adolescents who suffer from depression, anxiety, or engage in substance use are more likely to

have mental disorders in their adulthood. After controlling for confounding effects of socio-familial and individual factors, adolescents with anxiety or depressive disorders are 2- to 3-times more likely to develop subsequent anxiety, depression, illicit drug dependence, and educational under-achievement later in life (Pine, Cohen, Gurley, Brook, & Ma, 1998; Woodward & Fergusson, 2001). Individuals who started drinking during early adolescence are 3 times more likely to develop an alcohol disorder in their lifetime than individuals who started drinking during emerging adulthood (Grant & Dawson, 1997). Therefore, this study focuses on these three negative indicators of adolescent adjustment: depression symptoms, anxiety symptoms, and substance use behaviors.

Positive Aspects of Adolescent Adjustment

Positive indicators for individual adjustment are mainly derived from the hedonic and eudemonic perspectives of well-being (Huta & Waterman, 2014; Ryan & Deci, 2001). The hedonic perspective emphasizes the subjective feelings of pleasure, happiness, and satisfaction (Diener, Suh, Lucas, & Smith, 1999; Diener, Oishi, & Lucas, 2003). It includes two core elements: (1) positive subjective feelings (e.g., the presence of pleasant affect/positive emotions) and (2) positive perception or global judgment about the elements of life (i.e. life satisfaction) (e.g., Diener, 2006; Keyes, Shmotkin, & Ryff, 2002; Waterman, 1993). The eudemonic perspective additionally proposes that (3) self-realization (i.e. fulfillment of one's potential) is as important as the satisfaction of human desires and hedonic needs (Ryff & Singer, 2008; Waterman, 1993), and the key element—self-realization—is comprised of different indicators, including being authentic, having purpose and meaning in life, being completely absorbed in what he/she does, and pursuing intrinsic goals autonomously (Csikszentmihalyi, 1997; Deci & Ryan, 2008; Delle Fave, Massimini, & Bassi, 2011; Huta & Waterman, 2014).

Among these different indicators of self-realization, having a purpose in life is especially important during adolescence (Damon, 2009). Adolescence is a period that is full of potentials and plasticity (Lerner & Benson, 2003). Having a purpose in life that is meaningful to the self and contributes to society thriving beyond the self is crucial for adolescents' self-realization, because it helps them to know who they are and in which direction to make full use of their potentials and strengths (Damon, 2004; 2009; Damon, Menon, & Bronk, 2003; Hill, Burrow, O'Dell, & Thornton, 2010; Hill, Burrow, & Sumner, 2013). Such purposeful adolescents also have a high level of positive subjective feeling and perception in their life in general: they are more agentic, driven in their lives, goal-directed, and feel happier, as well as have greater life satisfaction (Cotton Bronk, Hill, Lapsley, Talib, & Finch, 2009; Burrow, O'Dell, & Hill, 2010; Hill et al., 2013; Minehan, Newcomb, Galaif, 2000). Not surprisingly, these adolescents—who are purposeful, and have high level of positive emotions and life satisfactions—are also less likely to have depression, substance use, delinquency, and more likely to have prosocial engagement, school integration, and contribution to society (Jelicic, Bobek, Phelps, Lerner, & Lerner, 2007; Keyes, 2013). Therefore, this study focuses on these three positive indicators of adolescent adjustment: positive affect, life satisfaction, and having a purpose in life.

Family Relationships' Influences on Adolescent Adjustment

Close and affectionate family relationships have significant promotive effects on adolescent adjustment (e.g., Amato, 1994; Fosco, Caruthers, & Dishion, 2012; Harold, Osborne, & Conger, 1997; Lewis et al., 2015; Videon, 2002). By forming and maintaining strong and ongoing relational bonds with family members, adolescents' basic psychological need of relatedness and belonging are satisfied, so that they are more likely to fulfill their potential, and have higher levels of personal growth and integrity; whereas adolescents who lack such deep

connection tend to develop different forms of maladjustment symptoms (Baumeister & Leary, 1995; Maslow, 1943; Ryan & Deci, 2001). Moreover, being connected with other family members serves as a secure base for adolescents. Same as the function of a secure base during early childhood, adolescents who are close and securely attached to their parents are more likely to engaging in exploration processes (Allen et al., 2003; Moretti & Peled, 2004). In the exploration processes, their social-emotional competences, cognitive and behavioral skills, and self-efficacy are strengthened, which in turn boost adolescent positive development and adjustment (Benson & Leffert, 2001; Bowlby, 1988; Laible, 2007; Wolfe & Betz, 2004).

Close parent-adolescent relationships are characterized by high parental warmth and support, good communication, and low rejection. Being close with both parents significantly predicts adolescent positive affect, happiness, and satisfaction across diverse cultural populations (Amato, 1994; Flouri & Buchanan, 2003; Jiménez-Iglesias, García-Moya, & Moreno, 2017; Leung & Leung, 1992; Levin & Currie, 2010; Love & Murdock, 2004; Ma & Huebner, 2008; Schwarz et al., 2012; Young, Miller, Norton, & Hill, 1995), and it is also found to be positively associated with adolescent sense of purpose in a Chinese population (Shek, 2000). Regarding different aspects of adolescent maladjustment, high warmth and support from both parents buffer against the mood-lowering effects of exposure to stressors, so that protects adolescents from suffering depression (Bean, Barber, & Crane, 2006; Cole & McPherson, 1993; Greenberger & Chen, 1996; Lewis et al., 2015; Sheeber, Davis, Leve, Hops, & Tildesley, 2007; Vazsonyi & Belliston, 2006; Videon, 2002; Vulić-Prtorić & Macuka, 2006). In addition, communication with mothers and not experiencing rejection from their fathers were especially important for preventing adolescent anxiety symptoms (Vazsonyi & Belliston, 2006; Vulić-Prtorić & Macuka, 2006). And feeling connected to their parents and families help adolescents adhere to family

roles and regulations (Hawkins, Catalano, & Miller, 1992), which has concurrent and long-term implication for decreasing adolescents' frequent use of cigarettes, alcohol (and binge drinking), marijuana, and illicit drugs, as well as having substance use disorders (Barnes & Farrell, 1992; Brody & Forehand, 1993; Fosco & Feinberg, 2018; Goncy & van Dulmen, 2010; Habib et al., 2010; Resnick et al., 1997). Although more replications of findings on how parent-adolescent closeness impact adolescent sense of purpose are needed in diverse populations, prior work have generally demonstrated the significant implication of parent-adolescent closeness on both negative and positive aspects of adolescent adjustment.

Besides parent-adolescent relationships, interparental relationship quality is also a robust predictor for adolescent adjustment. Regarding positive indicators of adolescent adjustment, marital satisfaction was positively associated with adolescent life satisfaction in American and Chinese populations (Feldman, Fisher, & Seitel, 1997; Shek, 2000). Conversely, adolescents who perceived that their parents were in a poor relationship tend to report low positive affect, less satisfaction with their life, and a lack of purpose in their life (Chappel, Suldo, & Ogg, 2014; Cui, Conger, & Lorenz, 2005; Fosco & Lydon-Staley, 2017; Grossman & Rowat, 1995; Xin, Chi, & Yu, 2009). Regarding negative indicators of adolescent adjustment, interparental closeness was associated with less depression or anxiety symptoms in Mexican American girls in the 6th grade (Leidy et al., 2009). Conversely, poor interparental relationship quality, marked by high dissatisfaction and distress were associated with high levels of depression and anxiety from early adolescence to young adulthood (Cui, Conger, & Lorenz, 2005; Cui, Donnellan, & Conger, 2007; Davies & Lindsay, 2004; Feldman, Fisher, & Seitel, 1997). Similarly, low parental connection and overt interparental conflict were also associated with adolescent lifetime tobacco and alcohol use (Amoateng, Barber, & Erickson, 2006). Together, prior work has demonstrated

the associations between interparental relationship quality and positive and negative aspects of adolescent adjustment. Although empirical evidence lends support to the association between mother-father relationship quality and adolescent adjustment, most studies focused on interparental conflict or distress instead of directly measuring their relationship closeness. It is worth investigating whether mother-father closeness is a direct and robust protective factor for adolescent adjustment in future work. In summary, studies support the general idea that relationship closeness in both parent-adolescent dyads and the interparental dyad are important predictors of adolescent adjustment.

Although prior work demonstrated the significance of parent-adolescent relationships and interparental relationships respectively, little is known on how closeness in mother-father, mother-adolescent, and father-adolescent relationships work in concert with each other to influence adolescent adjustment. Considering families are comprised by multiple, interdependent subsystems, studying multiple family relationships as an integrative unit in the system instead of one dyad at a time would depict a more completed picture (Cox & Paley, 1997; Minuchin, 1985). More importantly, a family system as an organized whole is more than the sum of its dyadic subsystems (Von Bertalanffy, 1972; Nichols & Everett, 1986). Simultaneously considering all three dyads not only includes the sum of absolute closeness between mother-father, mother-adolescent, and father-adolescent, but also contains the relative closeness among three family members. It is the relative closeness between family members that portrays interactive patterns and alliances that emerge on the triadic relationship level, which is essential information for family system functioning that is not able to be captured on the dyadic level (Gordon & Feldman, 2008; Lindsey & Caldera, 2006). For example, a close mother-adolescent relationship may be good in a family where three dyads are all close and connected, it may also represent a

mother-adolescent coalition in a family with alliances where mother-father relationship is distant and mother-adolescent closeness is used to compensate for mother-father closeness. To get a more comprehensive and accurate understanding of how family relationship closeness is associated with adolescent adjustment, it is necessary to look at the MFA triad—a unit that integrate all three dyads together—from the family systems perspective.

The Mother-Father-Adolescent Triad in Family Systems

In family systems, connection and individuation are two key dimensions, where connection refers to affection and trust and individuation refers to respect and nurture of autonomy and competence (Bell & Bell, 2009; 2016). The MFA triad is a central unit to reflect whether a family system is able to balance the need of connection and individuation for each family member (Bowen, 1978). In a well-functioning family, family members have a sense of togetherness—they feel connected to each other, are able to communicate effectively, support each other, and resolve conflicts constructively; they also experience a sense of separateness—parents and the child have distinct roles, the interparental subsystem and parent-child subsystems are in a hierarchical structure, and the adolescent child has enough space for individuation. In such a family, three family members are able to maintain a steady equilibrium between their needs of connection and individuation (e.g., Minuchin, 1985; Olson, 2000).

Whether an MFA triad is able to balance the togetherness and separateness among three members is determined by the relationship quality in the interparental subsystem—the fundamental and executive component in a family system. When mother and father have a close relationship, they give each other emotional support to work as an integrative unit, and both parents have enough emotional availability to their adolescent child (Cox, Paley, & Harter, 2001; Satir, 1983). They are also able to complement each other, resolve disagreements, make

decisions, and take care of children together without the involvement of a third party. In such a family, the interparental subsystem and parent-adolescent subsystems are hierarchical and non-reciprocal, and both parents are well-connected with the adolescent child (Gordon & Feldman, 2008; Minuchin, 1974; Margolin, Gordis, & John, 2001; McHale, 1995). In this way, three family members form a cohesive MFA triad; the whole family has a good executive function and an emotional environment of mutual affection, warmth, and support.

On the contrary, when mothers and fathers do not have a close relationship (i.e., the relationship is distant and/or conflictual), their need of connection cannot be satisfied within the interparental subsystem and they are not able to make decisions for the family together. In turn, one or both parents may form a close relationship with the adolescent child to compensate for their emotional needs, and the adolescent child may be inappropriately brought into the executive subsystem to facilitate interparental communication, or intervene in problem solving and decision-making processes (Bell, Bell, & Nakata, 2001; Buchanan & Waizenhofer, 2001). In such a family, the interparental subsystem and parent-adolescent subsystems are reciprocal and non-hierarchical, and the adolescent child has to sacrifice his/her individuation space to meet inappropriate emotional demands from parents or be involved in interparental conflicts to defuse tension in multiple ways, so that different alliances are formed in the MFA triad to stabilize the dysfunctional family (e.g., Cox et al., 2001; Erel & Burman, 1995; Kerig, 2005, 2015; Katz & Gottman, 1996; Nuttall & Valentino, 2017). Alternatively, both parents may choose to fulfill their need of connection outside of the family and live their lives in their own way. In turn, both parents have no emotional availability to take care of or support the adolescent child, and the family does not work as an integrative system anymore. In such a family, each family member is highly independent and distant from each other; they do not know or care about other family

members' lives, and they also do not want other family members to be involved in their decision-making process (Minuchin, 1974; Olson, Sprenkle, & Russell, 1979). In this way, a disengaged MFA triad is formed.

Adolescents in different MFA triads develop different coping tendencies to deal with adversities in their lives, which further influences their adjustment (e.g., Bowen, 1978; Kerig, 2015; Skinner & Edge, 2002). According to the self-determination theory (SDT, Ryan & Deci, 2000) and the motivational model based on SDT (Skinner & Edge, 2002), adolescents who get their psychological needs (i.e. relatedness, autonomy, and competence) satisfied tend to view adversities as challenges and obtain positive growth through constructive coping process, whereas adolescents who lack satisfaction of their psychological needs tend to view adversities as threats and become more maladjusted through destructive coping process (Skinner, Edge, Altman, & Sherwood, 2003). Specifically, cohesive MFA triads balance connection and individuation in family systems, so that adolescents need of relatedness, autonomy, and competence are satisfied. When facing adversities, these adolescents tend to challenge themselves and surrounding contexts in a constructive way, such as cope with self-reliance, support and information seeking from others, and accommodation and negotiation (Demaray, Malecki, Davidson, Hodgson, & Rebus, 2005; Skinner et al., 2003). The way they handle challenging experience cumulatively facilitates their long-term adjustment and thriving. However, MFA triads with alliances disturb adolescents' individuation in family systems, so that adolescents need of autonomy and competence are not satisfied. When facing adversities, these adolescents tend to perceive them as threats and cope in a destructive way, such as become submissive and blame themselves, or become angry and aggressive, which undermines their adjustment (Fox & Boulton, 2006; Garnefski, Legerstee, Kraaij, van den Kommer, & Teerds,

2002; Park, Kim, Cheung, & Kim, 2010; Skinner et al., 2003). Alternatively, disengaged MFA triads fail to accommodate connection in family systems, so that adolescents' need of relatedness is not satisfied. When facing adversities, these adolescents also tend to perceive them as threats and cope in a different destructive way—they may isolate themselves and withdraw from the situation, or become totally dependent and ask others to be the delegates (Skinner et al., 2003). In turn, those adolescents are more likely to have maladjustment symptoms (Branje, van Doorn, van der Valk, & Meeus, 2009; Hall-Lande, Eisenberg, Christenson, & Neumark-Sztainer, 2007).

In summary, diverse MFA triadic relationship structures foster different coping tendencies, which in turn, has significant implications for adolescent adjustment. To be able to explore the specific associations between each MFA triadic relationship structure and different aspects of adolescent adjustment, a prior step is to know what the possible MFA triadic relationship structures are in normal daily life. In the following section, I specify and describe eight potential MFA triadic relationship structures on a daily basis.

MFA Triadic Relationship Structures

Given the MFA triadic relationship structures has been defined both as a specific interaction pattern in the interparental conflict context and a general relationship pattern in daily family interactions, its construct is not easy to define and demarcate (Buchanan & Waizenhofer, 2001; Gilbert, Christensen, & Margolin, 1984; Kerig, 2015). Table 1 listed several representative terms in the literature to conceptualize and classify MFA triadic relationship structures. Although disparate, I summarized several common points in these terms and classifications: (1) the key determinant is whether there is a well-connected interparental relationship. A strong interparental bond promotes other positive relationships in MFA triad; whereas a weak interparental bond results in dysfunctional triadic structures. (2) Triadic structures are distinguished by the relative

closeness within the interparental dyad and between parents and the adolescent child. Among the triadic structures with alliances, coalition triadic structures are marked by relatively high closeness in parent-adolescent relationship(s) and low closeness in the interparental relationship, and detouring triadic structures are marked by relative high closeness in the interparental relationship and low closeness in both parent-adolescent relationships. And (3) MFA relationship structures can be pictorially represented by triangle diagrams.

Previous studies of MFA triadic relationships have mainly focused on the dysfunctional relationship structures in interparental conflict scenarios (e.g., Buehler & Welsh, 2009; Fosco & Grych, 2010). In this study, I look beyond families experiencing conflicts or families that have dysfunctional relationships, and explore general relationship structures in daily family interactions by looking at each family member's relative distances or closeness to the other two on a daily basis (Bell, Bell, & Nakata, 2001; Bowen, 1978; Fogarty, 1975; Minuchin, 1974; Kerig, 1995). To create a framework that can be applied to general structures in two-parent families, I outlined eight mathematically possible MFA triadic relationship structures (see Figure 1) based on the combination of strong or weak bonds in mother-father (MF), mother-adolescent (MA), and father-adolescent (FA) dyads: they are the cohesive, mother-centered, father-centered, mother-adolescent coalition (MA Coalition), father-adolescent coalition (FA coalition), adolescent-centered, couple-centered, and disengaged triads.

A *Cohesive* MFA triad is made up by strong bonds in all three dyads. In this structure, mother and father are closely connected, the executive subsystem is able to function by itself, and both parents are emotionally close to the adolescent without undermining adolescent's need of individuation (Bell, Bell, & Nakata, 2001; Cox & Paley, 1997; Kerig, 1995). Cohesive families satisfied adolescents' psychological needs and adolescents are more likely to use

constructive coping strategies. Studies showed that these adolescents also more likely to have good adjustment, such as having healthier behaviors, less use of drugs/alcohol, and less engaging in conduct problems and rule-breaking behaviors (Bakken & Romig, 1989; Franko, Thompson, Bauserman, Affenito, & Striegel-Moore, 2008; Marsiglia, Parsai, & Kulis, 2009; Protinsky & Shilts, 1990).

An unbalanced parent-adolescent triad also has a strong MF bond, but one parent is closer to the adolescent child and the other parent is relatively distant to the adolescent child. Although there is one weak bond in each of these two structures, their well-connected interpersonal relationships serve as a good foundation for the MFA triad, and the closeness with adolescent is not used to compensate for parent's emotional need of connection (Anderson & White, 1986; Kerig, 2005; Minuchin, 1974). Specifically, a *Mother-Centered* MFA triad is made up by strong bonds in MF and MA dyads and a weak bond in FA dyad; a *Father-Centered* MFA triad is made up by strong bonds in MF and FA dyads and a weak bond in MA dyad. Although these structures may not balance connection and individuation as well as the cohesive structure, adolescents in those triads get all their needs of relatedness, autonomy, and competence satisfied to some degree. Until now, there was a lack of empirical or theoretical studies focusing on these two structures. One possible reason is: in these two structures, the close relationship with one parent may buffer against the negative impact of the distant relationship with the other parent (Forehand, Middleton, & Long, 1987; van Aken & Asendorpf, 1997), so that the two unbalanced structure may be not significantly associated with adolescent maladjustment outcomes. Another possible reason is: these two structures may not be as predominant as other structures, such as cohesive and disengaged (discussed later) triads. Thus, they are less likely to be observed or

detected if the interval of time used in measurement is too large (e.g., measuring relationships in years/in general instead of on each day).

An *Adolescent-Centered* MFA triad consists of strong bonds in MA and FA dyads and a weak bond in MF dyad. Due to the weak bond in the foundational and executive subsystem, both the mother and the father try to ally to the adolescent child to compensate for their need of connection and may also involve the adolescent child in the family decision-making process (Anderson & White, 1986; Sobolewski & Amato, 2007). In such families, there is a lack of hierarchy between the interparental subsystem and parent-adolescent subsystems, and the adolescent's individualization space is disturbed (Jacobvitz & Bush, 1996; Kerig, 1995). Due to the lack of satisfaction in needs of autonomy and competence, these adolescents tend to become submissive or blame themselves when they feel being caught between parents (Skinner, Edge, Altman, & Sherwood, 2003). As a result, these adolescents may withdraw from the tension, feel depressed, and have a low level of subjective well-being (Amato & Afifi, 2006; Baker & Brassard, 2013; Buchanan, Maccoby, & Dornbusch, 1991).

A parent-adolescent coalition triad is made up of one strong parent-adolescent bond, one weak parent-adolescent bond, and a weak bond in MF dyad. Specifically, an *MA Coalition* MFA triad is made up of a strong MA bond and weak bonds in both MF and FA dyads; an *FA Coalition* MFA triad is made up of a strong FA bond and weak bonds in both MF and MA dyads. In these two structures, a weak MF bond is compensated for by one of the parent-adolescent bonds. Because adolescents are "pulled into" an alliance with one of the parents, the boundaries between the interparental subsystem and parent-adolescent subsystems are disturbed, and the adolescent's individuation space is compromised (Bell, Bell, & Nakata, 2001; Jacobvitz & Bush, 1996; Kerig, 1995). In turn, those children tend to have low prosocial behavior and assertiveness

as well as high social problems (Leon, Wallace, & Rudy, 2007). These two structures have also been studied in the interparental conflict scenario as the concept of triangulation. When facing the stress of being triangulated into interparental conflicts, adolescents are submissive to the parent they ally to and blame themselves for not being able to solve parents' problems (Grych & Fincham, 1993). With the accumulative feeling of threats and the tendencies of blame themselves, these adolescents tend to be overstressed by the adversities they encounter and more likely to have internalizing and aggression problems, poor school adjustment, and more verbal abuse in their dating relationships (Buehler & Welsh, 2009; Davies & Cummings, 1994; Fosco, Lippold, & Feinberg, 2014; Fosco, Xia, Lynn, & Grych, 2016; Grych, Raynor, & Fosco, 2004; Wang, Liu, & Belsky, 2016).

A *Couple-Centered* MFA triad is made up of weak bonds in MA and FA dyads and a relatively stronger bond in MF dyad. It is possible that the adolescent has disengaged from his/her parents and more engaged with peer interactions (Dishion, Nelson, & Bullock, 2004), or the parents focus more on themselves rather than their role of being parents, or it may be caused by the covert interparental conflict where both parents band together to focus on the adolescent child's "problem" in order to defuse the tension within interparental dyad (Bell, Bell, & Nakata, 2001; Buchanan & Waizenhofer, 2001; Kerig, 1995, 2015). And any one of them is a risk factor for adolescent maladjustment. Specifically, adolescents who disengaged from family interactions and more engaged in peer interactions may have more chances of affiliating with deviant peers, so that they are more likely to have problem behaviors (Dishion et al., 2004; Fergusson, Swain-Campbell, & Horwood, 2002). For the adolescents whose parents focus more on themselves instead of their parent roles or use the adolescents as the "trouble maker" to defuse interparental tension, the adolescents are less likely to have close connection with their parents, receive

effective parenting, or maintain their individuation space. In turn, these adolescents have less opportunities to satisfy their need of relatedness, competence, and autonomy in their family. When facing stresses, these adolescents tend to blame themselves or act out aggressively to become the “problem”, so that they are at high risk of low self-esteem and low school adjustment, have more symptoms of depression and anxiety, as well as have more aggression problems (Kerig, 1995; Wang, Liu, & Belsky, 2016).

Finally, a *Disengaged* MFA triad is made up by weak bonds in all three dyads. This structure is characterized by unsupportive and distant relationships in the whole family (Martin, Bascoe, & Davies, 2011; Minuchin, 1974). Three family members in this triadic structure are highly independent and act as if they are unrelated individuals. They primarily make individual decisions, get individual activities done without the involvement of family, and maximize their separated space and time apart from family (Olson, Sprenkle, & Russell, 1979). With the lack of relatedness need satisfaction, these adolescents tend to isolate themselves when having difficulties or feeling stressful. Consequently, they have lower connection with peers, more internalizing symptoms (e.g., depression and anxiety) and difficulties in emotional adjustment (Bell, Cornwell, & Bell, 1988; Kerig, 1995; Restifo & Bögels, 2009; Sturge-Apple, Davies, Cummings, 2010). Beyond the lack of connection, disengaged parents are less likely to work as a team to provide effective parenting in adolescents’ individualization process. As a result, these adolescents are more likely to use destructive coping strategies to handle stress and easily to affiliate with deviant peers, which in turn increases their engagement in substance use, being hostile and discordant in relationships, and having antisocial and other externalizing behaviors (Davies, Cummings, & Winter, 2004; Dishion, Nelson, & Bullock, 2004; Sturge-Apple et al., 2010).

Above I illustrated eight potential MFA triadic relationship structures: three structures that attend both connection and individuation in family systems at least to some degree (i.e., Cohesive, Mother-Centered, and Father-Centered structures), four structures that undermines adolescent individuation (i.e., Adolescent-Centered, MA Coalition, FA coalition, and Couple-Centered structures), and one structure that is with insufficient connection in family systems (i.e. Disengaged structure).

An important next step is to look at how MFA triads may change among those structures from day to day given family systems are not static over time (Hollenstein, 2013; Olson, 2000). In MFA triads, each family member influences one another in a myriad of ways, and the complex transactional processes among the three dyads may continuously change triadic relationship structures over time (Schermerhorn & Cummings, 2008). In the next section, I will discuss the possible changing processes among different MFA triadic structures on a daily basis.

Dynamic Perspective of Mother-Father-Adolescent Triadic Relationships

MFA triadic relationships may change in different ways. Given an MFA triad is part of an open system (i.e. family), it may respond to stress inside and outside of the MFA triadic subsystem differently from time to time (Cox & Paley, 2003; Thelen & Smith, 2006). For example, a family may exhibit different MFA relationship structures on the days when the father is overstressed at work (stress outside of the family system) or on the days when parents have an argument (stress inside of the family system). Even when facing the same stress, an MFA triad may react differently on different days. For instance, when there is unresolved emotional tension in the MF dyad, the adolescent child may be pulled into the situation by an uncomfortable parent through complaints about the other parent, or a proactive adolescent acts out to distract both parents from the tension in the interparental dyad (Bowen, 1978; Kim-Appel & Appel, 2015).

Beyond the change in MFA triadic relationship structure itself, different families may have different dynamic configurations of these structures on a daily basis (Granic & Hollenstein, 2003). For example, some MFA triads may stay in the cohesive structure most of the time with minor fluctuations on several stressful days, some MFA triads may change between different coalition structures on a daily basis, and some other MFA triads may chaotically jump around different relationship structures (Cooper, Holman, & Braithwaite, 1983; Minuchin, et al., 1975; Olson, 2000).

In the following section, I will use *attractor(s)* and *variability* to describe different MFA triadic relationship dynamics (Granic & Hollenstein, 2003). Attractor(s) describes the general tendency of which relationship structure(s) an MFA triad tend to stay; these relationship structures have high frequency of visit, a high probability of recurrence, and high tendency for an MFA triad to return to (Granic & Hollenstein, 2006). Variability refers to the degree of an MFA triad to change over time. An MFA triad with high variability tend to change very quickly and easily, whereas a MFA triad with low variability has high tendency of staying in the same structure over time (Hollenstein, 2013). If we put variability of MFA triads on a continue spectrum: on the lowest end, an MFA triad may exhibit the same relationship structure most days (i.e. a very strong attractor) and only a few days (if any) in other structures; in the middle range, an MFA triad may spend a large proportion of days in more than one structure (i.e. a few moderate strength attractors) and possibly a very few days in other structures; on the highest end, an MFA triad may change between multiple different structures from day to day (i.e. very weak strength or no attractor). Combined the dynamic aspects of systems and family systems theories, I propose five MFA triadic dynamics in the next section (Hollenstien, 2013; Minuchin, 1985).

MFA Triadic Relationship Dynamics

In the previous section, I proposed eight MFA triadic relationship structures, which are eight potential attractors in different MFA triadic dynamics. On the lowest end of variability, there are eight possible dynamics with each of these structures as a very strong attractor; I name them as stable dynamics. Given the Mother-Centered structure and Father-Centered structure are rare to see in the family literature and observation, these two structures are very unlikely to be very strong attractors. Therefore, only the rest six stable MFA triadic dynamics are likely to be seen. Among these six stable dynamics, I cluster Stable MA Coalition, Stable FA Coalition, Stable Couple-Centered, and Stable Adolescent-Centered together and name them as stable alliance dynamics given those structures share same underlying function—alliance(s) are formed to compensate for the lack of closeness in interparental subsystems and the adolescent's individuation space is sacrificed (Bell, Bell, Nakata, 2001; Bowen, 1978; Kerig, 1995; Minuchin, 1985). In sum, I propose three stable MFA triadic dynamics: stable cohesive, stable disengaged, and stable alliance dynamics.

In the moderate range of variability, there may be a few structures (among the eight) work as moderate strength attractors so that an MFA triad has most days shifting between those structures. Considering the key dynamic feature of these triads is the shift between a few structures, they are named as shifting dynamics. Since family systems usually have a settled equilibrium between connection and individuation, it is more likely to see shifts between structures serving the same function from day to day. As mentioned previously, the cohesive structure provides a good balance between connection and individuation in family systems, the structures with alliances make up for connection by scarifying the adolescent child's individuation, and the disengaged structure neither provides sufficient connection nor effective guidance/validation for adolescent individuation. It is more likely to see shifts between different

alliance structures (i.e. MA Coalition, FA Coalition, Couple-Centered, and Adolescent-Centered) instead of shifts between alliance structures and the cohesive structure, between alliance structures and the disengaged structure, or between the cohesive structure and the disengaged structure. Therefore, I propose one shifting dynamic—the shifting alliances dynamic.

On the highest end of variability, there may be an MFA triad dynamic with no attractors, where the MFA triad exhibit totally different structures on a daily basis. I name it as chaotic dynamic. Overall, from low to high levels of variability, I propose five hypothetical MFA triadic dynamics: (1) Stable Cohesive, (2) Stable Disengaged, (3) Stable Alliance, (4) Shifting Alliances, and (5) Chaotic dynamics.

A *Stable Cohesive* MFA triad is often considered well-functioning because it is associated with better developmental outcomes. Families in this dynamic stay in the cohesive MFA triadic relationship structure consistently, or return to cohesive structures quickly after occasionally visit some other triadic structures (Olson, Sprenkle, & Russell, 1979). Families with a Stable Cohesive dynamic consistently provide warm, connection, and support, as well as the developmental space for adolescents' individuation. Adolescents growing in these families develop constructive coping tendencies, which prevent them from maladjustment problems and promote their positive development (e.g., English & Chen, 2011; Goldman & Kernis, 2002; Xia, Fosco, Lippold, & Feinberg, 2018). A Stable Cohesive MFA dynamic would be of low variability and have the cohesive structure as a strong attractor.

A *Stable Disengaged* MFA dynamic has low variability (similar to the Stable Cohesive dynamic) and the disengaged structure as a strong attractor. Families in this dynamic are distant and separated on most days. It is possible to see one or two dyads get closer on a few days, but the settled disengaged relationship structure does not change in the long term (Olson, Sprenkle,

& Russell, 1979). A family with this MFA dynamic is not an integrative living system, instead, every family member lives their own life independently. This dynamic has been referred to as a disengaged family or separated family in prior work (Kerig, 1995; Sturge-Apple, Davies, & Cummings, 2010). Children in this dynamic consistently lack connection with other family members, thus more likely to have emotional and relationship problems, as well as internalizing and externalizing problems (e.g., Bell, Cornwell, & Bell, 1988; Dishion, Nelson, & Bullock, 2004; Sturge-Apple et al., 2010).

A *Stable Alliance* dynamic may manifest in three ways—Stable MA Coalition, stable FA Coalition, and stable Couple-Centered. In families with the Stable MA Coalition dynamic, the mother and the adolescent child are close to each other and the father is disengaged on most days. Families in this dynamic may exhibit other MFA relationship structures on a few days, but the reciprocal influence among three family members generally gear their interaction toward the old relationship structure (Minuchin, 1974). The stable FA Coalition and the stable Couple-Centered dynamics present in a similar way to the Stable MA Coalition: one dysfunctional “close” dyad is formed to keep family members together, and a third party is used to stabilize the family system. These three dynamics have been studied as three different types of triangulation in interparental conflict context (Bell, Bell, & Nakata, 2001; Buchanan & Waizenhofer, 2001; Kerig, 1995), which predict children’s negative self-concept, cognitive appraisals, and emotional insecurity, and ultimately increase their risk of having internalizing and externalizing problems (e.g., Buehler & Welsh, 2009; Grych, Raynor, & Fosco, 2004; Kerig, 1995; Wang, Liu, & Belsky, 2016). From the dynamic system perspective, three sub-types of the stable alliance MFA dynamic have low variability and their respective structure as a strong attractor.

Although the Adolescent-Centered MFA triadic relationship structure is also viewed as a structure with alliances, it may be less likely to see a stable Adolescent-Centered MFA dynamic. Being allied with both parents to compensate for both parents' emotional needs may overburden the adolescent child, so that the adolescent child is likely to give in to the request of closeness from one parent on some days. In this way, it is more likely to see a shift between Adolescent-Centered, MA Coalition, and FA coalition structures on a daily basis instead of seeing a stable Adolescent-Centered triad. Alternatively, the adolescent may feel overwhelmed by the pressure on both sides and withdraw from both parents on some days, and both parents may blame the adolescent child for not being on his/her side (Buchanan & Waizenhofer, 2001; Kerig, 1995). In this way, it is likely to see a shift between Adolescent-Centered and Couple-Centered structures on a daily basis. These are two sub-types of the shifting alliances dynamic rather than a stable dynamic.

A *Shifting Alliances* MFA dynamic is composed of a shift between two/three/four alliance structures (i.e., MA Coalition, FA coalition, Couple-Centered, and Adolescent-Centered) most of the time with (possibly) a few visits to some other structures. It is likely to see shift in different combinations among those four alliance structures on a daily basis because those alliances are formed to serve the same function—stabilizing the triangle in families (Bell, Bell, & Nakata, 2001; Buchanan & Waizenhofer, 2001; Kerig, 1995). Families in this dynamic lack the stability at the whole family level, so that any tension between either two family members results in the involvement of a third party to diffuse the anxiety, resulting in the formation of alliances in one of the four MFA triadic relationship structures (Bowen, 1978). Adolescents in this dynamic experience constant changes in who to connect to and in what ways. They are more likely to feel overwhelmed by the anxiety in the family system, exhausted by acting differently in different

situations. In such an unstable environment that is full of emotional tension, these adolescents are less likely to get their psychological needs satisfied and more likely to use destructive coping strategies, which makes them at increased risk of having psychological problems (Forman & Davies, 2003; Groh, Roisman, van Ijzendoorn, Bakermans-Kranenburg, & Fearon, 2012; Grych, Harold, & Miles, 2003). In terms of their dynamic system features, shifting alliances dynamics may exhibit moderate variability with the alliance structures as moderate attractors.

The last one is a *Chaotic* MFA dynamic, which has very weak or no attractor and a high level of variability. In this MFA dynamic, there are unpredictable changes between different triadic relationship structures and none of these structures are strong attractors (i.e. having significantly more visits than others). This dynamic is likely to be seen in the following three situations: (1) a therapist intervenes in a dysfunctional dynamic family and the family is in the changing process, thus some well-functioning structures emerge (Minuchin, 1974; Satir, 1983); (2) when a family is going through a big event for the whole family (e.g., financial strain) or one member (e.g., father loses his job), and the triad is in the restructuring process to cope with the difficulties (Henry, Morris, & Harrist, 2015; Patterson, 2002); and (3) new individual demands within the triad emerge, such as adolescents' growing need of autonomy and individuation, so that the whole family is changing to meet the new needs (Feldman & Gehring, 1988; Larson, Richards, Moneta, Holmbeck, & Duckett, 1996). This dynamic may also be seen in families that are chaotic in general. These families are disorganized and lack routines, which undermines children's emotional and behavioral functioning, so that these children are more likely to have internalizing and behavioral problems (Brody & Flor, 1997; Coldwell, Pike, & Dunn, 2006; Evans & Wachs, 2010; Markson & Fiese, 2000; Valiente, Lemery-Chalfant, & Reiser, 2007).

To capture those MFA dynamic types in different families, we need a method that can simultaneously consider MFA triadic relationship structures and their dynamic combinations on a daily basis. Multilevel latent profile analysis (MLPA) is a novel and feasible method to model both holism and dynamics of MFA triads at the same time: Level-1 (day-level) model identifies MFA triadic relationship structures across days by concurrently estimating the relationship closeness in all three dyads for each family on each day; and then Level-2 (family-level) model examines the MFA triadic dynamics by identifying different types of families based on the proportions of days spent with different structures identified at Level-1. This not only allows us to map onto the MFA triad—a key unit that reflects family functioning—from the family systems perspective, but also provides a way to expand our knowledge of family system dynamics by evaluating how these structures fluctuate in normal daily life.

MFA Triadic Relationship Dynamics and Adolescent Adjustment

The Stable Cohesive MFA dynamic is considered to be a well-functioning family triad that is generally negatively associated with adolescent maladjustment and positively associated with positive indicators of adolescent adjustment. Families with a Stable Cohesive MFA triadic dynamic have close connections in both interparental and parent-adolescent dyads, which are important protective factors for adolescent depression, anxiety, and substance use, as well as significant promotive factors for adolescent positive affect, life satisfaction, and a sense of purpose in life (e.g., Amato, 1994; Amoateng, Barber, & Erickson, 2006; Fosco & Lydon-Staley, 2017; Leidy et al., 2009; Lewis et al., 2015; Resnick et al., 1997; Shek, 2000). In addition, adolescents from cohesive families get their psychological needs of relatedness, autonomy, and competence satisfied in general. Thus, they are better able to cope with stress constructively and effectively, which in turn is associated with less depression, anxiety, or drug/alcohol use, and

more life satisfaction (Bakken & Romig, 1989; Manzi, Vignoles, Regalia, & Scabini, 2006; Marsiglia, Parsai, & Kulis, 2009; Protinsky & Shilts, 1990; Wilson & Constantine, 1999).

Therefore, adolescents from the Stable Cohesive dynamic are expected to have low levels of depression, anxiety, or substance use, and high levels of positive affect, life satisfaction, and a sense of purpose in life.

The Stable Disengaged MFA dynamic is thought to be positively associated with adolescent maladjustment and negatively associated with positive indicators of adolescent adjustment. Children from disengaged families or disconnect with family members have great insecurity and poorly developed self-identity, which is associated with more internalizing and externalizing problems, as well as low positive adjustment (Baumeister & Leary, 1995; Bowen, 1978; Davies, Cumming, & Winter, 2004; Ryan & Deci, 2001). They also tend to avoid problems, withdrawal from emotional tension, and use disengagement coping strategy to deal with stress, which place them at the highest risk of experiencing depression (Arthur, 1998). Adolescents who are disengaged from families are also less likely to adhere to family rules and regulations, in turn, they are at increased risk of engaging in substance use (Foxcroft & Lowe, 1991; Hawkins & Catalano, 1992; Vakalahi, 2001; Visser, Winter, & Reijneveld, 2012). Moreover, due to the lack of connection with their families, these adolescents have strong desire of feeling connected to other people. As a result, they may be more likely to affiliate with deviant peers, which in turn increases the risk for them to engage in substance use (Dishion, Nelson, & Bullock, 2004; Rudolph et al., 2014). Together, adolescents from the Stable Disengaged dynamic at the highest risk of engaging in substance use. Thus, I expect that adolescents in the Stable Disengaged MFA triadic dynamic are at the highest risk of experiencing depression and engaging in substance use.

The Stable Alliance MFA dynamic is also thought to be positively associated with adolescent maladjustment and negatively associated with positive indicators of adolescent adjustment. In the stable alliance dynamics, part of the closeness between parents and adolescents may be used to compensate for the lack of close connection between parents and adolescents may also have more chances of being involved into interparental conflict, which undermines adolescent individuation. With unsatisfied need of autonomy and stress of dealing with interparental conflict, these adolescents tend to become submissive and blame themselves (Shelton & Harold, 2008; Skinner, Edge, Altman, Sherwood, 2003). Therefore, they are more likely to have depression and anxiety symptoms, and drug abuse or dependence (Grych, Raynor, & Fosco, 2004; Kerig, 1995; Pinheiro et al., 2006; Schindler, Thomasius, Sack, Gemeinhardt, & Küstner, 2007; Wang & Crane, 2001; Wang, Liu, & Belsky, 2016), as well as low levels of positive mood and life satisfaction (Hooper, Tomek, Bond, & Reif, 2015; Perrin, Ehrenberg, & Hunter, 2013; Shek, 2007). However, there is a lack of empirical research testing the association between the alliance structures and adolescent sense of purpose in life. Therefore, the stable alliance triad is expected to be positively associated with adolescent depression, anxiety, and substance use, and negatively associated with their positive affect and life satisfaction. Its association with adolescent sense of purpose in life is examined in an exploratory manner.

Adolescents in the shifting alliances MFA triadic dynamics experience 1) lack of satisfaction in autonomy need and more involvement in interparental conflict (like in the stable alliance dynamic) and 2) instability in family relationships, both of which have negatively influences on adolescent adjustment. As discussed in the stable alliance dynamic, adolescents who did not satisfy their autonomy need and involved in interparental conflict tend to use destructive coping strategies, which has negative implication for different aspects of adolescent

adjustment. Beyond that, changing between different alliance MFA triadic structures increases family instability, which is a factor that diminishes adolescent sense of security and further decreases their life satisfaction, increases internalizing problems, and substance use initiation (Busby, Thomas, & Narumi, 2001; Ivanova & Israel, 2005, 2006; Lippold, Hussong, Fosco, & Ram, 2018; Rask, Åstedt-Kurki, Paavilainen, & Laippala, 2003; Winter, Davies, & Cummings, 2010). Moreover, shifting between different relationship structures causes extra emotional stress and anxiety that is harmful for adolescent well-being. Studies showed that children who feel caught between parents and suffer from loyalty conflict have poor adjustment outcomes and low levels of subjective well-being (Amato & Afifi, 2006; Buchanan, Maccoby, & Dornbusch, 1991; Schrodt & Afifi, 2007). In this vein, adolescents in the shifting alliances dynamic are expected to have high levels of maladjustment and low levels of positive adolescent adjustment in general, especially at the highest risk of experiencing anxiety.

Although few research focused on the association between the Chaotic MFA triadic dynamic and adolescent adjustment, family chaos has been demonstrated as a risk factor for adolescent maladjustment in general (e.g., Fiese & Winter, 2010; Skinner, Johnson, Snyder, 2005). Chaotic families are disorganized and unpredictable, such uncertainty would lower adolescent sense of competency and family identity, which has negative influence on their social-emotional development and psychological well-being (Fiese & Winter, 2010; Fiese, Foley, & Spagnola, 2006; Evans & Wachs, 2010). In addition, adolescents in chaotic triads experience more changes in their family relationships; the instability in multiple family relationships and inconsistency in daily family interactions increase adolescent sense of insecurity, which results in more depression, anxiety, and substance use, and a lower level of life satisfaction (Amato & Afifi, 2006; Fowler, Henry, & Marcal, 2015; Ivanova & Israel, 2005,

2006; Lippold, Davis, Lawson, & McHale, 2016; Lippold, Hussong, Fosco, & Ram, 2017; Rask, Åstedt-Kurki, Paavilainen, & Laippala, 2003; Schrodts & Afifi, 2007). However, adolescents in chaotic MFA triadic dynamics may also have more time spending in the cohesive structure (which is considered as a well-functioning structure) compared with adolescents in the Stable Disengaged, the Stable Alliance, and even the Shifting Alliances dynamics, which may promote adolescent general level of well-being to some degree. Given that there is little knowledge on how two contrary aspects (i.e., high family chaos and high instability but more visits to the cohesive structures) may influence adolescent well-being together, the association between the chaotic MFA triadic dynamic and the six aspects of adolescent adjustment is exploratory.

The Present Study

This dissertation includes four related aims which focus on identifying types of MFA triadic relationship dynamics and their associations with adolescent adjustment. As one of the pioneer studies in applying daily method to study MFA triadic functioning, my first three aims concentrate on identifying and describing different MFA triadic relationship dynamics.

Specifically, this dissertation aims to (1) identify MFA triadic relationship structures (without considering the dynamic aspect) across all families and all days, (2) explore MFA triadic relationship dynamics within families across days (accounting for the dynamic aspect) and identify different types of MFA triadic relationship dynamics across families, (3) compare demographic and family conflict characteristics of families with different MFA triadic relationship dynamics, and (4) explore the associations between MFA triadic relationship dynamics and indicators of adolescent adjustment.

Aim 1. To identify potential MFA triadic relationship structures during daily interactions. This extends prior research on triadic relationships mainly in interparental conflict scenarios by

directly examining the relative closeness among MF, MA, and FA dyads in normal daily life.

The hypothesis related to Aim 1 is about relationship structure: (H1) without considering its dynamic aspect, there are eight MFA triadic relationship structures—Cohesive, Mother-Centered, Father-Centered, Adolescent-Centered, MA Coalition, FA Coalition, Couple-Centered, and Disengaged structures—across all families and all days.

Aim 2. To identify MFA triadic relationship dynamics within families across days based on the triadic structures identified in Aim 1. This extends prior work by investigating whether families shift between different structures from day to day and what are the MFA triadic relationship dynamics. The hypothesis related to Aim 2 is that (H2) there are five types of MFA triadic relationship dynamics: Stable Cohesive, Stable Disengaged, Stable Alliance, Shifting Alliances, and Chaotic.

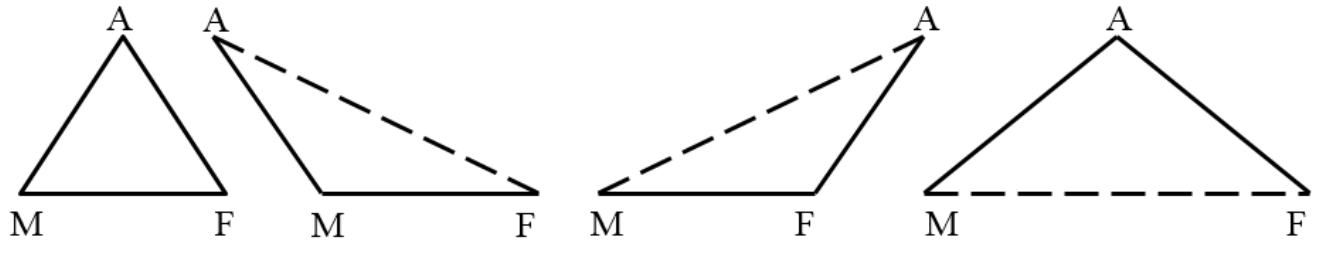
Aim 3. To compare demographic and family characteristics between families that exhibit different MFA triadic relationship dynamics. This contributes to the literature by adding descriptive information of different family dynamic systems and inspiring future studies to explore precursors and outcomes of different dynamics in family systems. In this study, I included available demographic variables (i.e., parent education, family income, relationship statuses, parent age, adolescent age, and adolescent gender) and key family functioning indicator—family conflict variables at different levels (i.e., family-level conflict, interparental conflict, and parent-adolescent conflict). As a pioneer study examining family dynamics, this is an exploratory aim, and I do not have a specific hypothesis.

Aim 4. The fourth aim of this dissertation is to examine the associations between MFA triadic relationship dynamics and six indicators of adolescent adjustment. This contributes to the literature by examining holistic triadic functioning in families and its influence on both positive

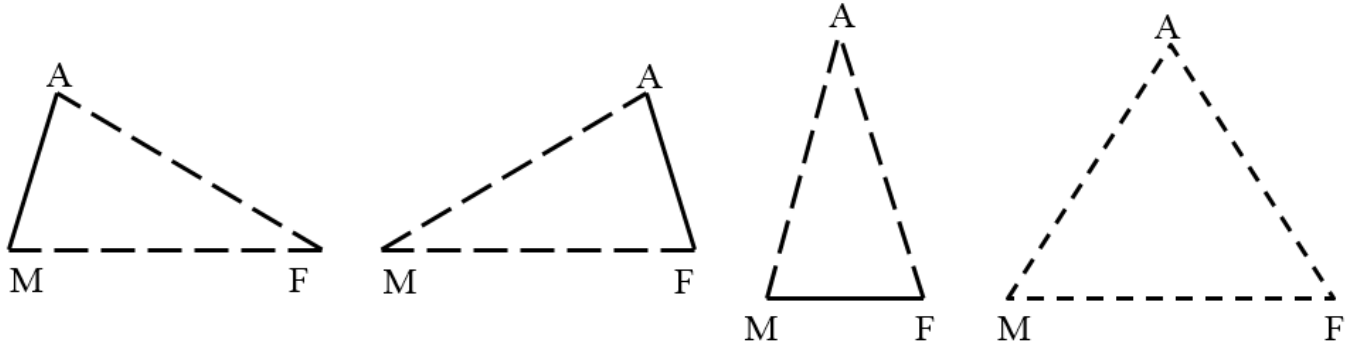
and negative aspects of adolescent adjustment. The set of hypotheses related to this aim are as follows: (H4a) adolescents in the Stable Cohesive triad have the lowest levels of depression, anxiety, and substance use symptoms, and the highest levels of positive affect, life satisfaction, and a sense of purpose in life; (H4b) adolescents in the Stable Disengaged triad have high levels of negative adolescent adjustment and low levels of positive adolescent adjustment, with the highest levels of depression and substance use; and (H4c) adolescents in the Shifting Alliances triad have high levels of negative adolescent adjustment and low levels of positive adolescent adjustment, with the highest levels of anxiety.

Table 1.
Conceptualization and Classification of MFA Triadic Relationship Structures

Term	Focus	Classification	Measure	Reference(s)
Triangulated family structure	Different ways in which children might be triangulated within the family system	1. rigid triangle (each parent attempts to enlist the child's support and loyalty) 2. detour	Clinical observation	Minuchin, 1974
Triangles (in Bowen's theory)	Triangles comes in different sizes and shapes	1. balanced 2. isosceles triangle (e.g., mother-father close, mother-child=father-child distant, or mother-father distant, mother-child=father-child close) 3. variable pattern (e.g., mother and father are distant from child but mother-child≠father-child)	Geographic demonstration	Fogarty, 1975
Patterns of alliances	Family interaction about: to whom, about whom, affective quality, and content	1. distressed (low overall alliance, weakness in marital alliance relative to other alliances, and discrepancies in parent-child alliances) 2. nondistressed	Coded observation in problem-solving interaction and negotiation skills interaction	Gilbert, Christensen, & Margolin, 1984
Triangles (family structure types)	Family members' perception on the typologies of their families in pictorial representations of family circles	1. cohesive 2. detouring 3. triangulated (mother coalition, father coalition, child in middle, shifting coalitions) 4. separate	Mothers', fathers', and children's description of family system on revised version of the Family Cohesion Index (FCI)	Kerig, 1995
Patterns of family interaction	Seek child emotional sustenance in general or involve the child in marital discord	1. cross-generational alliances 2. triangulated family pattern (e.g., detour, coalition)	Surveys on mother-child and father-child enmeshment, conflict mediation, marital conflict, and marital support	Jacobvitz & Bush, 1996
Triangles	Differences or disagreement between two people	1. balanced 2. pushed out 3. mediator 4. cross-generational coalitions	Patterns of agreement and disagreement among MFA on Family Environment Scale (FES)	Bell, Bell, & Nakata, 2001
Triangulation	Different mechanisms of using a third party in some way to diffuse tension created by conflict in a pair	1. scapegoating 2. align with mother 3. align with father 4. withdraw 5. loyalty conflicts/feel caught	Adolescent cognitive representation of family relations	Buchanan & Waizenhofer, 2001



(1) Cohesive (2) M-centered (3) F-centered (4) A-centered



(5) MA coalition (6) FA coalition (7) Couple-centered (8) Disengaged

Note.
M = Mother, F = Father, A = Adolescent, MA = Mother-Adolescent, FA = Father-Adolescent;
A solid line represents a strong bond in the dyad, and a dashed line represents a weak bond in the dyad.

Figure 1. Eight MFA Triadic Relationship Structures

CHAPTER 2: METHOD

Procedures

Data were drawn from the Penn State Family Life Optimizing Well-Being Study (the FLOW study), which is a daily diary study focusing on family functioning and family members' well-being. It was approved by Penn State's IRB (#0472). The original sample involved 151 eligible families who meet the following six criteria: (1) a family has one adolescent in 9th or 10th grade, (2) the family is a "two-parent" family with two caregiving adults living in the same house for at least two years, (3) the participating adolescent should live in one household continuously, (4) all participants are able to read and write English fluently, (5) the participating adolescent and caregiver have internet access and means to complete online daily surveys at home, and (6) the adolescent and caregiver consent to participating in this study.

Parents were notified through emails sent from school principals, the study website, and references from participating families. Parents received the consent form and detailed study information if they were interested in participating. After the family was confirmed to be eligible for the study, adolescents received the consent form and a baseline survey. Only one parent and the adolescent child from each family filled in surveys after they signed the consent forms. Once the participating adolescent finished the baseline survey, the participating caregiver received his/her baseline survey. With the completion of baseline surveys from both the adolescent and the participating caregiver, the family was automatically enrolled in a 21-day daily diary and subsequent follow-up assessments at 3 months, 6 months, and 12 months after the initiation of the baseline survey. During the 21-day period, daily surveys were sent separately to the participating caregiver and the adolescent at 7 p.m. in their time-zone, followed by text message or phone call reminder that the links had been sent. The link was active until 9 a.m. the next

morning (participants were instructed to report on the previous day if they initiated the survey in the morning). Data were automatically recorded through Qualtrics when the participants finished each daily survey. Families with either the caregiver or the adolescent that failed to complete 4 continuous days during the first week were dropped from the daily diary phase based on the protocol. Payments were made in the form of a gift card from Walmart or Amazon after each family's completion of the baseline, the 21-day daily, and the follow-up surveys. The payment amount was based on each participant's completion rate, they received \$25 for completing the baseline survey, \$10 for the 3-month survey, \$35 for the 6-month survey, \$35 for the 12-month survey, and \$75 for full completion of the daily surveys (the total possible family compensation is \$360). Continued participation through the daily diary was incentivized through the use of a raffle for which an iPad mini was available as a prize. Higher completion rates resulted in gaining more entries into the raffle.

Participants

Because this study focused on mother-father-adolescent triadic relationships, only families with mother-father as caregivers were included in the analytic sample. "Mother-father" in this study refers to caregivers in one of mother-father, mother-stepfather, stepmother-father, mother-mother's fiancé, and mother-mother's partner combinations; families with other caregivers, such as sister, grandmother, aunt, and uncle were removed from the analytic sample. This resulted in a subsample of 145 families for analysis. In the analytic sample, families provided daily reports ranging from 11 to 21 days. Adolescents completed 90.7% ($M = 19.05$, $SD = 2.44$) of daily surveys resulting in 2762 occasions, and caregivers completed 96.7% ($M = 20.30$, $SD = 1.24$) resulting in 2944 occasions. Adolescent participants (reported by caregiver) were 14 to 16 years old ($M = 14.76$, $SD = 0.73$); 61.4% were female ($n=89$). Adolescents were

identified (by caregiver-report) as White (84.1%), African American/Black (2.8%), Native American/American Indian (0.7%), Asian American (4.1%), Hispanic/Latino (1.4%), and Mixed or Other (6.9%). The participating caregivers were between 30 and 61 years old ($M = 43.40$, $SD = 6.91$); 93.1% were mothers ($n=135$), 4.8% were fathers ($n=7$), 1.4% were stepmother ($n=2$), and 0.7% were foster mother ($n=1$). Caregivers identified their ethnicity as White (90.3%), African American/Black (2.8%), Asian American (2.8%), Hispanic/Latino (1.4%), and Mixed or Other (2.7%). The majority of participating caregivers (97.2%) had graduate from high school or earned a GED certificate. The yearly household income ranged from “less than \$10,000” to “\$125,000 or more” with the Median in the range of \$70,000 to \$79,999.

Measures

Daily Relationship Variables

Daily dyadic closeness. Adolescents reported on all three dyads in the MFA triads. They reported two items on MF, MA, FA dyadic closeness, respectively, on each of the 21 days. Given only one caregiver participated in the study and the caregiver can be mother, father, or other caregivers, the items were listed as [parent 1] and [parent 2] which referred to the participated caregiver and the non-participated caregiver respectively. Prior to data scoring, the raw data for each item were reordered in the analytic sample, so that all data for the mother and all data for the father were listed in their respective columns. The two items for each parent-adolescent dyad were: (1) “how warm and affectionate was your [parent 1] with you?” and (2) “how close and connected did you feel to your [parent 1]?” And two same items were asked for [parent 2]. Moreover, two items for mother-father dyads were: to what degree do you agree (1) “my [parent 1] and [parent 2] were loving and affectionate with each other today” and (2) “my [parent 1] and [parent 2] got along with each other well today”? All six questions are on a 0 – 10

point slider with 1 decimal increment. The scores were reordered in the analytic sample so that the 2 items that adolescent reported per dyad were averaged to create a single score to represent the average closeness level for each dyad on each day. Across all families in the analytic sample across all days, the average mother-father closeness was 8.15 ($SD = 2.42$); similarly, average mother-adolescent closeness was 8.40 ($SD = 2.22$), and average father-adolescent closeness was 7.55 ($SD = 2.92$). The higher values indicated higher closeness in the given dyad on that day.

Family Characteristics Variables

Demographic variables. Parent reported on the following eight demographic variables at the baseline assessment: family income, relationship status, mother's education level, father's education level, adolescent's gender, mother's age, father's age, and adolescent's age. Family income was represented by family gross annual income; it was scored as (1) *less than \$10,000*, (2) *\$10,000 to 19,999*, (3) *\$20,000 to 29,999*, (4) *\$30,000 to 39,999*, (5) *\$40,000 to 49,999*, (6) *\$50,000 to 59,999*, (7) *\$60,000 to 69,999*, (8) *\$70,000 to 79,999*, (9) *\$80,000 to 89,999*, (10) *\$90,000 to 99,999*, (11) *\$100,000 to 124,999*, and (12) *\$125,000 or more*. Parent's relationship status was (1) *married* or (0) *not married*. Mother's and father's education level were measured on the same scale: (1) *no formal schooling*, (2) *7th grade or less*, (3) *Junior High completed*, (4) *Partial High School*, (5) *High school graduate / GED certificate*, (6) *Partial college (at least one year) or specialized training*, (7) *Junior college / Associates degree (2 years)*, (8) *Standard college or University graduation (4 years)*, and (9) *Graduate professional training, graduate degree*. Adolescent gender was scored as (1) *female* or (0) *male*. Three family members' ages were continuous variables with values of years old.

Family-level conflict. Parent reported on family-level conflict at the baseline assessment. Family-level conflict was measured using the Family Environment Scale (Moos & Moos, 1981).

These five items were selected based on a short form validated by Bloom (1985), who established good convergent validity with the original scale, and good internal consistency across multiple samples (Cronbach's alpha ranges from .76-.85). Example Items included: (1) "Family members fought" and (2) "Family members got so angry they threw things". Items were rated on a 5-point Likert-type scale from *Almost Never* (1) to *Almost Always* (5). Items were averaged to create a single score so that higher values reflected more family-level conflict (Mean = 1.66, *SD* = 0.60, $\alpha = .83$).

Interparental conflict. Interparental conflict was measured by the Conflict and Problem Solving Scale (Kerig, 1996). The original scale is 27 items; however, this was shortened by selecting 21 items from the four subscales that had the highest factor loadings and lowest cross-loadings that were shared by mothers and fathers. The reliability of the original scale is good (Cronbach's alpha: wife- .86, .81, .85, and .83; husband- .86, .85, .84, and .87). The participating caregiver reported on both their strategies and their partners' strategies that were used during interparental conflict at the baseline assessment. Following the stem of "How often do you/your partner use the following strategies", example items were: (1) "Try to reason with each other" (reverse coded), (2) "Argue in front of the child(ren)", (3) "Raise voice, yell, shout", and (4) "Throw something at other". Items were rated on a 4-point Likert-type scale from *Never* (1) to *Often* (4). Each item was averaged between both parents to create 21 averaged items, and then these 21 items were averaged to create a single score to represent composite interparental conflict, so that higher values reflected more negative strategies were used during interparental conflict (Mean = 1.55, *SD* = 0.32, $\alpha = .84$).

Parent-adolescent conflict. Parent reported on 4 items of negative aspects in Parent-Child Relationship Scale (PCR, Hetherington & Clingempeel, 1992) at the baseline assessment.

Four items were: (1) “How much do you yell at your child after you’ve had a bad day?” (2) “How much does your child yell at you after he or she had had a bad day?” (3) “How much does your child nag you about what you are doing wrong?” and (4) “How much does your child criticize you?” Items were rated on a 5-point Likert-type scale from *Not at All* (1) to *Extremely* (5). Items were averaged to create a single score so that higher values reflected more parent-adolescent conflict (Mean = 1.85, *SD* = 0.65, $\alpha = .74$).

Adolescent Adjustment Variables

Depression. Adolescents reported on 10 items from the depression subscale of the Revised Child Anxiety and Depression Scale-Short Version (RCADS; Chorpita, Moffitt, & Gray, 2005) at the 6-month follow up. Example items are: Please mark the word that shows how often each of these things happen to you (1) “I feel sad or empty”; and (2) “I have trouble sleeping”. Items were rated on a 4-point Likert-type scale from *never* (1) to *always* (4). Items were averaged to create a single score so that higher values reflected more depressive symptoms (Mean = 1.51, *SD* = 0.61, $\alpha = .93$).

Anxiety. Adolescents reported on 7 items from the Generalized Anxiety Disorder 7-item Scale (GAD-7, Spitzer, Kroenke, Williams, & Löwe, 2006) at the 6-month follow up. Example items were: Over the last two weeks, how often have you been bothered by the following problems? (1) “Feeling nervous, anxious or on edge”; and (2) “Trouble relaxing”. Items were rated on a 4-point Likert-type scale from *Not at all* (1) to *Nearly Everyday* (4). Items were averaged to create a single score so that higher values reflected more anxious symptoms (Mean = 1.50, *SD* = 0.68, $\alpha = .95$).

Substance use. Seven types of substance use initiation—cigarette, cigar, chewing tobacco, snuff, alcohol, drunkenness, and marijuana—were reported by adolescents at the 6-

month follow up. The questions used were as follows: (1) “Have you ever smoked a cigarette?”; (2) “Have you ever smoked a cigar?”; (3) “Have you ever used chewing tobacco?”; (4) “Have you ever smoked, or used snuff?”; (5) “Have you ever had a drink of alcohol?”; (6) “Have you ever been drunk from drinking alcohol?”; (7) “Have you ever smoked marijuana (grass, pot) or hashish (hash)?”. Questions were answered in *yes* (1) or *no* (0) format (Spoth, Redmond, & Shin, 2001).

Positive affect. Adolescents reported on 4 items of positive affect from the Profile of Mood States-Adolescents (POMS-A, Terry, Lane, & Fogarty, 2003) at the 6-month follow up. Items were: (1) “How much of the time in the last month did you feel happy?” (2) “How much of the time in the last month did you feel content?” (3) “How much of the time in the last month did you feel proud?” And (4) “How much of the time in the last month did you feel calm?” Items were rated on a 5-point Likert-type scale from *None of the Time* (1) to *All of the time* (5). Items were averaged to create a single score so that higher values reflected more positive affect (Mean = 4.00, *SD* = 0.84, $\alpha = .90$).

Life satisfaction. Adolescents reported on 5 items from Mental Health Inventory-38 (Viet & Ware, 1983) and one added item from the Satisfaction with Life Scale (Diener, Emmons, Larsen, & Griffin, 1985) at the 6-month follow up. The six items were: During the past month, how much of the time (1) “Have you generally enjoyed the things you do”; (2) “Have you felt that the future looks hopeful and promising”; (3) “Has your daily life been full of things that were interesting to you”; (4) “Did you feel relaxed”; (5) “Were you a happy person”; and (6) “Were you satisfied with your life”. Items were rated on a 6-point Likert-type scale from *None of the Time* (1) to *All of the Time* (6). Items were averaged to create a single score so that higher values reflected a higher level of life satisfaction (Mean = 4.78, *SD* = 1.11, $\alpha = .95$).

Purpose in life. Adolescents reported on 5 items from the Questionnaire for Eudemonic Well-Being (QEWB; Schutte, Wissing, & Khumalo, 2013) at the 6-month follow up. Following the stem of “How much do you agree or disagree with each of the following statement?” example items were: “I can say that I have found my purpose in life”, “I believe I have discovered who I really am”, and “I believe I know what I was meant to do in life”. Items were rated on a 5-point Likert-type scale from *Strongly Disagree* (1) to *Strongly Agree* (5). Items were averaged to create a single score so that higher values reflected a better sense of purpose in life (Mean = 3.65, *SD* = .81, α = .80).

Analytic Approach

Data Preparation

The repeated measures data of 21 daily adolescent-report MF, MA, and FA closeness were prepared in a long data format with one row of data for each family, each day and each column named as family ID, day, MF closeness, MA closeness, and FA closeness. Because multivariate normality is one of the fundamental assumptions of LPA, the plausibility of this assumption can be strengthened by transforming indicators that are not normally distributed prior to analysis. In the daily data, the three indicators (i.e. reversed coded MF, MA, and FA closeness) were highly positively skewed (skewness = 1.41, 1.73, and 1.17, respectively). Cube root transformation—a transformation suggested for data still skewed after square root transformation (DeCoster, 2001; Wilson & Hilferty, 1931)—was used to normalize indicators. The three transformed indicators (skewness = 0.11, 0.20, and -0.08, respectively) were normally distributed and were used for analysis. Higher values of the transformed indicators represented lower levels of closeness in the respective dyads on a given day. All missing data were coded as

-999 and all latent profile models were estimated using full information maximum likelihood estimation (Widaman, 2006).

For Aim 1

Latent profile analysis (LPA) was used to identify and describe MFA triadic relationship structures (without considering the dynamic aspect). The analysis included the transformed indicators of closeness in MF, MA, and FA dyads in the data pooled across all families and all days. Each indicator's variance was constrained to be equal across profiles. Since the data was in a nested structure (i.e., Level-1: each family has data up to 21 days, and Level-2: the sample comprises 145 families), a combination of the COMPLEX and CLUSTER commands in Mplus 8 was used to adjust the standard error in the model estimation process (Muthén & Muthén, 1988-2017). Identification of models with 1-6 profiles were checked with 500 initial and 100 final stage starts, and models with 7-10 profiles were checked with 1000 initial and 500 final stage starts. Model selection was based on the consideration of (1) statistical fit criteria, including the Akaike information criterion (AIC; Akaike, 1974), Bayesian information criterion (BIC; Schwarz, 1978), sample-size adjusted BIC (a-BIC; Sclove, 1987), and entropy (Celeux & Soromenho, 1996) and (2) theoretical interpretability. More optimal model fit was indicated by lower AIC, BIC, and a-BIC. Higher classification utility was indicated by higher entropy. The selected optimal model solution should be well-identified and each profile should be theoretically meaningful.

For Aim 2

Building on the optimal number of profiles solution from Aim 1, Aim 2 was to estimate a two-level random effects LPA using a non-parametric approach (Henry & Muthén, 2010). This was accomplished by using a combination of the TWOLEVEL and CLUSTER commands in

Mplus, and by specifying Level-1 and Level-2 models using %within%, %between%, and %overall% definitions, as well as measurement models (Muthén & Muthén, 1988-2017). In the multilevel LPA, the measurement models of Level-1 profiles were specified to be identical to those in the optimal model in Aim 1. The example syntax for Aim 1 and Aim 2 were listed in Appendix B. Level-2 model identification and selection were conducted similarly to Aim 1. Identification of models with 1-7 Level-2 classes (with a fixed number of Level-1 profiles from Aim 1) were checked with 1000 initial and final stage starts. Model with more than 7 Level-2 classes were not considered due to difficulty replicating the maximum likelihood solution for the 7-class model; thus only models with 1-6 classes were candidates for model selection. Model selection was based on the same statistical fit criteria (i.e., AIC, BIC, a-BIC, and entropy) and theoretical interpretability as in Aim 1. The selected optimal model should be well-identified, have good model fit indices, and be interpretable in a theoretically meaningful way. In this model, the proportion of each Level-1 profile within each Level-2 class is used to name the Level-2 classes. All models were estimated using Mplus version 8 (Muthén & Muthén, 1998-2017).

For Aim 3

As a product of the optimal model selection in Aim 2, a vector of posterior probabilities is produced for each family in the sample. These posterior probabilities are the probabilities that a family belongs to each Level-2 class. Modal assignment was used to assign each family to the class that it was most likely to belong to, thereby creating an observed variable that can be used in subsequent analyses. Assigned class membership was then used as a grouping variable to examine differences in means (or proportion for categorical variables) of demographic variables (i.e., mother's and father's education and age, adolescent's gender and age, relationship statuses,

and family income) and family conflict variables (i.e. family-level conflict, interparental conflict, and parent-adolescent conflict) between families with different dynamics (i.e., Level-2 classes). One-Way ANOVA in SPSS was used for overall tests to determine whether there were significant differences across all identified dynamics. The Tukey's HSD (for equal variances; Tukey, 1949) and the Dunnett T3 (for unequal variances; Dunnett, 1980) post-hoc pairwise difference tests were used to examine whether there were significant differences between any two dynamics (Lane & Salkin, 2010; Shingala & Rajyaguru, 2015).

For Aim 4

Similar to Aim 3, assigned class memberships based on the optimal model from Aim 2 were used to determine whether different MFA triadic dynamics had different associations with adolescent depression, anxiety, and substance use, as well as adolescent positive affect, life satisfaction, and a sense of purpose in life at the 6-month follow-up assessment. One-Way ANOVA in SPSS was used for overall tests to determine whether there were significant differences in adolescent adjustment outcomes across all MFA dynamics. The Tukey's HSD (for equal variances) and the Dunnett T3 (for unequal variances) post-hoc pairwise difference tests were used to examine whether there were significant differences on each indicators of adolescent adjustment between any two MFA dynamics.

CHAPTER 3: RESULTS

Aim 1: Identifying Profiles of MFA Triadic Relationship Structures

Model fit information and model selection criteria of Level-1 models are shown in Table 2. Models with 1 to 10 profiles were compared. The AIC, BIC, a-BIC were not minimized but their relative reductions decreased around the 6- to 8- profile models. Entropy ranged from 0.91 (2- and 3- profile models) to 0.96 (10-profile model). Given the limited information provided by the fit indices, we considered models with 6- to 8- profiles.

All profiles from the 6-profile model were theoretically interpretable, qualitatively unique, and large enough to warrant generalization. The same 6 profiles also appeared in the 7- and 8- profile models. When comparing the 6-profile model to the 7-profile model, the additional profile that emerged was not theoretically distinct from another previously identified profile. That is, the 6-profile model split into two similar and theoretically identical profiles in the 7-profile model. This additional profile was redundant and unnecessary, and models with more than 6 profiles were considered to be over-extracted and were not candidates for model selection. Thus, the 6-profile model was selected as the optimal model for interpretation and further analysis because it represented a good balance of theoretical interpretability and statistical fit.

Parameter estimates for the 6-profile model at Level-1 (i.e., day-level) are shown in Table 3. The top panel results for the transformed indicators' item-response means conditional on profile membership, including significance tests indicating whether these means were significantly different from the overall sample means; the bottom panel presents back-transformed results in the indicators' original metrics to facilitate interpretation of the profiles. Profile 1 (33% of the days across all families) was characterized by high levels of closeness in MF, MA, and FA dyads; this profile was labeled Cohesive (MFA triadic relationship structure).

Profile 2 (9%) was characterized by average to high levels of MF and MA closeness and low levels of FA closeness; this profile was labeled Mother-Centered. Profile 3 (4%) was characterized by high levels of closeness in MA and FA dyads and low levels of MF closeness; this profile was labeled Adolescent-Centered. Profile 4 (3%) was characterized by high levels of MA closeness and low levels of MF and FA closeness; this profile was labeled MA Coalition. Profile 5 (23%) was characterized by low levels of closeness in all three dyads; this profile was labeled Disengaged. Profile 6 (28%) was characterized by average to low levels of closeness in all three dyads; this profile was labeled Average.

Aim 2: Identifying Classes of MFA Triadic Dynamics

Model fit information and model selection criteria of Level-2 models are shown in Table 4. Recall that within the Level-2 models for dynamics, the Level-1 model for structure was fixed to have the 6 profiles identified in Aim 1. Similar to the models in Aim 1, the AIC, BIC, a-BIC were not minimized but their relative reductions decreased around the 4- to 6- profile models. Entropy ranged from 0.95 (Level 2 1-class model) to 0.98 (Level-2 4-class model and Level-2 5-class model). Similar to Aim 1, the limited information provided by these indices is insufficient for selecting the optimal model for interpretation, but did narrow the range of models under consideration at Level-2 4- to 6- class models.

All profiles from the Level-2 4-class model appeared in the Level-2 5-class model and Level-2 6-class model. The additional profiles that emerged in the Level-2 5-class model and Level-2 6-class model were qualitatively distinct and theoretically meaningful. However, due to model complexity, there was a non-positive definite matrix appearing and standard errors were unable to be calculated for the Level-2 6-class model. Therefore, the more parsimonious Level-2 5-class model was selected as the optimal model for interpretation and further analysis.

Table 5 shows the prevalences and sizes (n_{day} s and n_{family} s) of the 5 identified Level-2 classes, as well as 6 Level-1 structures within each Level-2 class in the selected multilevel latent profile model. Although sizes for both levels can be reported based on posterior probabilities or modal latent class assignment, table 5 is based on the modal latent class assignment for the interpretation purpose. At Level-2, Class 1 (35% of the families) was characterized by families who exhibited a Cohesive structure most days throughout the study; 85% of days among these families had a Cohesive structure and 89% of all days with a Cohesive structure stemmed from these families. This class was labeled Stable Cohesive. Class 2 (20%) was characterized by families who exhibited a Disengaged structure most days throughout the study; 91% of days among these families had a Disengaged structure and 78% of all days with a Disengaged structure stemmed from these families. This class was labeled Stable Disengaged. Class 3 (4%) was characterized by families who exhibited MA Coalition structure most days throughout the study; 67% of days among these families had a MA Coalition structure and 81% of all days with a MA Coalition structure stemmed from these families. This class was labeled Stable MA Coalition. Class 4 (24%) was characterized by families who exhibited Average structure most days throughout the study; 83% of days among these families had an Average structure and 74% of all days with an Average structure stemmed from these families. This class was labeled Stable Average. Class 5 (17%) was characterized by families who exhibited multiple different relationship structures throughout the study: 19% of their days were Cohesive, 34% Mother-Centered, 7% Adolescent-Centered, 3% MA Coalition, 9% Disengaged, and 28% Average. Thus Class 5 was labeled Variable. Figure 2 shows one example family for each dynamic: each row illustrates the pattern of a family's MFA triadic relationship structures across the 21 days of the study.

Aim 3: Characteristics of Families with Different MFA Triadic Dynamics

Descriptive statistics for family demographic and family conflict characteristics are presented in Table 6. One-way ANOVAs were conducted for all family demographic and family conflict characteristics to determine whether there were significant difference between families that belonged to different MFA triadic relationship dynamics. Overall tests, post-hoc pairwise comparisons, and effect sizes are presented in Table 7-10. For the post-hoc comparisons, Tukey's HSD test is suitable when there are equal variances in the outcome across groups (Tukey, 1949) and the Dunnett T3 test is suitable when variance are unequal (Dunnett, 1980). Both are presented here for completeness. When either post-hoc test was significant, Cohen's d and effect size r for that pair of groups is presented. When no post-hoc test was significant but the overall test was significant, the pairs of groups with Cohen's d and effect size r above moderate magnitudes ($d \geq .50$, $r \geq .30$; Cohen, 1988) are presented. Both significant tests and effect sizes were considered when interpreting trends in the results.

Differences in Demographic Characteristics Among Five MFA Dynamics

Among all tested demographic variables, there were overall significant differences across the five MFA dynamics on parent relationship status ($F(4,140) = 2.787$, $p = .029$) and mother's education level ($F(4,139) = 3.298$, $p = .013$), but not on family income, father's education level, adolescent's gender, mother's age, father's age, nor adolescent's age. Post-hoc pairwise comparison using the Tukey's HSD test and the Dunnett T3 were conducted on parent relationship status and mother's education level.

For parent relationship status, both post-hoc tests indicated that there were no significant differences between any pair of dynamics. Despite the effects being not-significant, differences between families in the Stable Cohesive and Stable MA Coalition dynamics (Cohen's $d = 0.74$,

effect size $r = 0.35$) and between families in the Stable Disengaged and Stable MA Coalition dynamics (Cohen's $d = 0.77$, effect size $r = 0.36$) were moderate to large. Differences between those in the Stable Cohesive and Variable dynamics (Cohen's $d = 0.50$, effect size $r = 0.24$), between those in the Stable Disengaged and Variable dynamics (Cohen's $d = 0.53$, effect size $r = 0.26$), and between those in the Stable Average and Stable MA Coalition dynamics (Cohen's $d = 0.57$, effect size $r = 0.28$) were moderate. All other pairwise effects were small or negligible.

For mother's education level, the Tukey's HSD test indicated that families with a Stable Cohesive dynamic ($M = 7.47$, $SD = 1.44$) or a Stable Average dynamic ($M = 7.63$, $SD = 1.35$) had significantly higher levels of mother education compared with families with a Variable dynamic ($M = 6.44$, $SD = 1.45$); the more conservative Dunnett T3 test indicated that only families with a Stable Average dynamic ($M = 7.63$, $SD = 1.35$) had significantly higher levels of mother education. In terms of effect sizes, differences between families in the Stable Cohesive and Variable dynamics ($d = 0.71$, $r = 0.34$) and between families in the Stable Average and Variable dynamics ($d = 0.85$, $r = 0.39$) were moderate to large.

Overall, parents in a Stable MA Coalition dynamic (moderate to large) and a Variable dynamic (small to moderate) were less likely to be married than parents in a Stable Cohesive dynamic, a Stable Average dynamic, and a Stable Disengaged dynamic. And families with a Stable Cohesive dynamic and a Stable Average dynamic tend to have higher levels of mother education than families with a Variable dynamic.

Differences in Family Conflict Characteristics Among Five MFA Dynamics

For family conflict variables, there were overall significant differences across the five MFA dynamics on family-level conflict ($F(4,139) = 5.106$, $p = .001$), interparental conflict ($F(4,140) = 9.016$, $p < .001$), as well as parent-adolescent conflict ($F(4,140) = 3.604$, $p = .008$).

Post-hoc pairwise comparisons using the Tukey's HSD test and the Dunnett T3 were conducted on all three family conflict variables.

For family-level conflict, the Tukey's HSD test indicated that families with a Stable Disengaged dynamic ($M = 1.94, SD = 0.74$) had significantly higher level of family-level conflict than families with a Stable Cohesive dynamic ($M = 1.51, SD = 0.44$); families with a Stable MA Coalition dynamic ($M = 2.33, SD = 0.99$) had significantly higher level of family-level conflict than families with a Stable Cohesive dynamic, a Variable dynamic ($M = 1.52, SD = 0.53$), and a Stable Average dynamic ($M = 1.63, SD = 0.50$). The more conservative Dunnett T3 test indicated that the difference of family-level conflict between any pair of families in five dynamic dynamics were not significant. In terms of effect sizes, differences between families in the Stable Disengaged and Stable Cohesive dynamics ($d = 0.71, r = 0.33$), between those in the Stable MA Coalition and Stable Cohesive dynamics ($d = 1.07, r = 0.47$), between those in the Stable MA Coalition and Variable dynamics ($d = 1.02, r = 0.45$), and between those in the Stable MA Coalition and Stable Average dynamics ($d = 0.89, r = 0.41$) were moderate to large.

For interparental conflict, Tukey's HSD test indicated that families with a Stable Disengaged dynamic ($M = 1.67, SD = 0.27$) had significantly higher levels of interparental conflict than families with a Stable Cohesive dynamic ($M = 1.45, SD = 0.31$) and a Variable dynamic ($M = 1.45, SD = 0.27$); families with a Stable MA Coalition dynamic ($M = 2.12, SD = 0.59$) had significantly higher levels of interparental conflict than families with other four dynamics. The Dunnett T3 test showed similar but more conservative results: only families with a Stable Disengaged dynamic had significantly higher levels of interparental conflict than families with a Stable Cohesive dynamic and a Variable dynamic. In terms of effect sizes, differences between families in the Stable Disengaged and Stable Cohesive dynamics ($d = 0.76, r$

= 0.35), between those in the Stable Disengaged and Variable dynamics ($d = 0.81, r = 0.38$), between those in the Stable MA Coalition and other four dynamics were all moderate to large.

For parent-adolescent conflict, both post-hoc tests indicated that families in the Stable Average dynamic ($M = 2.08, SD = 0.77$) had significantly higher levels of parent-adolescent conflict than families in the Stable Cohesive dynamic ($M = 1.61, SD = 0.50$). The effect size of differences between families with the Stable Average and Stable Cohesive dynamics was moderate to large ($d = 0.72, r = 0.34$).

Overall, families with a Stable Cohesive dynamic tend to exhibit the lowest level of family-level conflict, interparental conflict, and parent-adolescent conflict. Families with a Stable Disengaged dynamic and a Stable MA Coalition dynamic tend to exhibit higher levels of family-level conflict and interparental conflict than families in the rest three dynamics. Families with a Stable Average dynamic tend to have higher levels of parent-adolescent conflict than families with a Stable Cohesive dynamic.

Aim 4: Associations Between MFA Triadic Dynamics and Adolescent Adjustment

Associations between five MFA triadic relationship dynamics and six indicators of adolescent adjustment 6 months later were compared in one-way ANOVAs (see Table 11). Among all negative indicators, there were significant differences between adolescents from five dynamics on depression ($F(4,127) = 8.643, p < .001$) and anxiety ($F(4,127) = 3.905, p = .005$), but not on any types of substance use (including cigarette, cigar, tobacco, snuff, alcohol, drunkenness, and marijuana). Post-hoc pairwise comparisons using the Tukey's HSD test and the Dunnett T3 were conducted on adolescent depression and anxiety. When either post-hoc test was significant, the Cohen's d and effect size r for that pair of groups is presented. The complete

information for effect sizes in pairwise comparison is listed in Table 12. Both significant tests and effect sizes were considered when interpreting trends in the results.

Associations with Negative Indicators of Adolescent Adjustment

For adolescent depression, the Tukey's HSD test indicated that adolescents from a Stable Disengaged dynamic ($M = 1.96, SD = 0.75$) and a Stable MA Coalition dynamic ($M = 2.20, SD = 0.25$) had significantly higher levels of depression than adolescents from a Stable Cohesive dynamic ($M = 1.26, SD = 0.42$), a Variable dynamic ($M = 1.44, SD = 0.71$), and a Stable Average dynamic ($M = 1.45, SD = 0.44$). The Dunnett T3 test showed a similar result: adolescent from a Stable Disengaged dynamic had significantly high levels of depression than adolescents from Stable Cohesive and Stable Average dynamics; adolescents from a Stable MA Coalition dynamic had significantly higher levels of depression than adolescents from Stable Cohesive, Variable, and Stable Average dynamics. In terms of effect sizes, differences between adolescents from the Stable Disengaged and Stable Cohesive dynamics ($d = 1.15, r = 0.50$), between those from the Stable Disengaged and Variable dynamics ($d = 0.71, r = 0.34$), between those from the Stable Disengaged and Stable Average dynamics ($d = 0.83, r = 0.38$), between those from the Stable MA Coalition and Stable Cohesive dynamics ($d = 2.72, r = 0.81$), between those from the Stable MA Coalition and Variable dynamics ($d = 1.43, r = 0.58$), and between those from the Stable MA Coalition and Stable Average dynamics ($d = 2.10, r = 0.72$) were all moderate to large.

For adolescent anxiety, both post-hoc tests indicated that adolescents from a Stable Disengaged dynamic ($M = 1.93, SD = 0.78$) had significantly higher levels of depression than adolescents from a Stable Cohesive dynamic ($M = 1.34, SD = 0.68$) and a Stable Average dynamic ($M = 1.37, SD = 0.44$). The effect sizes of differences between adolescents from the Stable Disengaged and Stable Cohesive dynamics ($d = 0.81, r = 0.37$), and between adolescents

from the Stable Disengaged and Stable Average dynamics ($d = 0.88$, $r = 0.40$) were moderate to large.

Overall, adolescents from a Stable Disengaged dynamic and a Stable MA Coalition dynamic tend to have higher levels of depression than adolescents from the rest three dynamics. Adolescents from a Stable Disengaged dynamic tend to have higher levels of depression than adolescents from the rest four dynamics.

Associations with Positive Indicators of Adolescent Adjustment

In terms of positive adjustment outcomes, there were significant differences between adolescents from five dynamics on positive affect ($F(4,128) = 8.685$, $p < .001$), life satisfaction ($F(4,128) = 9.732$, $p < .001$), as well as a sense of purpose ($F(4,127) = 5.215$, $p = .001$). Thus, post-hoc pairwise comparisons using the Tukey's HSD test and the Dunnett T3 were conducted on all three positive adjustment variables.

For adolescent positive affect, the Tukey's HSD test indicated that adolescents from a Stable Cohesive dynamic ($M = 4.39$, $SD = 0.74$) had significantly higher levels of positive affect than adolescents from a Stable Disengaged dynamic ($M = 3.48$, $SD = 0.83$), a Stable MA Coalition dynamic ($M = 2.95$, $SD = 1.14$), and a Stable Average dynamic ($M = 3.88$, $SD = 0.63$); adolescents from a Variable dynamic ($M = 4.11$, $SD = 0.81$) had significantly higher levels of positive affect than adolescents from a Stable Disengaged dynamic and a Stable MA Coalition dynamic. The Dunnett T3 test showed more conservative results: adolescent from a Stable Cohesive dynamic had significantly high levels of positive affect than adolescents from a Stable Disengaged dynamic and a Stable Average dynamic. In terms of effect sizes, differences between adolescents from the Stable Cohesive and Stable Disengaged dynamics ($d = 1.16$, $r = 0.50$), between those from the Stable Cohesive and Stable MA Coalition dynamics ($d = 1.50$, $r =$

0.60), between those from the Stable Cohesive and Stable Average dynamics ($d = 0.74, r = 0.35$), between those from the Variable and Stable Disengaged dynamics ($d = 0.77, r = 0.36$), and between those from the Variable and Stable MA Coalition dynamic ($d = 1.17, r = 0.51$) were moderate to large.

For adolescent life satisfaction, the Tukey's HSD test indicated that adolescents from a Stable Disengaged dynamic ($M = 3.84, SD = 1.17$) had significantly lower levels of life satisfaction than adolescents from a Stable Cohesive dynamic ($M = 5.26, SD = 0.96$), a Variable dynamic ($M = 4.91, SD = 1.19$), and a Stable Average dynamic ($M = 4.84, SD = 0.69$); adolescents from a Stable MA Coalition dynamic ($M = 3.97, SD = 0.42$) had significantly lower levels of life satisfaction than adolescents from a Stable Cohesive dynamic. The Dunnett T3 test showed similar results: adolescents from a Stable Disengaged dynamic had significantly lower levels of life satisfaction than adolescents from a Stable Cohesive dynamic, a Variable dynamic, and a Stable Average dynamic; adolescents from a Stable MA Coalition dynamic had significantly lower levels of life satisfaction than adolescents from a Stable Cohesive dynamic and a Stable Average dynamic. Regarding effect sizes, differences between adolescents from the Stable Cohesive and Stable Disengaged dynamics ($d = 1.33, r = 0.55$), between those from the Variable and Stable Disengaged dynamics ($d = 0.91, r = 0.41$), between those from the Stable Average and Stable Disengaged dynamics ($d = 1.04, r = 0.46$), between those from the Stable Cohesive and Stable MA Coalition dynamics ($d = 1.74, r = 0.66$), and between those from the Stable Average and Stable MA Coalition dynamics ($d = 1.52, r = 0.61$) were all moderate to large.

For adolescent sense of purpose, the Tukey's HSD test indicated that adolescents from a Stable Disengaged dynamic ($M = 3.20, SD = 0.96$) had significantly lower levels of having a

purpose in life than adolescents from a Stable Cohesive dynamic ($M = 3.94$, $SD = 0.73$) and a Variable dynamic ($M = 3.83$, $SD = 0.61$). Similar but more conservative results were showed in the Dunnett T3 test: adolescents from a Stable Disengaged dynamic had significantly lower levels of having a purpose in life than adolescents from a Stable Cohesive dynamic. The effect sizes of differences between adolescents from in the Stable Cohesive and Stable Disengaged dynamics ($d = 0.87$, $r = 0.40$), and between those from the Variable and Stable Disengaged dynamics ($d = 0.78$, $r = 0.36$) were moderate to large.

Overall, adolescents from a Stable Cohesive dynamic and a Variable dynamic tend to have higher levels of positive affect than adolescents from a Stable Disengaged dynamic and a Stable MA Coalition dynamic. Adolescents from a Stable Cohesive dynamic and a Stable Average dynamic tend to have higher levels of life satisfaction than adolescents from a Stable Disengaged dynamic and a Stable MA Coalition dynamic. Adolescents from a Stable Cohesive dynamic and a Variable dynamic tend to have higher levels of having a purpose in life than adolescents from a Stable Disengaged dynamic.

Table 2.
Model Fit Information and Selection Criteria for Latent Profile Models at Level-1

No. of Profiles	Log-Likelihood	No. of parameters estimated	AIC	BIC	a-BIC	Entropy
1	-9129.44	6	18270.88	18306.41	18287.34	--
2	-6602.78	10	13225.57	13284.78	13253.00	0.94
3	-5925.60	14	11879.20	11962.10	11917.62	0.91
4	-5469.44	18	10974.89	11081.48	11024.28	0.91
5	-5006.85	22	10057.69	10187.97	10118.07	0.95
6	-4711.85	26	9475.69	9629.65	9547.04	0.95
7	-4503.60	30	9067.20	9244.85	9149.53	0.95
8	-4319.67	34	8707.34	8908.67	8800.64	0.94
9	-4097.91	38	8271.82	8496.84	8376.10	0.95
10	-3912.11	42	7908.22	8156.93	8023.48	0.96

Notes. AIC = Akaike information criterion; BIC = Bayesian information criterion; a-BIC = sample size adjusted BIC. Dashes indicate criterion was not applicable; bold line indicates selected model.

Table 3.
Parameter Estimates for the Six-Profile Model at Level-1

		P1	P2	P3	P4	P5	P6
Latent Profile Size (Membership Probability)		Cohesive n=919 (0.33)	Mother- Centered n=235 (0.09)	Adolescent- Centered n=116 (0.04)	MA Coalition n=85 (0.03)	Disengaged n=644 (0.23)	Average n=757 (0.28)
Transformed Indicators	Overall Sample Means (<i>SDs</i>)	Item-Response Means					
MF Closeness	0.81 (0.73)	0.03 ^b	0.05 ^b	1.28 ^a	1.89 ^a	1.66 ^a	1.08 ^a
MA Closeness	0.74 (0.70)	0.09 ^b	0.69	0.24 ^b	0.05 ^b	1.58 ^a	1.01 ^a
FA Closeness	0.94 (0.77)	0.05 ^b	1.32 ^a	0.05 ^b	1.88 ^a	1.78 ^a	1.22 ^a
Raw Indicators	Overall Sample Medians / Means	Item-Response Means					
MF Closeness	9.20 / 8.15	10.00	10.00	7.88	3.23	5.44	8.73
MA Closeness	9.45 / 8.41	10.00	9.68	9.99	10.00	6.09	8.98
FA Closeness	8.55 / 7.54	10.00	7.71	10.00	3.40	4.32	8.17

Notes. P1 ~ P6 = Profile 1 ~ Profile 6 (at Level-1).

Given the raw data were highly skewed, both medians and means for the whole sample were listed as reference in the raw data.

The higher values in transformed MF/MA/FA closeness indicated lower levels of closeness in that dyad; the higher values in raw MF/MA/FA closeness indicated higher levels of closeness in that dyad.

^a Value is statistically significantly higher than the overall item mean at $p < .05$.

^b Value is statistically significantly lower than the overall item mean at $p < .05$.

Table 4.

Model Fit Information and Selection Criteria for Multilevel Latent Profile Models

No. of Classes	Log-Likelihood	No. of parameters estimated	AIC	BIC	a-BIC	Entropy
1	-4711.85	8	9439.70	9487.07	9461.66	0.95
2	-3700.82	14	7429.65	7512.55	7468.07	0.97
3	-3241.50	20	6523.00	6641.43	6577.88	0.97
4	-3089.04	26	6230.07	6384.03	6301.42	0.98
5	-2974.48	32	6012.97	6202.46	6100.78	0.98
6	-2900.12	38	5876.25	6101.27	5980.53	0.97

Notes. AIC = Akaike information criterion; BIC = Bayesian information criterion; a-BIC = sample size adjusted BIC. Bold line indicates selected model.

Table 5.
Parameter Estimates for the Level-2 5-Class Level-1 6-Profile Model

		C1	C2	C3	C4	C5
		Stable Cohesive	Stable Disengaged	Stable MA Coalition	Stable Average	Variable
Prevalences and <i>ns</i> for Level-2 Latent Classes		0.35 (<i>n_{family}</i> =50; <i>n_{day}</i> =955)	0.20 (<i>n_{family}</i> =29; <i>n_{day}</i> =532)	0.04 (<i>n_{family}</i> =6; <i>n_{day}</i> =118)	0.24 (<i>n_{family}</i> =35; <i>n_{day}</i> =671)	0.17 (<i>n_{family}</i> =25; <i>n_{day}</i> =480)
Level-1 Latent Profiles	Sample Prevalence (<i>n_{day}</i>)	Prevalence for each Level-1 profile in each Level-2 class				
P1: Cohesive	.33 (916)	.85 (811)	.00 (2)	.00 (0)	.01 (10)	.19 (93)
P2: M-Centered	.09 (245)	.04 (38)	.02 (10)	.03 (4)	.05 (32)	.34 (161)
P3: A-Centered	.04 (117)	.06 (55)	.00 (2)	.08 (9)	.03 (17)	.07 (34)
P4: MA Coalition	.03 (97)	.00 (0)	.01 (5)	.67 (79)	.00 (0)	.03 (13)
P5: Disengaged	.23 (623)	.02 (17)	.91 (484)	.21 (25)	.08 (53)	.09 (44)
P6: Average	.28 (758)	.04 (34)	.05 (29)	.01 (1)	.83 (559)	.28 (135)

Notes.

C1 ~ C5 = Class 1 ~ Class 5 (at Level-2).

P1 ~ P6 = Profile 1 ~ Profile 6 (at Level-1).

M-Centered = Mother-Centered structure, A-Centered = Adolescent-Centered structure.

The bold prevalence (*n_{day}*) is the highest proportion (larger than 50%) of Level-1 profile in each Level-2 class.

The item-response means for each Level-1 profile are identical to the values in Level-1 6-Profile Model (presented in Table 2). To save space, the redundant information is not presented in this table.

Table 6.
Descriptive Statistics for Families' Demographics and Family Conflict Characteristics

Category		Variable	Mean (SD) / Frequency	
Demographics	Family income	less than \$10,000	2	
		\$10,000 to 19,999	2	
		\$20,000 to 29,999	12	
		\$30,000 to 39,999	14	
		\$40,000 to 49,999	7	
		\$50,000 to 59,999	8	
		\$60,000 to 69,999	13	
		\$70,000 to 79,999	15	
		\$80,000 to 89,999	14	
		\$90,000 to 99,999	11	
		\$100,000 to 124,999	23	
		\$125,000 or more	24	
		Relationship status		91% married
		Mother's education	No formal schooling	1
			7 th grade or less	0
			Junior High completed	0
			Partial High School	3
			High school graduate / GED certificate	22
			Partial college (at least one year) or specialized training	25
			Junior college / Associates degree (2 years)	18
			Standard college or University graduation (4 years)	42
			Graduate professional training, graduate degree.	33
		Father's education	No formal schooling	0
			7 th grade or less	0
			Junior High completed	0
			Partial High School	10
			High school graduate / GED certificate	34
			Partial college (at least one year) or specialized training	27
			Junior college / Associates degree (2 years)	14
	Standard college or University graduation (4 years)		28	
	Graduate professional training, graduate degree.	29		
	Adolescent's gender		61.4% female	
	Mother's age		43.28 (6.94)	
	Father's age		45.12 (7.84)	
	Adolescent's age		14.76 (0.73)	
Family Conflict Characteristics	Family-level conflict		1.66 (0.60)	
	Interparental conflict		1.55 (0.32)	
	Parent-adolescent conflict		1.85 (0.65)	

Table 7.
Demographics Comparison among Five MFA Triadic Dynamics

	Overall Mean (SD)	1 Stable Cohesive (n=50)	2 Stable Disengaged (n=29)	3 Stable MA Coalition (n=6)	4 Stable Average (n=35)	5 Variable (n=25)	Overall Test F (p-value)	Tukey's HSD Post-hoc	Dunnett T3 Post-hoc
Family income	8.06 (3.17)	7.74	8.24	6.50	9.06	7.48	1.613 (p=.174, ns)	—	—
Relationship status [†]	0.91 (0.29)	0.96	0.97	0.67	0.91	0.80	2.787 (p=.029)	ns	ns
Mother's education	7.17 (1.56)	7.47 ⁵	6.83	6.67	7.63 ⁵	6.44 ^{1,4}	3.298 (p=.013)	1,4 > 5	4 > 5
Father's education	6.73 (1.66)	6.54	6.69	6.40	7.14	6.60	0.787 (p=.535, ns)	—	—
Adolescent's gender [†]	0.61 (0.49)	0.56	0.55	0.67	0.60	0.80	1.208 (p=.310, ns)	—	—
Mother's age	43.28 (6.94)	42.04	43.24	45.50	45.77	41.76	2.036 (p=.093, ns)	—	—
Father's age	45.12 (7.84)	43.48	46.31	47.20	47.51	43.24	2.037 (p=.093, ns)	—	—
Adolescent's age	14.76 (0.73)	14.84	14.83	14.67	14.63	14.72	0.533 (p=.711, ns)	—	—

Note. "—"=not applicable, "ns"=not significant.

[†]variances were significant different across groups in Levene's Homogeneity of Variance Test.

On [†]line, ¹⁻⁵were Dunnett T3 results; otherwise, ¹⁻⁵were Tukey HSD results.

¹ Value is significantly different from profile 1 at $p < .05$.

⁴ Value is significantly different from profile 4 at $p < .05$.

⁵ Value is significantly different from profile 5 at $p < .05$.

Table 8.
Effect Sizes for Pairwise Comparison of MFA Triadic Dynamics on Demographic Characteristics

	Relationship Status		Mother's Education	
	<i>Cohen's d</i>	<i>r</i>	<i>Cohen's d</i>	<i>r</i>
1 vs. 2 S-CO vs. S-DI	-0.05	-0.03	0.40	0.20
1 vs. 3 S-CO vs. S-MA	0.74	0.35	0.46	0.23
1 vs. 4 S-CO vs. S-AV	0.21	0.10	0.11	0.06
1 vs. 5 S-CO vs. V	0.50	0.24	0.71	0.34
2 vs. 3 S-DI vs. S-MA	0.77	0.36	0.09	0.04
2 vs. 4 S-DI vs. S-AV	0.25	0.12	-0.52	-0.25
2 vs. 5 S-DI vs. V	0.53	0.26	0.24	0.12
3 vs. 4 S-MA vs. S-AV	-0.57	-0.28	-0.57	-0.27
3 vs. 5 S-MA vs. V	-0.28	-0.14	0.13	0.07
4 vs. 5 S-AV vs. V	0.31	0.15	0.85	0.39

Note. Only variables that were significant in the ANOVA overall test were listed in the table.

S-CO = Stable Cohesive dynamic, S-DI = Stable Disengaged dynamic, S-MA = Stable MA Coalition dynamic, V = Variable dynamic, and S-AV = Stable Average dynamic.

Table 9.
Family Conflict Characteristics Comparison among Five MFA Triadic Dynamics

	Overall Mean (SD)	1 Stable Cohesive (n=50)	2 Stable Disengaged (n=29)	3 Stable MA Coalition (n=6)	4 Stable Average (n=35)	5 Variable (n=25)	Overall Test F (p-value)	Tukey's HSD Post-hoc	Dunnett T3 Post-hoc
Family-Level Conflict	1.66 (0.60)	1.51 ^{2,3}	1.94 ¹	2.33 ^{1,4,5}	1.63 ³	1.52 ³	5.106 (p=.001)	2>1; 3>1,4,5	ns
Interparental Conflict	1.55 (0.32)	1.45 ^{2,3}	1.67 ^{1,5}	2.12 ^{1,2,4,5}	1.57 ³	1.45 ^{2,3}	9.016 (p<.001)	2>1,5; 3>1,2,4,5	2>1,5
Parent-Adolescent Conflict [†]	1.85 (0.65)	1.61 ⁴	1.89	2.25	2.08 ¹	1.85	3.604 (p=.008)	4>1	4>1

Note. "ns"=not significant.

[†]variances were significant different across groups in Levene's Homogeneity of Variance Test.

On [†]line, ¹⁻⁵were Dunnett T3 results; otherwise, ¹⁻⁵were Tukey HSD results.

¹ Value is significantly different from profile 1 at p < .05.

² Value is significantly different from profile 2 at p < .05.

³ Value is significantly different from profile 3 at p < .05.

⁴ Value is significantly different from profile 4 at p < .05.

⁵ Value is significantly different from profile 5 at p < .05.

Table 10.

Effect Sizes for Pairwise Comparison of MFA Triadic Dynamics on Family Conflict Characteristics

	Family-Level Conflict		Interparental Conflict		Parent-Adolescent Conflict	
	<i>Cohen's d</i>	<i>r</i>	<i>Cohen's d</i>	<i>r</i>	<i>Cohen's d</i>	<i>r</i>
1 vs. 2 S-CO vs. S-DI	-0.71	-0.33	-0.76	-0.35	-0.48	-0.23
1 vs. 3 S-CO vs. S-MA	-1.07	-0.47	-1.42	-0.58	-1.04	-0.46
1 vs. 4 S-CO vs. S-AV	-0.25	-0.13	-0.44	-0.21	-0.72	-0.34
1 vs. 5 S-CO vs. V	-0.02	-0.01	0.00	0.00	-0.44	-0.21
2 vs. 3 S-DI vs. S-MA	-0.45	-0.22	-0.98	-0.44	-0.53	-0.25
2 vs. 4 S-DI vs. S-AV	0.49	0.24	0.40	0.20	-0.26	-0.13
2 vs. 5 S-DI vs. V	0.65	0.31	0.81	0.38	0.06	0.03
3 vs. 4 S-MA vs. S-AV	0.89	0.41	1.23	0.52	0.23	0.11
3 vs. 5 S-MA vs. V	1.02	0.45	1.46	0.59	0.61	0.29
4 vs. 5 S-AV vs. V	0.21	0.11	0.48	0.23	0.34	0.17

Note. Only variables that were significant in the ANOVA overall test were listed in the table.

S-CO = Stable Cohesive dynamic, S-DI = Stable Disengaged dynamic, S-MA = Stable MA Coalition dynamic, S-AV = Stable Average dynamic, and V = Variable dynamic.

Table 11.
Associations between Five MFA Triadic Dynamics and Adolescent Adjustment Outcomes

	Overall Mean (SD)	1 Stable Cohesive (n=50)	2 Stable Disengaged (n=29)	3 Stable MA Coalition (n=6)	4 Stable Average (n=35)	5 Variable (n=25)	Overall Test F (<i>p</i> -value)	Tukey's HSD Post-hoc	Dunnett T3 Post-hoc
Depression [†]	1.51 (0.61)	1.26 ^{2,3}	1.96 ^{1,4}	2.20 ^{1,4,5}	1.45 ^{2,3}	1.44 ³	8.643 (<i>p</i> <.001)	2,3>1,4,5	2>1,4; 3>1,4,5
Anxiety	1.50 (0.68)	1.34 ²	1.93 ^{1,4}	1.63	1.37 ²	1.45	3.905 (<i>p</i> =.005)	2>1,4	2>1,4
Cigarette [†]	0.11 (0.32)	0.11	0.19	0.40	0.06	0.04	1.987 (<i>p</i> =.100, ns)	—	—
Cigar [†]	0.05 (0.21)	0.02	0.12	0.20	0.03	0.00	1.940 (<i>p</i> =.108, ns)	—	—
Tobacco [†]	0.02 (0.15)	0.04	0.04	0.00	0.00	0.00	0.643 (<i>p</i> =.633, ns)	—	—
Snuff [†]	0.02 (0.15)	0.00	0.08	0.00	0.03	0.00	1.324 (<i>p</i> =.265, ns)	—	—
Alcohol [†]	0.30 (0.46)	0.20	0.35	0.60	0.39	0.26	1.601 (<i>p</i> =.178, ns)	—	—
Drunkenness [†]	0.10 (0.30)	0.07	0.19	0.20	0.09	0.04	1.138 (<i>p</i> =.342, ns)	—	—
Marijuana [†]	0.11 (0.32)	0.09	0.19	0.40	0.09	0.04	1.868 (<i>p</i> =.120, ns)	—	—
Positive Affect	4.00 (0.84)	4.39 ^{2,3,4}	3.48 ^{1,5}	2.95 ^{1,5}	3.88 ¹	4.11	8.685 (<i>p</i> <.001)	2,3,4<1; 2,3<5	2,4<1
Life Satisfaction [†]	4.78 (1.11)	5.26 ^{2,3}	3.84 ^{1,4,5}	3.97 ^{1,4}	4.84 ^{2,3}	4.91 ²	9.732 (<i>p</i> <.001)	2<1,4,5; 3<1	2<1,4,5; 3<1,4
Sense of Purpose	3.65 (0.81)	3.94 ²	3.20 ^{1,5}	3.04	3.56	3.83 ²	5.215 (<i>p</i> =.001)	2<1,5	2<1

Note. “—”=not applicable. [†]variances were significant different across groups in Levene's Homogeneity of Variance Test. On [†]line, ¹⁻⁵were Dunnett T3 results; otherwise, ¹⁻⁵were Tukey HSD results. ¹ Value is significantly different from profile 1 at *p* < .05; ² Value is significantly different from profile 2 at *p* < .05; ³ Value is significantly different from profile 3 at *p* < .05; ⁴ Value is significantly different from profile 4 at *p* < .05; ⁵ Value is significantly different from profile 5 at *p* < .05.

Table 12.

Effect Sizes for Pairwise Comparison of MFA Triadic Dynamics on Adolescent Adjustment Outcomes

	Depression		Anxiety		Positive Affect		Life Satisfaction		Sense of Purpose	
	<i>Cohen's d</i>	<i>r</i>	<i>Cohen's d</i>	<i>r</i>	<i>Cohen's d</i>	<i>r</i>	<i>Cohen's d</i>	<i>r</i>	<i>Cohen's d</i>	<i>r</i>
1 vs. 2 S-CO vs. S-DI	-1.15	-0.50	-0.81	-0.37	1.16	0.50	1.33	0.55	0.87	0.40
1 vs. 3 S-CO vs. S-MA	-2.72	-0.81	-0.50	-0.24	1.50	0.60	1.74	0.66	1.18	0.51
1 vs. 4 S-CO vs. S-AV	-0.44	-0.22	-0.05	-0.03	0.74	0.35	0.50	0.24	0.53	0.26
1 vs. 5 S-CO vs. V	-0.31	-0.15	-0.16	-0.08	0.36	0.18	0.32	0.16	0.16	0.08
2 vs. 3 S-DI vs. S-MA	-0.43	-0.21	0.47	0.23	0.53	0.26	-0.15	-0.07	0.18	0.09
2 vs. 4 S-DI vs. S-AV	0.83	0.38	0.88	0.40	-0.54	-0.26	-1.04	-0.46	-0.43	-0.21
2 vs. 5 S-DI vs. V	0.71	0.34	0.64	0.30	-0.77	-0.36	-0.91	-0.41	-0.78	-0.36
3 vs. 4 S-MA vs. S-AV	2.10	0.72	0.58	0.28	-1.01	-0.45	-1.52	-0.61	-0.70	-0.33
3 vs. 5 S-MA vs. V	1.43	0.58	0.30	0.15	-1.17	-0.51	-1.05	-0.47	-1.12	-0.49
4 vs. 5 S-AV vs. V	0.02	0.01	-0.13	-0.07	-0.32	-0.16	-0.07	-0.04	-0.41	-0.20

Note. Only variables that were significant in the ANOVA overall test were listed in the table.

S-CO = Stable Cohesive dynamic, S-DI = Stable Disengaged dynamic, S-MA = Stable MA Coalition dynamic, S-AV = Stable Average dynamic, and V = Variable dynamic.

C1 Stable Cohesive (ID=103)	AV	CO	CO	CO	CO	CO	CO	CO	AC	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	
C2 Stable Disengaged (ID=106)	DI	DI	DI	DI	DI	DI	DI	DI	DI	DI	DI	DI	DI	DI	DI	DI	DI	DI	DI	DI	DI	DI	
C3 Stable MA Coalition (ID=122)	MA	DI	DI	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MC
C4 Stable Average (ID=164)	MC	AV	MC	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV
C5 Variable (ID=139)	MC	AC	CO	AV	AC	MC	DI	MC	DI	N/A	DI	AV	CO	DI	AV	AV	CO	AV	AV	AV	AV	MC	
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21		

Note.

CO = Cohesive, MC = M-Centered, AC = A-Centered, MA = MA Coalition., DI = Disengaged, AV = Average (structure visited on that day);

N/A = missing data.

Figure 2. Example Family Trajectory for Each MFA Triadic Dynamic

CHAPTER 4: DISCUSSION

Since empirical tests of core concepts in family systems lag far behind theory, studies that examine beyond one dyadic subsystem at a time is still in the early stage. Even less research has simultaneously considered both relationship structures across multiple dyads and how they change with time. As a pioneer study that focuses on the MFA triad—a key relationship structure to reflect the organization of family systems, I first examined possible triadic relationship structures across all families and all days in the daily diary dataset from the FLOW study, and then additionally considered the changing process among those relationship structures and identified MFA triadic dynamics at the between-family level. To clarify the characteristics of families with these MFA dynamics, I further described their demographic and family conflict features in each dynamic. Finally, I examined the implication of these MFA dynamics on positive and negative indicators of adolescent adjustment, which acts as an initial step to study individual development in an integrative family dynamic system.

Key findings were: (1) there were six MFA triadic relationship structures identified in this sample—Cohesive, Mother-Centered, Adolescent-Centered, MA Coalition, Disengaged, and Average structures; (2) there were five MFA triadic relationship dynamics across 21 days identified in this sample—Stable Cohesive, Stable Disengaged, Stable MA Coalition, Stable Average, and Variable dynamics; (3) there were significant differences on parent relationship status, mother's education level, and family conflict in different subsystems across families in the five identified dynamics; and (4) these five dynamics have different implications for adolescent depression, anxiety, positive affect, life satisfaction, and a sense of purpose. These results are discussed in greater details below.

Profiles of MFA Triadic Relationship Structures

The findings revealed five out of eight hypothesized MFA triadic relationship structures in the sample: Cohesive, Mother-Centered, Adolescent-Centered, MA Coalition, and Disengaged structures. Two structures with a strong MF bond were the Cohesive and the Mother-Centered structures. As expected, the Cohesive structure exhibited high levels of closeness in all three dyads and were the most prevalent (33%) family subgroup in the sample. The Mother-Centered structure exhibited high levels of closeness in MF and MA dyads but average to low levels of FA closeness. This structure was much less prevalent (9%). Although fathers in families with the Mother-Centered structure have a relatively distant relationship with their adolescent children, mothers serve a key role to make the family function well enough: they are closely connected with fathers to solidify the foundation for their family and they are the supportive caregivers to satisfy adolescents' need of connection.

Three structures with a weak MF bond were identified—the Adolescent-Centered, MA Coalition, and Disengaged structures. Among them, the two alliance structures (i.e. Adolescent-Centered and MA Coalition) may represent different family processes than the Disengaged structure. In families with the two alliance structures, closeness in one or both parent-adolescent dyads were used to hold the family together instead of having the well-connected interparental bond as the foundation. However, in families with the Disengaged structure, three family members acted as if they were unrelated individuals and the family did not function as an organized system at all (Olson, 2000). Adolescent children from those families could not fulfill their need of connection and did not get support and effective guidance during their individuation process. Therefore, adolescents from families with the alliance structures and the Disengaged structure may have different destructive coping tendencies, which in turn lead to different maladjusted developmental trajectories (Skinner, Edge, Altman, & Sherwood, 2003).

An additional profile—the Average structure was found in this sample with a moderate to large prevalence (28%). Substantively, it is possible to identify a subgroup of families with moderate levels of closeness in all three dyads, which is consistent with Davies and colleagues' (2004) study showing there was an adequate family constellation. It worth exploring how moderate levels of closeness in family relationships would have different implications for family functioning and family members' development when comparing to families with high closeness (e.g., the Cohesive structure) and low closeness (e.g., the Disengaged structure). Methodically, it was not rare to see a “residual” subgroup in LPA models where the subgroup contained all the cases without robust features to be picked out as a separate subgroup or the subgroup of cases with a certain feature is not large enough. There might be other nuanced structures separated out from this subgroup if the sample size is large enough, or it may be the case that the average structure is a substantively stable structure in family systems—which needs future replicated work to verify.

In this sample, the results did not identify the Father-Centered, the FA Coalition, and the Couple-Centered MFA relationship structures. In general, mothers are more involved in childrearing and have a closer relationship with their child than fathers (McBride & Mills, 1993; Yan, 2017). In a relatively small sample of families ($n=145$), it is more common to see family relationship structures with high closeness in MA dyad than FA dyad. Thus, it is not surprise to identify the Mother-Centered and the MA Coalition structures much easier than the Father-Centered and the FA Coalition structures. To clarify whether the Couple-Centered structure is identifiable, two things worth considering in the future research. First is to additionally account for conflict in three dyads above beyond their closeness levels, given prior work has emphasized that a key family process related to this structure is the covert interparental conflict and overt

parent-adolescent conflict (Bell, Bell, & Nakata, 2001; Buchanan & Waizenhofer, 2001; Kerig, 1995, 2015). Second is to conduct replication studies in other larger and more diverse samples, because the analytic sample for this study only included 151 families and many of these families were generally high functional. Overall, the results with three unrevealed structures need to be interpreted with caution because some small subgroups may not be able to be identified when the sample size is not large enough. Further replicated and/or complemented findings from studies with larger and more diverse samples are needed.

Classes of MFA Triadic Relationship Dynamics

Considering families are alive systems with ongoing changes from time to time, an important next step is to zoom into micro family processes and investigate the fluctuation in family relationship structures on a daily basis (Bolger, Davies, & Rafaeli, 2003; Repetti, Reynolds, & Sears, 2015). In this study, the results did reveal changes between different relationship structures on a daily basis and further identified five MFA dynamics at between-family level: Stable Cohesive, Stable Disengaged, Stable MA Coalition, Stable Average, and Variable dynamics. The stable dynamics exhibited characteristics that were consistent with the expectation. Specifically, families with a Stable Cohesive dynamic exhibited the Cohesive structure most days (85%) with a few days exhibited the Mother-Centered, the Adolescent-Centered, the Disengaged, or the Average structure(s); this subgroup had the largest prevalence (35%). Families in the Stable Disengaged subgroup exhibited the Disengaged structure most days (91%) with a few days exhibited the Average structure; this subgroup had moderate prevalence (20%). Results showed that families with different functional organizations among relationships tend to stay in their respective “settled structure”, which supported the point in

family systems theory that each family system has its equilibrium and the system would regulate itself to go back to the equilibrium (Minuchin, 1974, 1985; Olson, 2000).

Partially consistent with our hypotheses, only one subtype of stable alliance dynamic (i.e. Stable MA Coalition) was found in this sample and it was least prevalent (4%). Families in this subgroup exhibited the MA Coalition structure most days (67%). On the days when the family was not in the MA Coalition structure, these families were most likely to exhibit the Disengaged structure. Given that both structures build upon the weak interparental bond and they both lack a good balance between connection and individuation, it is not surprise to see the interchange between the MA Coalition structure and the Disengaged structure. This also lends support to the idea that families with the MA Coalition structure might turn into a mother-adolescent two-member family system: regardless of good or bad days for the family, the father is always isolated out of the system. Unfortunately, the FA Coalition and Couple-Centered structures were not identified in the prior step, this sample was not able to be used to detect if the two other stable alliances dynamics and the shifting alliances dynamic would reveal or not. Future replication work is needed to be done with larger and more diverse samples.

Consistent with the hypotheses, there was a dynamic characterized by families exhibited multiple different MFA relationship structures across days. However, this dynamic was named as “Variable” instead of “Chaotic”, because families in this subgroup exhibited shifts between low-risk MFA structures (i.e., the Cohesive, the Mother-Centered, and the Average structures) most days (81%) rather than changing across all different structures. In turn, the impact of families in the Variable dynamic on adolescent development may not be as negative as families with high levels of instability or chaos (discuss later). In terms of family system structure, this finding may imply that it is possible to see families shifting between different relationship structures on a

daily basis, but the changes mostly happen between low-risk structures. Families with this dynamic may have fluctuation in their levels of closeness in some dyads, but the consistent connection in the interparental relationship ensures the adequate executive function of the family system (Gilbert, Christensen, & Margolin, 1984; Minuchin, 1974; Satir, 1983). Families that exhibited high-risk structures (e.g. MA Coalition and Disengaged) are more likely to stick to that structure, which is consistent with family therapy and clinical observation: their settled family relationship structures are the result of a long-term training process and serve a function for the family system, thus they are less likely to change unless intervention is involved or new demands emerge inside or outside of the family system (e.g., Bowen, 1978; Minuchin, 1974; Nichols & Fevarett, 1986).

Beyond my expectation, the Stable Average dynamic was an additional stable dynamic appeared in this sample. Families in this subgroup exhibited the average structure most days (83%) with a few days exhibited the Mother-Centered, the Adolescent-Centered, or the Disengaged structure(s). With a moderate to large proportion of families in this dynamic (24%), this finding advocated the idea that the average MFA triadic relationship structure is more of a substantively meaningful structure with moderate levels of closeness in all three dyads instead of a methodologically “residual” subgroup in the prior step. With little known about the different implications of high, moderate, or low levels of closeness in all three dyads for family systems, it is important to examine the nuanced differences of family functioning and family members’ development between families in the Stable Average and Stable Cohesive dynamics, as well as between those with in the Stable Average and Stable Disengaged dynamics.

The findings illustrated different types of family systems located on a continuous spectrum between being vigorous and being lifeless. On the most vigorous end, families exhibit

Stable Cohesive dynamic where family members are consistently affectionate and connected to each other. On the moderate level, families exhibited Stable Average dynamic where family members may not be as warm and loving as the ones in the Stable Cohesive dynamic but they are close enough to maintain the system functioning. And the vigorous level of families with the Variable dynamic is somewhere between the Stable Cohesive and the Stable Average families; family members' relationships fluctuate between close and adequate on a daily basis. On the least vigorous end, family systems transform into two-member system and an isolated member (i.e. Stable MA Coalition dynamic) or totally dissolve into three separated individuals (i.e. Stable Disengaged dynamic). These findings may also imply the importance of interparental connection as the foundation for a family system (Bell, Bell, & Nakata, 2001; Kerig, 1995; Minuchin, 1974): when parents are closely connected to each other, the family is consistently cohesive; when parents closeness level decreases, the family is changing toward a functionally adequate system with moderate connection between family members; when parents closeness decreases to a degree where the interparental subsystem function is disrupted, the family system dissolves into other formats that are different from an integrative system with all three family members together.

By using MLPA in daily diary data, this study also proposed a way of using advanced methods to examine complicated and abstract concepts in family systems theories. On the first level (day-level), the analysis focused on identifying the MFA triadic relationship structure beyond looking at one dyad at a time; on the second level (family-level), the change between different MFA relationship structures were incorporated to cluster families into different dynamics, so that both family structure and family dynamics—two important concepts in family systems theories—were considered simultaneously to describe family system functioning.

Moreover, these findings also expanded knowledge on relationship structures and changes beyond traditional family system theories. Rooted in family therapy and treatment of psychopathology, traditional family system theories mainly focus on dysfunctional relationship structures that results in maladjustment and assume relationship structures are static and unlikely to change over time unless new demands/intervention present (Bowen, 1978; Minuchin, 1974). This study adopted the dynamic systems approach to challenge family researchers to think more about the dynamics and changes of family relationship structures in normal daily life. Zooming into family relationship structures on a daily basis, the results showed several functional dynamics (e.g., Variable and Stable Average) other than Stable Cohesive, which provided a more nuanced description and understanding for functional family systems. Additionally, by showing both stable and variable dynamics in the results, this study also lend support for the idea that family relationship structures may fluctuate on a short time scale (e.g., day by day).

Characteristics of Families with Different MFA Triadic Dynamics

Demographic Characteristics Comparison Between MFA Triadic Dynamics

When comparing the demographic characteristics of families in the five identified dynamics, there were significant differences on parent relationship status and mother's education level, but not on family income, father's educational level, adolescent's gender, or three family members' ages. Although none of the post-hoc pairwise comparison showed significant difference on parent relationship status between families in these dynamics, the magnitude of effect sizes for some pairs suggested a trend: parents in the Stable MA Coalition dynamic (moderate to large effect sizes) and in the Variable dynamic (small to moderate effect sizes) were less likely to be married than parents in the Stable Cohesive, the Stable Average, and the Stable Disengaged dynamics. The difference between families in the Stable MA Coalition dynamic and

the rest three stable dynamics may partially due to the sample's feature: in most divorced or step-families of this sample, the adolescent child is living with their biological mother and mother's partner. It is possible that the mother's partner did not stay long enough to tightly connect with the adolescent child or did not support the adolescent child as his/her biological mother from the child's point of view (Amato, 1987). The difference between families in the Variable dynamic and the same three stable dynamics were in smaller magnitudes, which needs to be interpreted with caution. It might be the case that when having a new family member to integrate into the original family system, there would be a lot of changes to be made to form a new holistic system. The new triadic relationship structure is not settled yet, and the family dynamic is still in the changing process. However, giving the small overall sample size and small numbers of families in the Stable MA Coalition dynamic ($n=6$) and the Variable dynamic ($n=17$), the results only suggested there may be a trend. More replication with larger and more diverse samples in future work is needed for verification.

Another finding was that families in the Stable Cohesive and Stable Average dynamics tend to have higher levels of mother education than families in the Variable dynamic. It may be the case that mothers with higher education have more knowledge on the importance of family stability, thus they are more willing to help maintain family harmony. Additionally, mothers with higher education may be better capable to cope with newly emergent demands in the family, so that family function is more stable and relationship structure is less likely to change (Klebanov, Brooks-Gunn, & Duncan, 1994). This finding also had implication for family-centered intervention: (1) mothers with lower education may be an indicator for family structure variability; and (2) interventions that teach the importance of family stability and strengthen

women's coping ability to family stress can be made for low-educated women when they are getting married or expecting children to prevent family instability.

Family Conflict Characteristics in Each MFA Triadic Dynamic

In terms of family conflict characteristics, families in the five identified dynamics have their uniqueness in family-level conflict, interparental conflict, and parent-adolescent conflict. Due to the small sample size, the specificities presented in the results need to be interpreted with caution. As expected, families in the Stable Cohesive dynamic exhibited the lowest level of family-level conflict, interparental conflict, and parent-adolescent conflict, which validated the interaction processes in families with a Stable Cohesive dynamic: In those families, three family members are closely connected, affectionate, supportive to each other, and less likely to have conflict in either subsystem or in the whole family system; when there is unavoidable disagreement and conflict in interpersonal interactions, family members are capable to resolve disagreement in that subsystem without escalating into destructive conflict or spilling over into other subsystem (or the whole family system).

It is worth comparing the similarity and differences between families in the Stable Disengaged and Stable MA Coalition dynamics—two subgroups of families that build up a weak MF bond. There was a trend that families in these two dynamics exhibited higher levels of conflict on the family-level and in the interparental subsystem than families in the rest three dynamics (moderate to large effect sizes). This may imply that family systems without a well-connected interparental subsystem are more likely to have disagreement and less able to deal with family conflict effectively (Minuchin, 1974; Satir, 1983). Interestingly, families in the Stable Disengaged dynamic tend to exhibit lower levels of conflict than families in the Stable MA Coalition dynamic on family-level, in the interparental subsystem, as well as in the parent-

adolescent subsystem. This may reflect that family members in the disengaged families have few chance to interact with each other in either positive or negative way. They mainly make individual decisions rather than working as an integrative system. With little care of other family member's life, they even do not bother to have conflict with each other.

Differently, families in the Stable MA Coalition dynamic exhibited the highest levels of conflict in multiple family subsystems with an especially high level of interparental conflict (which was significantly higher than families in the other four dynamics). In those families, the lack of close connection and high conflict in the interparental dyad may reflect the ineffective problem solving process between parents. When parents are not able to resolve their disagreements or deal with interparental tension constructively, the adolescent child may be involved to expand the conflict into family-level, or the tension between parents may spills over into parent-adolescent subsystem (Erel & Burman, 1995). It is also possible to have family-level conflict and parent-adolescent conflict spilling over into the interparental subsystem. Given the interparental bond is the weakest among three dyadic subsystems, whenever there is elevated conflict in the family, the tension between parents is most intense.

Families with a Stable Average dynamic exhibited slightly higher family-level conflict and interparental conflict than families with a Stable Cohesive dynamic (small to moderate effect sizes), but the most consistent difference is that the conflict level between adolescents and the participating parents in the Stable Average families was significantly higher than that of families with a Stable Cohesive dynamic. This finding may reflect some ineffective parenting issues, such as using inconsistent, harsh discipline, or not provide reasons for parents' decision in the parent-adolescent interaction (Rodriguez, 2010). It may also be the case that subgroup of families with a Couple-Centered structure were not large enough to be separate as a unique subgroup from the

Average families, so that the Stable Average families in the results actually are a mix of “real” Stable Average families and some “unidentified” stable Couple-Centered families. If this is the case, the high parent-adolescent conflict may reflect the detouring process in which interparental tension is covert and defused by overt parent-adolescent conflict (Bell, Bell, & Nakata, 2001; Buchanan & Waizenhofer, 2001; Kerig, 1995, 2015). Future work that uses larger sample and includes both relationship closeness and conflict in multiple family subsystems may provide clearer information. Regardless, families in different dynamics may reflect nuanced different family processes, which implies the importance of tailoring family-centered intervention to fit different family situations and work on their respective weakness (e.g., teach constructive strategies of dealing with interparental conflict, or coach promoting effective parenting skills).

MFA Triadic Dynamics and Adolescent Adjustment

The results partially supported our hypotheses of the associations between MFA triadic dynamics and adolescent adjustment. Consistent with (H4a), adolescents from the Stable Cohesive dynamic tend to have the lowest levels of depression and anxiety, and the highest levels of positive affect, life satisfaction, and a sense of purpose in life. Partially consistent with (H4b), adolescents from the Stable Disengaged dynamic tend to have higher levels of depression and anxiety, and low levels of positive affect, life satisfaction, and a sense of purpose in life. But instead of having highest level of depression and substance use, adolescents from the Stable Disengaged dynamic tend to have highest anxiety. Unfortunately, since the shifting alliances dynamic was not identified in the previous steps, (H4c) was not able to be examined.

For the substance use outcomes, the results showed no significant difference among adolescents in five identified dynamics. One possible reason is that the sample contained most high functioning families with adolescents who in general have lower rates of substance

initiation at early ages (Mean Age=14.76) compared to the average population (Kosterman, Hawkins, Guo, Catalano, & Abbott, 2000; Moss, Chen, & Yi, 2013). In addition, the small sample size (n=145) may not have enough power to detect significant differences across five groups; findings in this study only demonstrated trends and need to be interpreted with caution. More replications in larger and more diverse samples are needed to confirm and compliment the findings. In the following sections, I will discuss the implications of MFA triadic dynamics on the other two negative indicators (i.e. depression and anxiety) and three positive indicators of adolescent adjustment in greater details.

MFA Triadic Dynamics and Negative Aspects of Adolescent Adjustment

For adolescent depression, the post-hoc pairwise analysis showed that adolescents in the Stable Disengaged and Stable MA Coalition dynamics tend to have higher depression than adolescents in the Stable Cohesive, Variable, and Stable Average dynamics, which implies the important role of family system functioning on individual development (Sturge-Apple, Davies, & Cummings, 2010; Davies, Cummings, & Winter, 2004). In the Stable MA Coalition families, the father has disengaged from both the mother and the adolescent; in the Stable Disengaged families, all three family members have separated from each other. In those families, there is insufficient emotional support and connection among family members. Thus, adolescents from those families are less likely to satisfy their need of connection or get enough support when they need. In turn, these adolescents are more likely to have psychopathology symptoms, especially depression (Baumeister & Leary, 1995; Costello, Swendsen, Rose, & Dierker, 2008; Ryan & Deci, 2001).

For adolescent anxiety, there was a trend showing that adolescents in the Stable Disengaged dynamic tend to have the highest level of anxiety. Specifically. Adolescents from the

Stable Disengaged dynamic had significantly higher levels of anxiety than adolescents from the Stable Cohesive and Stable Average dynamics, and the effect sizes of differences between adolescents in the Stable Disengaged dynamic and the rest four dynamics were all moderate. Consistently disengaged family context contains multiple risk factors for adolescent anxiety (Bögels, Brechman-Toussaint, 2006). First, the distant and/or conflictual interparental relationship is a stressor that threatens the adolescent's sense of security (Emery, 1989). Such insecure feeling increases their anxiety (Colonnaesi et al., 2011; Lee & Hankin, 2009). Moreover, adolescents growing up in the disengaged families experience inconsistent discipline, receive less acceptance and more avoidance in their interaction with parents, which also increases their risk of having anxiety symptoms (Dadds, Barrett, Rapee, & Ryan, 1996; Emery, 1989; Siqueland, Kendall, & Steinberg, 1996). Finally, disengaged families cannot satisfy adolescents' psychological need of belonging and connection, which increase their risk of maladjustment in general (Baumeister & Leary, 1995; Ryan & Deci, 2001). This finding was consistent with prior work linking family disengagement and children's anxiety symptoms, and extended this association to the adolescent period (Jacobvitz, Hazen, Curran, & Hitchens, 2004; Katz & Low, 2004). This highlights the importance of having support and connection in family for adolescent development even during the development stage when individuals seek more autonomy and independence.

MFA Triadic Dynamics and Positive Aspects of Adolescent Adjustment

Both post-hoc significant tests and effect sizes showed that adolescents from the Stable Cohesive dynamic exhibited the highest positive affect at 6-month follow-up assessment among adolescents from all five identified dynamics, which highlights the important role of a cohesive family climate plays on adolescent happiness (Fosco, Caruthers, & Dishion, 2012; North,

Holahan, Moos, & Cronkite, 2008). Not surprisingly, our findings indicated that adolescents from the Stable Disengaged and Stable MA Coalition dynamics tend to have lowest levels of positive affect among adolescents in all five identified dynamics, which is consistent with prior work demonstrating that adolescents in dysfunctional families tend to have lower levels of subjective well-being (Hooper, Tomek, Bond, & Reif, 2015; Perrin, Ehrenberg, & Hunter, 2013). Moreover, it is worth noting the nuanced differences among adolescents in the three adequate functioning dynamics (i.e., Stable Cohesive, Variable, and Stable Average). In the results, both Tukey's HSD and Dunnett T3 pairwise tests showed significant difference on the positive affect between adolescents from the Stable Cohesive and Stable Average dynamics, and the means of adolescent positive affect ordered from high to low are in the Stable Cohesive dynamic, the Variable dynamic, and the Stable Average dynamic accordingly. This depicted a tendency: the higher the closeness in an MFA triad the higher the adolescent child's positive affect is, regardless of how much changes between different functional family relationship structures. The findings suggested that whereas the Stable Cohesive and the Stable Average families have similar implications for adolescent maladjustment, families with high levels of closeness have better promotive effect on adolescent happiness than families with moderate levels of closeness.

Similar to the positive affect, the results showed that adolescents in the Stable Cohesive dynamic tend to have the highest level of life satisfaction, whereas adolescents from the Stable Disengaged and the Stable MA Coalition dynamics tend to have the lowest level of life satisfaction. These findings indicated that families in the Stable Disengaged and Stable MA Coalition dynamics not only increase the risk for adolescent maladjustment (as discussed in the previous sub-section), but also bring down adolescents' subjective well-being. The diminished subjective well-being may be caused by lacking the balance between connection and

individuation (Bell & Bell, 2009). It may also be the case that adolescents growing up in families with a distant interparental relationship internalized destructive interpersonal interaction patterns so that they are less likely to develop positive interpersonal relationships, which also decreased their life satisfaction (Skowron, Holmes, & Sabatelli, 2003; Skowron, Stanley, & Shaprio, 2009).

When comparing the means of adolescent sense of purpose in life among all five identified dynamics, there was a tendency that adolescents from families with higher levels of closeness in MFA triad were more likely to report having a sense of purpose in life. And the magnitude of means of adolescent sense of purpose seems can be clustered into high (Stable Cohesive=3.94, Variable=3.83), moderate (Stable Average=3.56), and low (Stable Disengaged=3.20, Stable MA Coalition=3.04), which was in line with their closeness levels in respective MFA triads. This might imply that families with moderate levels of closeness might be as good as cohesive families in terms of their protective effect on adolescent maladjustment and promotive effect on adolescent life satisfaction, but they have nuanced different influences for adolescent sense of purpose (the higher the better). It is possibly because adolescents growing up in families with higher levels of closeness tend to have more positive attachment to their parents and develop a more consistent perception of actual and ideal conditions, both of which are facilitators for the development of adolescent sense of purpose in life (Hill, Burrow, & Sumner, 2016; Stanley & Burrow, 2015). Although post-hoc pairwise comparisons only suggested that adolescents in the Stable Disengaged dynamic had a lower sense of purpose in life than adolescents in families with functional dynamics, the non-significant result on adolescents in the Stable MA Coalition needs to be interpreted with caution. Given the mean of adolescent sense of purpose in the Stable MA Coalition dynamic (3.04) was lower than that in the Stable Disengaged dynamic (3.20) and the number of families in the Stable MA Coalition dynamic was

fairly small ($n=6$), it is plausible that the parsimonious post-hoc tests did not have enough power to identify the difference between adolescents in the Stable MA Coalition dynamic and other dynamics. Replication with samples that are able to identify more families in the Stable MA Coalition dynamic is needed to further clarify the influence of this dynamic on adolescent sense of purpose in life.

Strengths, Limitations, and Future Directions

One strength of this study is that it used daily diary data to get a more ecologically valid understanding of family system dynamics on a daily basis. Not only the daily report would be more accurate than retrospective report, but also the daily changing process can be captured (Bolger, Davis, & Rafaeli, 2003; Laurenceau & Bolger, 2005; Repetti, Reynolds, & Sears, 2015). Moreover, by using MLPA—an innovative method to simultaneously model family relationship structures in the MFA triad and their changing processes across days, this study has the potential to deepen our understanding of family system dynamics as an integrative whole instead of static snapshots of its dyadic subsystems. Substantively, the findings enriched our nuanced understanding on family relationship structures (beyond cohesive, coalition, and disengaged) and further identified several dynamics among those relationship structures. Regarding the associations between MFA triads and adolescent adjustment, the results also extended the knowledge on the implications of family contexts for both positive and negative adolescent adjustment outcomes, with a more specific understanding on the influence of families with moderate levels of closeness and how that is different from cohesive and disengaged families.

A few limitations of this study should be noted. First, the findings in this study were limited by its sample generalizability. It was primarily a White, middle class sample with a larger proportion of highly functioning families. Results in this study only captured a small range on

the spectrum of family systems dynamics (toward well-functioning end). Therefore, the inference that can be made from this study is limited to healthy to normal families, not distressed families. Future work with larger and more diverse samples and longer period of daily assessments will broaden the range of findings on the spectrum of family systems dynamics with more accurate estimation. And an important next step is to use stratified sampling to draw a sample of families with different functional levels (e.g., clinically distressed families, high-risk families for misbehavior, as well as well-functioning families), so that we can get a more complete picture of family system dynamics in the whole range. Second, the sample size was relatively small for the ANOVA post-hoc pairwise comparison, so that findings only indicated tendencies and needed to be interpreted with caution. More replication work is needed in the future. Third, scores of daily dyadic closeness and adolescent adjustment were all calculated based on adolescent self-report, which mainly captures adolescent children's perceptions of their family dynamics and may introduce measurement bias in the analysis. Given the potential discrepancies between parents' and adolescents' perception of family relationships, it is worth investigating different family members' perceptions on family processes simultaneously and evaluating how nuanced family process that is reflected by discrepancies between parents and adolescents may influence adolescent adjustment. Forth, there were unavoidably increased measurement error in Aim 3 and Aim 4 analyses when modal assigning group memberships of each family based on their posterior probabilities through MLPA in Aim 2. Currently, the optimal approach to predicting distal outcomes (i.e. analyses in Aim 3 and Aim 4) in LPA is "BCH approach" (Bakk & Vermunt, 2016; Dziak, Bray, Zhang, Zhang, & Lanza, 2016; Vermunt, 2010). However, this approach is not able to be used in MLPA, because so far the

BCH weight matrix can only be generated on one-level LPA. New applicable methods that better handle measurement errors are needed.

One direction for future work is to extend family relationships beyond the MFA triad, such as including siblings, intergenerational parents, or other family members in the household, to get a more complete and comprehensive understanding of the holistic family systems. Additionally, research that focuses on more diverse family types will complement the limit scope on traditional two-parent families in this study, which include but not limit to LGBTQ families, single parent families, and intergenerational families. Furthermore, studies that exam the associations between family dynamics and other aspects of adolescent development outcomes or studies that explore possible mechanisms will expand the knowledge of adolescent development in the context of family system dynamics.

Conclusion

This dissertation utilized a sample of 145 mother-father-headed two-parent families in the FLOW study, identified six MFA triadic relationship structures and five MFA triadic dynamics, described the demographic and conflict characteristics of families in these five dynamics, and further examined their associations with adolescent adjustment. Findings suggested that simultaneously considering MFA triadic relationship structures and their change on a daily basis is a more accurate way to understand family systems. Adolescents in the Stable Cohesive families tend to have the optimal adjustment outcomes, whereas adolescents in the Stable Disengaged families and the Stable MA Coalition families tend to have the most negative adjustment outcomes. Regarding adolescents in the Stable Average families, they are at low-risk of maladjustment symptoms just as the adolescents in the Stable Cohesive families, but their positive adjustment levels tend to be lower than adolescents in the Stable Cohesive families.

Last, the daily variation on MFA relationship structures did not show a tendency of negative influence on adolescent adjustment as long as the changes were mostly among low-risk relationship structures.

Several implications for family-centered intervention derived from the findings. First, given different family relationship dynamics implies different family interactive processes, tailoring family-centered intervention to address the respective issue(s) in each family type can be a way to facilitate intervention effectiveness. Second, intervention would be more effective if all family members are involved rather than solely a dyad (e.g., a parent and an adolescent child). In this way, the practitioners can get a holistic view of family interactive structure and evaluate families more accurately. In the meanwhile, the intervention can target the whole family dynamics to facilitate the change in interactive structures at the family level rather than a part of it. Finally, the findings of associations between family dynamics and adolescent adjustment enriched the knowledge on identifying high-risk families to intervene: families with disturbed boundaries (e.g., the MA stable coalition families and the Stable Disengaged families) are at high risk, whereas families that fluctuate between multiple low-risk relationship structures are at low risk.

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APPENDIX A: Measures Used in the Study

1. Daily Dyadic Closeness (Daily Diary Adolescent-report)

These questions are about how your [PARENT 1] and your [PARENT 2] got along with EACH OTHER TODAY. Please rate how much these statements were true TODAY: (Coding scheme: Slider [Not at All : A Lot]; 0-10, 0.1 increment)

1	My [parent 1] and [parent 2] GOT ALONG with each other well TODAY
2	My [parent 1] and [parent 2] were LOVING and AFFECTIONATE with each other TODAY

These questions are about YOUR RELATIONSHIP WITH YOUR [Parent 1]. Please indicate how true each statement was TODAY. (Coding scheme: Slider [Not at All True: Very True]; 0-10, 0.1 increment)

1	How CLOSE and CONNECTED did you feel to your [parent 1]?
2	How WARM and AFFECTIONATE was your [parent 1] with you?

These questions are about YOUR RELATIONSHIP WITH YOUR [Parent 1]. Please indicate how true each statement was TODAY. (Coding scheme: Slider [Not at All True: Very True]; 0-10, 0.1 increment)

1	How CLOSE and CONNECTED did you feel to your [parent 2]?
2	How WARM and AFFECTIONATE was your [parent 2] with you?

2. Demographic Variables (Baseline Parent-report)

Family income	<p>What is your annual gross (before taxes) family income?</p> <p>1 Less than \$10,000 (1)</p> <p>2 \$10,000-19,999 (2)</p> <p>3 \$20,000-29,999 (3)</p> <p>4 \$30,000-39,999 (4)</p> <p>5 \$40,000-49,999 (5)</p> <p>6 \$50,000-59,999 (6)</p> <p>7 \$60,000-69,999 (7)</p> <p>8 \$70,000-79,999 (8)</p> <p>9 \$80,000-89,999 (9)</p> <p>10 \$90,000-99,999 (10)</p> <p>11 \$100,000-124,999 (11)</p> <p>12 \$125,000 or more (12)</p>
Relationship status	What is your relationship status?

	1 Married (1) 2 Living Together (2) 3 Separated (3) 4 Divorced (4) 5 Widowed (5) 6 Single (6)
[Parent 1] education level	What is the last level of formal education you completed? 1 No formal schooling (1) 2 7th grade or less (2) 3 Junior High completed (3) 4 Partial High School (4) 5 High school graduate / GED certificate (5.) 6 Partial college (at least one year) or specialized training (6) 7 Junior college / Associates degree (2 years) (7) 8 Standard college or University graduation (4 years) (8) 9 Graduate professional training, graduate degree (9)
[Parent 2] education level	What is the last level of formal education YOUR PARTNER completed? 1 No formal schooling (1) 2 7th grade or less (2) 3 Junior High completed (3) 4 Partial High School (4) 5 High school graduate / GED certificate (5) 6 Partial college (at least one year) or specialized training (6) 7 Junior college / Associates degree (2 years) (7) 8 Standard college or University graduation (4 years) (8) 9 Graduate professional training, graduate degree (9)
Adolescent's gender	What is YOUR CHILD'S gender? Female(1) Male(2)
[Parent 1]'s age	How old were you on your last birthday?
[Parent 2]'s age	How old is your partner?
Adolescent's age	How old was YOUR CHILD on his/her last birthday?

3. Family-Level Conflict (Baseline Parent-report)

These statements are about families. Please mark how often the following statements were true in your family in the LAST MONTH. There are no correct answers, we are interested in knowing what your family seems like to YOU. (Response scale: Almost Never, Once in a While, Sometimes, Frequently, Almost Always)

1	Family members fought
2	Family members got so angry they threw things
3	Family members lost their tempers

4	Family members hit each other
5	Family members criticized each other

4. Interparental Conflict (Baseline Parent-report)

What strategies do you and your partner use when you have disagreements with each other? How often do YOU use each strategy? How often does YOUR PARTNER use each strategy?
(Response Scale: (1) Never, (2) Rarely, (3) Sometimes, (4) Often)

1	Express thoughts and feelings openly
2	Listen to the other's point of view
3	Try to understand what the other is really feeling
4	Try to reason with the other
5	Compromise, meet the other half way, "split the difference"
6	Become angry with child when really angry with partner
7	Argue in front of the child(ren)
8	Involve the child(ren) in our argument
9	Argue when the child(ren) might be able to overhear
10	Talk with child(ren) about conflicts with partner
11	Raise voice, yell, shout
12	Interrupt/don't listen to the other
13	Become sarcastic
14	Make accusations
15	Name-calling, cursing, insulting
16	Throw objects, slam doors, break things
17	Throw something at the other
18	Threaten physical harm to other
19	Push, pull, shove, grab partner
20	Slap partner
21	Strike, kick, bite, partner

5. Parent-Adolescent Conflict (Baseline Parent-report)

For each statement, please mark the one that best describes your relationship with your child.
(Response Scale: Not at All, A Little, Somewhat, Very, Extremely)

1	How much do you yell at your child after you've had a bad day?
2	How much does your child yell at you after he or she has had a bad day?
3	How much does your child nag you about what you are doing wrong?
4	How much does your child criticize you?

6. Depression (Six-month Adolescent-report)

Please mark the word that shows how often each of these things happen to you. There are no right or wrong answers. (Response Scale: Never, Sometimes, Often, Always)

1	I feel sad or empty
---	---------------------

2	Nothing is much fun anymore
3	I have trouble sleeping
4	I have problems with my appetite
5	I have no energy for things
6	I feel worthless
7	I think about death
8	I am tired a lot
9	I feel restless
10	I feel like I don't want to move

7. Anxiety (Six-month Adolescent-report)

Over the LAST TWO WEEKS, how often have you been bothered by the following problems?
(Response Scale: Not at All, Several Days, More than Half the Days, Nearly Everyday)

1	Feeling nervous, anxious or on edge
2	Not being able to stop or control worrying
3	Worrying too much about different things
4	Trouble relaxing
5	Being so restless that it is hard to sit still
6	Becoming easily annoyed or irritable
7	Feeling afraid as if something awful might happen

8. Substance Use (Six-month Adolescent-report)

1	Have you ever smoked a cigarette? (1) Yes, (0) No
2	Have you ever smoked a cigar? (1) Yes, (0) No
3	Have you ever used chewing tobacco? (1) Yes, (0) No
4	Have you ever smoked, or used snuff? (1) Yes, (0) No
5	Have you ever had a drink of alcohol? (1) Yes, (0) No
6	Have you ever been drunk from drinking alcohol? (1) Yes, (0) No
7	Have you ever smoked marijuana (grass, pot) or hashish (hash)? (1) Yes, (0) No

9. Positive Affect (Six-month Adolescent-report)

Please indicate how much of the time you felt each of the following emotions in the LAST MONTH. (Response Scale: None of the Time, A Little of the Time, Some of the Time, A Good Bit of the Time, Most of the Time, All of the Time)

1	How much of the time in the last month did you feel HAPPY?
2	How much of the time in the last month did you feel CONTENT?
3	How much of the time in the last month did you feel PROUD?
4	How much of the time in the last month did you feel CALM?

10. Life Satisfaction (Six-month Adolescent-report)

During the PAST MONTH, how much of the time... (Response Scale: None of the Time, A Little of the Time, Some of the Time, A Good Bit of the Time, Most of the Time, All of the Time)

1	Have you generally enjoyed the things you do
2	Have you felt that the future looks hopeful and promising
3	Has your daily life been full of things that were interesting to you
4	Did you feel relaxed
5	Were you a happy person
6	Were you satisfied with your life

11. Purpose in Life (Six-month Adolescent-report)

Please indicate how much you agree or disagree with the following statements. (Response Scale: Strongly Disagree, Disagree, Slightly Disagree, Neither Agree nor Disagree, Slightly Agree, Agree, Strongly Agree)

1	I believe I know what I was meant to do in life
2 (r)	As yet, I've not figured out what to do with my life
3	I can say that I have found my purpose in life
4	I believe I have discovered who I really am
5	I believe I know what my best potentials are and I try to develop them whenever possible

APPENDIX B: Example Syntax for Aim 1 and Aim 2 Analysis

1. Example for Aim 1 Syntax

```
title: 6-class cluster by ID across all families all days
data: file is "scored sample (with transformation).csv";
variable: names are id day
          mf1 mf2 ma1 ma2 fa1 fa2
          mfclose maclose faclose
          Tmf Tma Tfa;
missing are all (-999);
usevariables = Tmf Tma Tfa;
cluster = id;
class = c(6);
analysis: type = complex mixture;
          starts = 500 100;
          lrtstarts 500 100 500 100;
          lrtbootstrap = 100;
          processors = 4;
output: tech11;
```

2. Example for Aim 2 Syntax

```
title: level-1 6 class level-2 5 class
data: file is "scored sample (with transformation).csv";
variable: names are id day mf1 mf2 ma1 ma2 fa1 fa2
         mfclose maclose faclose Tmf Tma Tfa;
missing are all (-999);
usevariables = Tmf Tma Tfa;
auxiliary=day;
cluster = id;
classes = cb(5) cw(6);
between = cb;
within = Tmf Tma Tfa;
analysis:
type = twolevel mixture;
optseed=475419;
processors = 4;
model:
% within%
% overall%

% between%
% overall%
cw on cb;

model cw:
% within%
% cw#1%
[Tmf@0.026 Tma@0.091 Tfa@0.046];
% cw#2%
[Tmf@1.892 Tma@0.054 Tfa@1.876];
% cw#3%
[Tmf@0.046 Tma@0.686 Tfa@1.319];
% cw#4%
[Tmf@1.284 Tma@0.236 Tfa@0.052];
% cw#5%
[Tmf@1.082 Tma@1.008 Tfa@1.224];
% cw#6%
[Tmf@1.658 Tma@1.576 Tfa@1.784];
savedata:
file is "^export membership.sav";
save = cprob;
```


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- 2019 Ph.D., Human Development and Family Studies, The Pennsylvania State University
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- 2010 B.S., Psychology, Wuhan University
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- Xia, M.**, Fosco, G. M., Lippold, M. A., & Feinberg, M. E. (2018). A Developmental Perspective on Young Adult Romantic Relationships: Examining Family and Individual Factors in Adolescence. *Journal of Youth and Adolescence*, *47*(7), 1499-1516.
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SELECTED PRESENTATIONS

- Xia, M.**, Weymouth, B., Bray, B. C., Lippold, M. A., Feinberg, M. E., & Fosco, G. M. (May, 2018). Exploring Influence of Triadic Family Relationship Profiles on Adolescents' Early Substance Initiation. Poster, Society for Prevention Research, Washington, D.C.
- Xia, M.**, Fosco, G. M., Bray, B. C. (April, 2018). Triadic Dance on a Daily Basis: Profiles of Mother-Father-Adolescent Triadic Relationship Forms and Dynamics. Poster, Society for Research on Adolescence, Minneapolis, MN.
- Xia, M.**, & Fosco, G. M. (April, 2017). What Makes Adolescents Feel Loved by Their Parents? Daily Dynamics Among Support, Conflict, and Relationship Quality. Poster, Society for Research in Child Development, Austin, TX.
- Xia, M.**, Fosco, G. M., Bray, B. C., & Grych, J. H. (March, 2016). Profiles of Triadic Family Relationships: Predictors and Implications for Adolescent Friendship Quality. Poster, Society for Research on Adolescence, Baltimore, MD.