

**Social Networks over the Life Course:
Continuity, Context, and Consequences**

by

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DEDICATION

To the memory of my godfather, Thomas Pannaparayil, the first in my family to obtain a doctorate. His final words to me before his passing were, “I want to hear about your dissertation.” This is for him.

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“Call it a clan, call it a network, call it a tribe, call it a family. Whatever you call it, whoever you are, you need one.”

— Jane Howard

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ABSTRACT

Social relations have far-reaching influences on health and well-being across the lifespan. Social networks refer to the constellation of different interpersonal relationships that individuals maintain through their lives. Considering life course perspectives has illuminated the ways in which social networks develop and influence health and well-being at different life stages. The aim of this dissertation is to examine the multidimensionality, continuity, and consequences of social networks for well-being. The tenets of the convoy model are used as a guiding framework in conjunction with lifespan developmental perspectives to capture the unique challenges and circumstances of each developmental period examined.

Most studies of children's social relations focus on specific relationships, despite robust evidence that children's social networks are comprised of a diverse range of social partners. The first study identified patterns of social relations among a regionally representative sample of children aged 7 to 14 ($N=203$), and investigated distinguishing sociodemographic factors between them. Further, links to childhood depressive symptomology were examined. Three typologies were identified: Varied Family (55%), Close Family (22.5%), and Friend and Family (22.5%). Whites were more likely to be in the Friend and Family networks. There were no other sociodemographic differences between typologies. Additionally, membership in the Friend and Family typology was associated with greater depressive symptomology, but this link was not observed after accounting for significant life events. The findings highlight the importance of family-centric networks in childhood.

Previous studies document differences in social networks across the lifespan, but longitudinal studies of intraindividual change in social networks are limited. The second study investigated continuity in social networks from childhood to adulthood using three waves of longitudinal data spanning 23 years. Results of growth curve analyses indicated that the majority of social network characteristics changed. Four patterns of social networks were identified in early adulthood ($M_{\text{age}}=23$): Diverse Distal, Varied Family, Close Family, and Friend-Focused. Descriptive data on transitions between social network patterns from childhood to adulthood suggest that most respondents experienced an expansion and diversification of social networks. This study demonstrated that changes in social networks from childhood to adulthood are consistent with the developmental goals of the transition to adulthood.

The third study focused on older adults' social networks and loneliness. Given the prominence of activity engagement in models of successful and active aging, the broader social integration derived from activity engagement was expected to protect against loneliness. The purpose of this study was to identify activity engagement patterns, and use these patterns to disentangle links between activity engagement, social network characteristics, and loneliness. Three classes of activity engagement were identified in a sample from the Health and Retirement Study ($N=7,731$): Restricted Activities (24%), Average Activities (46%), and Diverse Activities (30%). Activity engagement had direct and moderating effects on loneliness. Specifically, diverse activity engagement buffered the negative effects of having few close ties with children. These findings suggest that social integration through activity engagement may compensate for inadequate social networks.

Taken together, these findings underscore the importance of studying social networks with a consideration for the developmental context in which they are formed, evolve, and exert

influences on well-being. Using innovative pattern-centered approaches, these studies illuminate alternative ways of conceptualizing and measuring social networks. Findings from this dissertation provide insight into how social networks can be most effectively leveraged to promote successful development and aging.

CHAPTER I

INTRODUCTION

Close, social ties are ubiquitous interpersonal resources that significantly influence individuals' health and well-being across the lifespan. Among the earliest, most compelling findings was the link between social relations and mortality, suggesting that individuals who lacked social ties were more likely to die by the 9-year follow-up (Berkman & Syme, 1979). Decades later, Holt-Lunstad, Smith, and Layton (2010) conducted a meta-analytic review that reinforced the strength of the association between social relations and mortality, as well as clarified which aspects of social ties are most influential. Despite the lack of rigorous empirical work on representative samples in the earliest studies, there was recognition that social ties, specifically family relationships and friendships, are a naturally occurring social resource. Pioneering research on interpersonal ties isolated specific relationships. One of the earliest theoretical perspectives on social relations was attachment theory. Bowlby (1969) articulated the importance of the mother-child relationship in infancy, and subsequent studies showed how attachment processes can be applied to all close relationships (Antonucci, Akiyama, & Takahashi, 2004; Chopik, Edelstein, & Fraley, 2013; Van IJzendoorn, 1995). This theory has evolved considerably since its inception and now encompasses a number of different close, intimate ties across the lifespan. Similarly, Lowenthal and Haven (1968) provided early evidence for the importance of a confidant in buffering against stressful losses. This ground-

breaking work inspired subsequent research on the direct and indirect impact of social support on health and well-being. In addition, it has become increasingly clear that social relations are more complex and expansive than the presence or absence of specific social ties.

Social networks, the constellation of an individual's closest relationships, accompany individuals across the lifespan and play an important role in each developmental period. Evolving theoretical perspectives and methodological advances have yielded new insights into the multidimensional nature of social relations, and how they manifest depending on personal and situational characteristics (Antonucci, Fiori, Birditt, & Jackey, 2010). Furthermore, adopting a lifespan perspective allows for a more nuanced understanding of how the distinct facets of these close relationships differentially influence health and well-being, from childhood into older adulthood.

The central aim of this dissertation is to clarify and extend past research on social relations by providing a developmental lens through which to examine the multidimensionality of, stability and change in, and determinants and consequences of social relations. Several theoretical perspectives on human development within psychology and other disciplines consider the development and implications of social relations across the lifespan. I begin this introduction chapter by summarizing the theoretical perspectives that inform this dissertation, beginning with the convoy model of social relations. Next, I provide a brief description and critique of commonly used social network measures. This is followed by a summary of other life course perspectives. Throughout these sections, I integrate empirical work that has applied these theories and highlight the gaps that exist in the literature. Finally, I end this chapter with an overview of the questions I aim to address, illustrated with a conceptual model that provides a framework for this dissertation.

Convoy Model of Social Relations

This dissertation is primarily guided by the convoy model of social relations (Antonucci et al., 2010; Kahn & Antonucci, 1980). Individuals' social networks, or convoy, consist of their closest and most important social relationships. The convoy model is comprised of four basic tenets: 1) social relations are multidimensional; 2) social relations are dynamic; 3) personal and situational characteristics shape social relations; and 4) social relations influence health and well-being. In the following sections, I describe each of these tenets, summarize illustrative past research, and highlight gaps in the literature.

Multidimensional

The convoy model posits that social relations consist of multiple dimensions, including social network structure, function, and quality (Antonucci et al., 2010). Social network structure refers to the objective characteristics of personal networks, including size, composition (e.g., age, gender of, and relationship to network members), and proximity to and contact with network members. Perhaps the most important function of social networks is the provision of support. When functioning optimally, an individual's social network serves to buffer stress by providing support in times of need. Support can be exchanged in a variety of ways, including instrumental support (e.g., offering advice) and emotional support (e.g., providing comfort). Support exchanges can also be conceptualized as affect, aid, and affirmation (Kahn & Antonucci, 1980). Depending on an individual's personal characteristics and on contextual factors, different levels and types of social support are required from network members at different points in the lifespan. Satisfaction with support refers to whether or not the support provided by convoy members is perceived by the recipient as adequate. Thus, the quality of one's relationships varies on both positive and negative dimensions. Although it is informative to assess individual social network

characteristics, the study of social relations has greatly benefited from examinations of multiple aspects simultaneously. In this dissertation, both variable-centered and pattern-centered approaches will be employed to gain a fuller understanding of social networks at different developmental periods.

Dynamic

Social convoys evolve and develop with an individual over time in terms of both structure and function. An optimally functioning social network will serve as a support system during times of stress, changing in ways to meet the demands of that developmental period and specific circumstances of the individual. A number of theoretical perspectives have described how social relations change with individual development. For most people, however, a core part of the social network (e.g., parents, children) will remain stable across longer periods of time (Antonucci & Akiyama, 1987). Similar to research on the different dimensions of social relations, research on stability and change of social networks is dominated by studies of adults. Although examinations of specific relationship types are more common in childhood, adolescence, and early adulthood, a comprehensive investigation of overall social networks across these age periods is lacking.

Determinants of Social Relations

Social convoys move with an individual throughout the lifespan and are shaped by personal and situational characteristics that remain stable as well as those that change over time (Antonucci, Birditt, & Ajrouch, 2011; Antonucci & Akiyama, 1987). Moreover, each of the dimensions of social relations is shaped by personal and situational characteristics. Personal characteristics including age, sex, race, ethnicity, and socioeconomic status shape how individuals' social networks are structured and the types of support they are likely to provide and

receive. In addition to the influence of age on social relations, as described in the previous section, prior research has investigated differences in the networks by gender, race and ethnicity, and socioeconomic status (Ajrouch, Antonucci, & Janevic, 2001; Ajrouch, Antonucci, & Webster, 2014; Ajrouch, Blandon, & Antonucci, 2005).

Situational characteristics describe the broader, macro-level context in which social relations are embedded, and include social roles, societal expectations, and sociocultural norms. Cross-cultural examinations have yielded insights into how social relations vary according to the norms and expectations of different cultures (Nguyen, 2017; Takahashi, Ohara, Antonucci, & Akiyama, 2002; Webster, Antonucci, Ajrouch, & Abdulrahim, 2015). Situational characteristics change over time according to shifts in social roles and societal expectations. By considering situational characteristics that are consistent different developmental goals, such as the acquisition of adult roles (e.g., spouse, parent) in early adulthood, the implications of social relations may be more readily applicable.

Outcomes of Social Relations

The links between social relations and health, well-being, and mortality have been well documented (Antonucci, Birditt, & Webster, 2010; Cohen, 2004; Julianne Holt-Lunstad et al., 2010; McCormick, Kuo, & Masten, 2011; Pietromonaco & Collins, 2017; Thoits, 2011; Uchino, 2006, 2009; Uchino et al., 2012; Uchino, Bowen, Carlisle, & Birmingham, 2012). Although many well-being outcomes, including depression, are important and have broad implications across the lifespan, others highlight the unique challenges of different developmental periods. Social relations, namely weak or unsupportive social networks, have been linked to depressive symptomology at all ages, from childhood and adolescence (Gavin, Chae, & Takeuchi, 2009; Meadows, Brown, & Elder, 2006; Rueger, Malecki, Pyun, Aycock, & Coyle, 2016) to older

adulthood (Antonucci, Fuhrer, & Dartigues, 1997; Schwarzbach, Luppá, Forstmeier, König, & Riedel-Heller, 2014). In addition, as Hanklin (2015) has noted, social relations represent an interpersonal mechanism through which other factors (e.g., stressful life events) influence depressive symptomology in childhood and adolescence.

Similarly, loneliness, often resulting from unmet social needs or poor social integration, can be experienced at all ages. However, social isolation and loneliness experienced by older adults is gaining widespread attention due to demonstrated negative links to physical health, psychological well-being, and mortality (Hawkey & Cacioppo, 2007; Holt-Lunstad, Smith, Baker, Harris, & Stephenson, 2015). It is important to consider the developmental context assessing how social relations are beneficial or detrimental at different periods (i.e., differential influences of social relations in childhood, older adulthood, etc.). In this dissertation, the implications of social networks for well-being will focus on depressive symptomology in childhood and loneliness among older adults.

Measuring Social Networks

Originally conceived as purely qualitative and hardly measurable, social relations are now widely understood to be multidimensional, incorporating many different structural (e.g., social network size, composition) and functional (e.g., social support) aspects. Social relations refer broadly to social networks, social support exchanges, social interactions, and characteristics of specific social relationships, or social ties (Antonucci, 2001). Personal, social networks have been defined in a number of ways across multiple disciplines, but broadly refer to the constellation of different interpersonal relationships that individuals maintain through their life. Social networks can be restricted to certain relationship types (e.g., friendship networks), describe social functions (e.g., interaction networks), or refer more generally to global networks

(Milardo, 1992; Ueno, 2005). Additionally, because social relations are dynamic and evolve with age, the practical problem of how to measure them consistently across age groups arose (Takahashi, 2005). The hierarchical mapping technique was developed to address this issue (Antonucci, 1986). This innovative measurement technique provided a way for individuals to project their social networks in terms of their own subjective evaluations of closeness to specific network members. Using this measure, a number of different characteristics can be derived, including the structural properties of social networks, levels and type of social support exchanges, and relationship quality. In contrast, other methods that use role relations (e.g., spouse, mother) to construct social networks may not capture individuals' subjective evaluations of whom they consider to be close and important.

It is important to distinguish between social networks, social support, relationship quality and satisfaction with support because they measure distinct constructs that differentially influence developmental outcomes (Antonucci & Akiyama, 1994). The focus of this dissertation is primarily on the structure of social networks. Without an understanding of the structural elements of social ties, it is difficult to contextualize function and quality. The characteristics of social network structure, including size, composition, contact, and proximity, can be examined independently or in combination.

Social Network Characteristics

Size. Social networks vary in size depending on the perceived number of close and important others. Social network size represents the availability of support, as well as the possibility for negativity or conflict.

Composition. Social networks vary in terms of composition, depending on the gender, age, and relationship with network members. For example, social networks can be comprised of

mostly family, mostly friends or non-kin, or a mix of both. They can include a majority of same-aged peers, or they can be more multigenerational with network members of different ages.

Social networks can also vary in terms of gender composition, consisting of mostly men, mostly women, or a mix of both. Different types of relationship partners may provide different types of support. It is, therefore, imperative to have diversity in one's network in order to fulfill a number of social support needs (Takahashi, 2005).

Frequency of Contact. Frequency of contact describes how often individuals are in touch with people in their social network. Greater contact frequency is typically associated with the availability of more social resources (Ajrouch et al., 2001).

Proximity. Social networks can be proximal or distal, depending on how geographically close individuals are to the people in the network. As with contact frequency, more proximate networks are associated with having more support available.

Patterns of Social Relations

Empirical examinations of these aforementioned social network characteristics provided insight into how they manifest at different ages, change over time, and influence well-being. By considering how individual social network characteristics were independently linked to other variables of interest, however, these variable-centered approaches did not adequately capture the systematic linkages among them. New and evolving methodological approaches such as cluster analysis and latent class or latent profile analysis (LCA/LPA) are uniquely appropriate to incorporate the recognition of the complex, multidimensional, and dynamic nature of social relations. LCA provides a framework for identifying multiple subgroups within a population by measuring systematic differences in a set of characteristics, such as social network variables (Lanza & Cooper, 2016; Muthén & Muthén, 2000). This method has enabled researchers to

characterize and classify individuals more holistically based on shared social network characteristics, and to potentially identify subgroups of individuals who are at-risk for poor developmental outcomes.

A number of previous studies have employed different techniques, including cluster analysis and latent class/profile analysis, to identify patterns of social relations by incorporating multiple dimensions and indicators of social relations (Fiori et al., 2016; Fiori, Antonucci, & Akiyama, 2008; Fiori, Antonucci, & Cortina, 2006; Fiori, Smith, & Antonucci, 2007; Levitt et al., 2005; Li & Zhang, 2015; Nguyen, 2017; Suanet, Antonucci, & Carr, 2016). Indicators range from network structure dimensions (e.g., network size) to function (e.g., support). Four patterns of social relations that often emerge across these studies include: Diverse, restricted, family-focused, and friend-focused. Diverse networks are usually relatively large and are composed of a number of different relationships, including family and friends. In contrast, restricted networks are small and only include very close individuals, usually close and immediate family. Other network types are characterized by the predominant category of social partners (e.g., family or friend). Friend-focused networks include a majority of friends or other non-kin, whereas family-focused networks are predominantly made up of various combinations of immediate and extended family. Friend- and family-focused networks can vary in size and support exchanges.

Studies that focus on more specific types of relationships can shed light on the possible heterogeneity within these broad patterns of social relations. For example, Miche and colleagues identified four types of friendship networks: Discerning, independent, selectively acquisitive, and unconditionally acquisitive (Miche, Huxhold, & Stevens, 2013). Individuals who fit these typologies were distinguishable by the number of friends they had, duration of friendships, and emotional closeness with friends.

The majority of these studies focus on middle-aged and older adult populations, including cross cultural examinations (Fiori et al., 2008; Li & Zhang, 2015; Litwin, 2001; Nguyen, 2017; Park et al., 2013). Pattern-centered examinations of children and young adults are more limited. The transition to young adulthood is typically a stressful, but normative, life transition marked by shifts and instability in social roles and relationships. By uncovering patterns of social relations among children and young adults, and investigating how these patterns are linked to health, well-being, and other important developmental outcomes, we might be able to identify children who are most at-risk and intervene. These patterns will also provide detailed information about the social resources that individuals have at hand while undergoing potentially stressful life transitions. Once the availability and nature of social ties is established, they can then be leveraged to combat stress and achieve developmentally appropriate milestones. Nevertheless, LCA and related procedures are still considered to be somewhat exploratory in identifying subgroups within populations (Lanza & Cooper, 2016) and, therefore, should be used in conjunction with variable-centered analyses to gain a fuller understanding of social relations. In this dissertation, both types of analytic techniques are employed.

Life Course Perspectives on Social Relations

The convoy model has life course and lifespan foundations, highlighting the plasticity of the social convoy as an individual develops and passes through different life stages and circumstances (Antonucci et al., 2010). It is important to consider these perspectives when studying social relations because early social relations are intimately related to later ones. There is usually substantial continuity among social relations at all points across the lifespan. There can, however also be a great deal of discontinuity and change, particularly during times of transition. Depending on the developmental context, continuity or change can be either

normative or non-normative, and this could have different repercussions for health and well-being. The life course perspective provides a lifespan developmental context for the study of social relations, whether assessing stability and change, or antecedents and consequences. In the following sections, I describe a few of the seminal theoretical perspectives that have guided research on social relations at different stages of the lifespan. It should be noted that although most of these perspectives are often applied to specific age periods or developmental stages, they are truly lifespan in nature, much like the convoy model of social relations.

Childhood

A number of classic developmental psychology theories reference to some extent the importance of social networks in children's development, including attachment theory (Bowlby, 1969), the bioecological model (Bronfenbrenner & Morris, 2006), and social network system perspectives (Cochran & Brassard, 1979). All of these theoretical frameworks recognize that children are embedded within larger social networks that contribute to their development. As mentioned above, Bowlby (1969) and other attachment theorists who followed maintained that the mother-infant bond served as the basis from which all other close relationships develop. Attachment theory has since been broadened to incorporate a number of long-lasting affectional bonds, including parent-child ties into adulthood, romantic partnerships, and close friendships (Ainsworth, 1989; Antonucci & Akiyama, 1994; Merz, Schuengel, & Schulze, 2007; Simpson & Rholes, 2017). Although the nature of attachment relationships changes with age to include different types attachment figures (e.g., spouse in adulthood), the major functions of attachment relationships, including proximity seeking, and serving as a safe haven and secure base, remain stable across the lifespan (Doherty & Feeney, 2004).

Bronfenbrenner and Morris (2006), though not the first to do so, articulated that children's social worlds extend beyond the mother-infant dyad and encompass social interactions and social ties that are formed at different levels of their environment, from the microsystem to the macrosystem, including those formed in the household, schools, and communities. A number of other theories and models of child development, including the social network systems perspective (Cochran, Lerner, Riley, Gunnarsson, & Henderson, 1990; Cochran & Brassard, 1979), reiterated that children's social worlds extend far beyond the parent-child tie, especially as they age into middle and later childhood (Lewis, 2005). Cochran and colleagues emphasized that understanding the personal networks of parents and children is crucial to the study of child development because these social networks represent the context in which development unfolds.

These social systems continue to exist and exert influences on the individual's development across the lifespan, although different systems may become more or less salient at different parts of the lifespan. For example, social relations at the household-level may be the most influential social system in early childhood when the child exists mostly within the cocoon of the family. In adulthood, the workplace and the broader neighborhood or community are likely to play a larger role in shaping development. Still, empirical inquiry into children's social relations is overwhelmingly dominated by research on specific social ties. In this dissertation, I look more broadly at children's social networks at large to identify those social ties that are subjectively evaluated to be closest and most important, and the implications of these social networks for well-being.

Young Adulthood

According to the convoy model of social relations, changes in social networks are shaped by changes in personal (e.g., age) or situational characteristics (e.g., social roles). The modern-

day transition to adulthood can be defined by a set of transition markers, or developmental tasks, that describe an individual's adjustment to new social roles and societal expectations (Schulenberg & Schoon, 2012). Developmental tasks refer to standards that span various domains used to judge individuals' successful adjustment to life stages (McCormick et al., 2011). Early theories about developmental tasks focused on childhood and adolescence, but recent extensions to adulthood and aging have provided a more lifespan perspective (Baltes, 1987; Baltes & Smith, 2003). Developmental tasks and transition markers of early adulthood include educational attainment, employment, romantic partnership, parenthood, and living independently (Settersten, 2007). These have bidirectional effects on social relations. For example, there is a body of literature describing how social networks change with the transition to parenthood and entry into the workforce (Bost, Cox, Burchinal, & Payne, 2002; Wrzus, Hänel, Wagner, & Neyer, 2013). In her lifespan theory of socioemotional selectivity theory (SST), Carstensen (1992, 1995) describes how the social motivations of different developmental periods drive individuals' intentions to form social ties. In early adulthood, when information acquisition is the primary goal, individuals seek out numerous social ties with a diverse set of partners to expand their social networks. These motivational influences described by SST would predict the expansion and diversification of social networks in early adulthood, but longitudinal studies of social networks from childhood to early adulthood are rare. In this dissertation, I examine intraindividual change in social networks from childhood through adulthood in an effort to build upon past work on age differences in social networks across the lifespan and fill this gap in the literature.

Older Adulthood

Individuals continue to be embedded within social networks as they age. The developmental perspectives that have been traditionally used to describe social relations in childhood and early adulthood are still applicable. Social integration and continued social engagement are, in fact, key components of successful aging (Rowe & Kahn, 1997). In addition, a number of theoretical perspectives have been developed to describe the differences and changes in social networks across age in adulthood.

In addition to providing a rationale for differences in the social networks of children and young adults, SST also offers an explanation for observed changes in adults' social networks as they age. According to SST, older adults are motivated by shifting time perspectives to prioritize emotion regulation and meaning in life. As a result, Carstensen argues that older people tend to focus on close, meaningful relationships (Carstensen, 1995, 2006). Observed reductions in network size as individuals age, she argues, can be attributed to loss of peripheral ties, rather than close ties (Fung, Carstensen, & Lang, 2001). Similarly, the strengths and vulnerabilities integration (SAVI) model, suggests that older individuals seek to enhance the positive and minimize the negative in terms of social relations (Charles & Piazza, 2009). According to SAVI, older adults become experienced at avoiding or mitigating negative experiences, including interpersonal experiences, through both cognitive and behavioral mechanisms (Charles & Luong, 2013). Together, SST and SAVI suggest that the commonly observed shrinking of social networks as people age is purposeful and motivated by emotion regulation goals.

Baltes and colleagues developed a theory of Selection, Optimization, and Compensation (SOC), which is yet another motivational framework for understanding age-related changes in social relations (Baltes, 1987, 1997; Freund, 2008). According to SOC, lifespan development entails allocation of resources (e.g., physical, cognitive, social, etc.) into growth, maintenance of

function, and regulation of loss when confronted with opportunities for growth or when faced with potential for loss (Baltes & Smith, 2004). When applied to social relations, this model effectively outlines the changes that occur in social networks across the lifespan. Specifically, growth or expansion of social ties occurs early in life and into young adulthood, maintenance or expansion during middle adulthood, and regulation of social losses in older adulthood.

Despite the changes in social networks in older adulthood that might suggest otherwise, social integration and continued social engagement is a hallmark of successful aging. In the classic MacArthur model, Rowe and Kahn (1987, 1997) defined successful aging as having three major components: Freedom from disease and disability, maintenance of high physical and cognitive function, and continued engagement with life. Engagement with life encompasses maintenance of interpersonal relationships and of productive activities, both of which are associated with physical and psychosocial indicators of successful aging. Existing research on the engagement of life dimension of successful aging typically only combines interpersonal relationships and activity by investigating social activities (Adams, Leibbrandt, & Moon, 2011; Huxhold, Miche, & Schüz, 2014). However, activities that are not explicitly social can also have implications for social integration. Broader conceptualizations of social relations that incorporate engagement with life should be considered when studying social relations among older adults. In this dissertation, I investigate activity engagement as an interpersonal resource that might substitute for limited social ties or augment robust social networks.

Dissertation Overview

My dissertation contributes to the literature on social relations by using the tenets of the convoy model as a guiding framework to examine social relations and activities over the life course. Furthermore, I draw from the literature surrounding three distinct developmental

periods, childhood, early adulthood, and later adulthood, to provide a lifespan developmental context for social relations. I focus on developmentally relevant determinants and consequences of social relations to highlight the importance of social networks during different developmental periods. In this way, I seek to broaden the implications of this work by making it more directly applicable to different age groups.

Specifically, across three papers I uniquely examine social relationships from childhood to older adulthood using pattern-centered approaches that incorporate multiple aspects of social ties. In the first study, I identify patterns of children's social networks and investigate how these patterns are distinguishable by sociodemographic characteristics, and are differentially associated with depressive symptomology. In the second study, I capitalize on three waves of in-depth social relations data to investigate stability and change over time from childhood to early adulthood. In the third study, informed by theories of successful and active aging, I broaden the conceptualization of social relations to include activity engagement and investigate links between activity engagement patterns, social network characteristics, and loneliness. Through these studies, I approach the study of social relations from a lifespan developmental perspective to capture the unique challenges and circumstances of the distinct developmental periods examined. This dissertation has three aims, each one addressed by one of the following papers and represented in the conceptual model (Figure 1.1):

- A. Identify patterns of social networks in childhood using indicators of social network structure, and investigate the sociodemographic correlates and well-being outcomes of these patterns.

- B. Investigate stability and change in social networks from childhood to early adulthood by examining intraindividual change in individual social network characteristics, as well as links between childhood and adulthood patterns of social networks.
- C. Identify patterns of activity engagement among older adults, and disentangle links between these activity engagement patterns, social network characteristics, and loneliness.

Preview of Studies

These aims will be addressed in three empirical papers reporting on secondary analyses of survey data. The first two papers use data from three waves of the Social Relations and Health Study (PI: Antonucci) and the third paper uses cross-sectional data from the 2010 wave of the Health and Retirement Study (HRS). In the first paper, I focus on childhood social networks and identify typologies of social networks using a pattern-centered approach. Next, I extend these findings to investigate continuity in social networks across the transition to adulthood. Finally, I broaden the meaning of social networks to encompass social integration through activity engagement in the third paper by identifying patterns of activity engagement and their links to loneliness. Each of these studies considers the developmental context in which social networks operate and contributes to a more complete understanding of social relations across the life course.

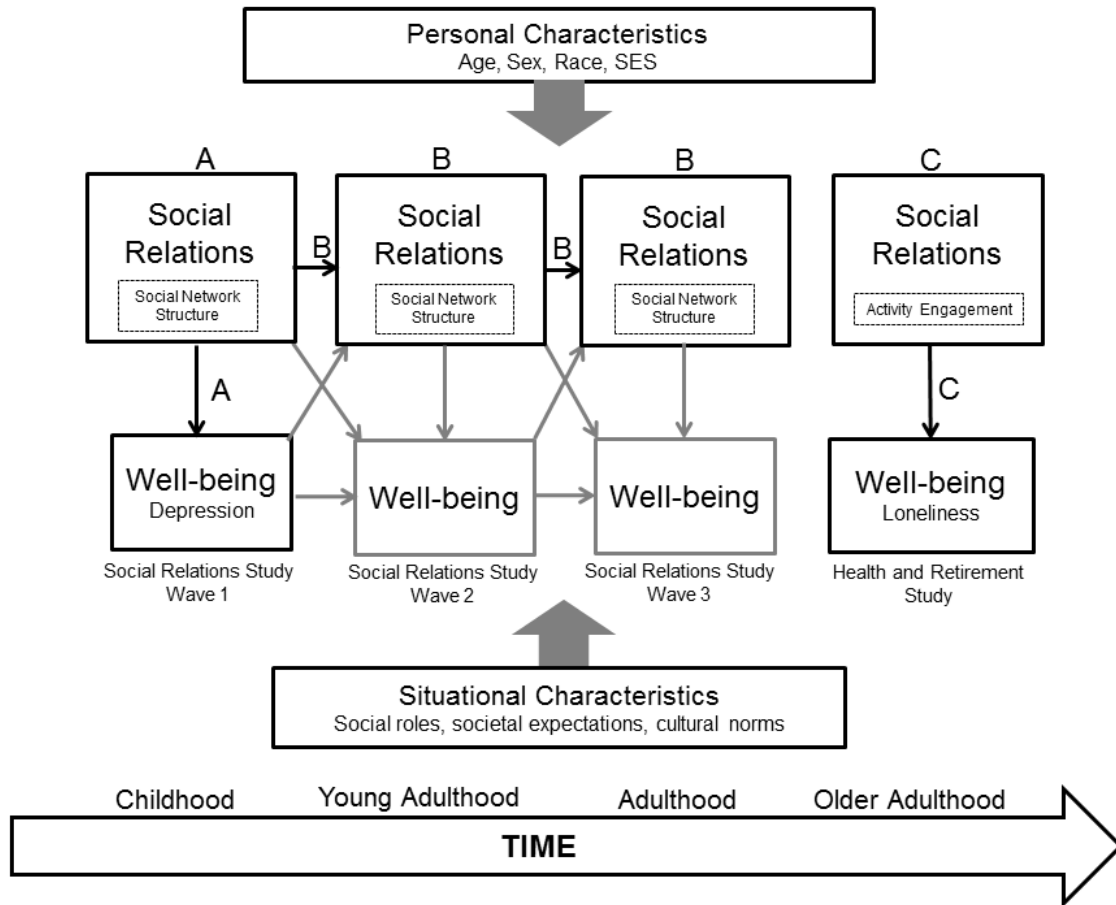


Figure 1.1 Conceptual model – adapted longitudinal convoy model of social relations. The letters A, B, and C refer to the parts of the model that will be addressed in chapters II, III, and IV, respectively.

CHAPTER II
BEYOND THE NUCLEAR FAMILY:
PATTERN-CENTERED INVESTIGATION OF CHILDREN'S SOCIAL NETWORKS

Introduction

Social relationships are an important interpersonal resource that significantly influences an individual's health and well-being across the lifespan. From infancy to old age, our social partners have a profound influence on all aspects of development. The social interactions and experiences that occur during childhood, in particular, can have lifelong implications. Previous research has been limited to investigations of specific relationships in childhood, including the parent-child tie and friendships. Children are embedded within larger social networks, and the constellation of these close and important social ties contributes to development in childhood and beyond.

Theoretical and methodological advances have yielded new insights into the multidimensional nature of social relations and how they manifest depending on personal and situational characteristics. Less is known, however, about the structure of social relations and social networks at earlier periods in the lifespan. The present study addresses this gap in the literature by examining children's social networks.

Theoretical Framework

Social relations have been defined in a number of ways across multiple disciplines, but broadly refer to the constellation of interpersonal relationships that individuals maintain through

their life. A number of classic developmental psychology theories reference the importance of social networks in children's development, including attachment theory (Bowlby, 1969), the bioecological model (Bronfenbrenner & Morris, 2006), and social network system perspectives (Cochran & Brassard, 1979). All of these theoretical frameworks recognize to some extent that children are embedded within larger social networks that contribute to their development.

The present study is guided primarily by the convoy model of social relations, which describes social relations as dynamic and multidimensional (Antonucci et al., 2010; Kahn & Antonucci, 1980). Social relations evolve and are influenced by personal and situational characteristics that remain stable as well as those that change over time (Antonucci & Akiyama, 1987; Antonucci, Birditt, & Ajrouch, 2011).

Even early in the lifespan, children's social networks expand to capture the social needs of their developmental stage. For example, in infancy, children's social worlds are limited to primary caregivers, and then throughout childhood, social partners expand to include other family members, playmates, school peers, and teachers. The convoy model encompasses multiple dimensions of social relationships, such as social network structure, function, and quality (Antonucci et al., 2010). Social network structure refers to the objective characteristics of personal networks, including size, composition (e.g., age, gender of, and relationship to network members), proximity to, and contact with network members. These aspects together represent the availability of interpersonal resources and social support. Social network function most often refers to exchanged support, or given and received support of various types (e.g., instrumental, informational, or emotional; aid, affect, or affirmation) (Kahn & Antonucci, 1980; Taylor, 2011). It is important to distinguish between social networks, social support, and satisfaction with support, or relationship quality, because they differentially influence developmental outcomes

(Antonucci & Akiyama, 1994). The focus of existing literature is primarily on social support in childhood, and studies that do investigate social network structure typically only address individual characteristics (e.g., network size). To gain a more holistic understanding of social network structure among children, this study examines multiple aspects of social network structure simultaneously using a pattern-centered approach.

Social Relations in Childhood

Most studies of children's social relations focus on specific relationships, namely the parent-child tie, or contexts of relationships, such as peer relationships at school. However, we know that children form and maintain social ties with multiple individuals, including family and friends, adults and children, during childhood and into adolescence (Levitt, 2005). Although each of these social partners likely plays a unique role in the child's development, the properties of the social network at large cannot be quantified by assessing each of the relationships individually, but rather, holistically. Models like the convoy model can capture the complexity of a child's social system.

There has been a concerted effort by researchers to look beyond the nuclear family and study social networks at large. The majority of studies address differences and changes in social support exchanges and relationship quality (Franco & Levitt, 1998; Levitt et al., 2005; Levitt, Guacci-Franco, & Levitt, 1993). There is also empirical work on the structural characteristics of social networks, including network size and composition. Research on other aspects of network structure, such as proximity and contact frequency, are less common (e.g., Franco & Levitt, 1997), perhaps because there is not a great deal of variation in childhood with respect to these network characteristics. Findings from these studies provide us with descriptions of children's

social networks and the ways in which they vary depending on personal and situational characteristics.

Close and immediate family members, including parents and siblings, are often considered to be the closest and most important for social support exchanges (Levitt et al., 1993). Children perceive mothers and fathers as providing the most support, followed by extended family, namely grandparents, and non-kin, including teachers and peers (Furman & Buhrmester, 1985). Although close family members are important members of children's social networks, other family and non-kin are often also included and take part in social support exchanges. Even preschool-aged children frequently nominated as network members peers (e.g., siblings and friends) and extended family (Franco & Levitt, 1997).

Previous research suggests that close, immediate family members play a prominent role in children's social networks. In general, early in childhood, children's social networks are small and dominated by family, but as they enter adolescence and then transition into adulthood, this is less often the case. The number of friends included in the network, for example, increases with age and friends take on more significant social support functions (del Valle, Bravo, & Lopez, 2010; Franco & Levitt, 1998; Levitt et al., 1993; Lewis, 2005). Older children also include more extended family in their networks than younger children (Levitt et al., 1993). On the other hand, extended family members are often displaced to some extent by friends as children transition into adolescence (Furman & Buhrmester, 1992; Levitt et al., 1993). Furman and Buhrmester (1992) found that children become less reliant on grandparents, in particular.

Children's social networks tend to be small in size, relative to adults, but become larger with age. Levitt, Guacci-Franco, and Levitt (1993) showed that the size of children's overall social networks was larger at age 10 than 7, but there were no differences between 10- and 14-

year olds. Studies that assess social network size for longer spans of time show that network size, particularly global and friendship networks, increase into early adulthood (Wrzus et al., 2013). These age-related changes in social network structure and social support are consistent with normative developmental trends, but also highlight the need to pay special attention to family ties in childhood.

Empirical Evidence for Patterns of Social Relations

Although previous investigations of individual network characteristics are valuable for understanding the nature and implications of children's social networks, variable-centered approaches do not capture systematic linkages between different components of social network structure. There is evidence that social network characteristics are systematically linked, and that these patterns of social relations influence outcomes beyond the implications of individual measures. Previous studies have employed various techniques, including cluster analysis and latent class or profile analysis, to capture variations in patterns based on multiple indicators of social relations. These indicators range from network structure dimensions (e.g., network size) to function (e.g., support and relationship quality). The majority of studies have examined several different adult populations. Older adults, in particular, have been a focus of much of this research (Fiori et al., 2006, 2007; Litwin & Shiovitz-Ezra, 2011; Suanet et al., 2016).

Findings of pattern-centered approaches often yield similar network typologies. Four commonly occurring patterns include: Diverse, restricted, family-focused, and friend-focused. Diverse networks are usually relatively large and are composed of a number of different relationships, including family and friends. In contrast, restricted networks are small and only include very close individuals, usually close and immediate family. Other network types can be characterized by the predominant category of social partners (e.g., family or friend). Friend-

focused networks include a majority of friends or other non-kin, whereas family-focused networks are predominantly made up of various combinations of immediate and extended family. Friend- and family-focused networks can vary in size and support exchanges.

Studies that utilize pattern-centered techniques of children are less common. Alternative approaches, including social-cognitive maps and social network analysis, have been used to examine specific types of social networks in childhood, such as friendship or peer networks (Cairns, Leung, Buchanan, & Cairns, 1995; Gest, Farmer, Cairns, & Xie, 2003). Takahashi used yet another measure, the Affective Relationships Scale, to capture the multiplicity of relationships by characterizing patterns of social relations based on support exchanges (Takahashi, 2005; Takahashi & Sakamoto, 2000; Takahashi, Tamura, & Makiko, 1997). Commonly identified typologies among adolescents included mother-type, friend-type, and romantic partner-type, based on the focal person who fulfills the most support functions (Takahashi, 1974; Takahashi & Sakamoto, 2000). These studies also recognize that there may not be one focal person in social networks, but multiple or none (e.g., lone wolf-type).

Levitt and colleagues (2005) examined the social networks of children undergoing the transition to adolescence to identify patterns of support using cluster analysis. Three patterns of social relations were identified at two separate time points, two years apart: Close family/friends, close family, and close/extended family. There was variation among these patterns in the primary source of support. For instance, those in the close family/friends typology reported receiving support from a combination of family and friends. Similar patterns were identified upon closer examination of gender, ethnicity, and cohort, highlighting the robustness of these patterns in a diverse sample of children. Together, these studies provide rich information about the function

and quality of children's social networks, but a more systematic examination of social network structure is lacking.

Distinguishing Factors in Childhood Social Networks

Although previous research has examined patterns of social relations in a variety of samples, most of them are restricted to middle-aged or older adults. This work can, nevertheless, provide insight into the personal and situational characteristics that distinguish different patterns. According to the convoy model, personal and situational characteristics influence various components of social networks. Personal characteristics including age, sex, race, ethnicity, and socioeconomic status shape how individuals' social networks are structured and the types of support they are likely to provide and receive. Situational characteristics capture more macro-level influences, such as social roles or cultural norms. Personal characteristics of the child, including gender and age, have been found in child and adult samples to influence the structure of social networks. As discussed above, older children are more likely to have friends in their networks, so it is hypothesized that age will be a distinguishing factor between networks that are characterized with and without same aged peers (Levitt, Weber, & Guacci, 1993). With regard to gender, women tend to report larger networks (Ajrouch et al., 2001, 2005), but whether this gender difference has childhood origins remains to be seen.

For children, the personal and situational characteristics of their parents may also play a strong role in shaping their own social relations. For example, Cochran and Riley (1990) suggest that children's social networks might even mirror those of their parents. They identified race and household structure (i.e., one- or two-parent family) as two of the most influential characteristics for children's social relations. White children tended to have larger social networks than Black

children and children in two-parent households had more non-kin in their networks than those in one-parent households.

Race, in particular, has been shown to shape social relations, especially in a multigenerational context in the United States. African Americans have strong bonds between extended family members and more frequently exchange tangible and emotional support (Ajrouch, Antonucci, & Janevic, 2001; Mutran, 1985; Taylor, Forsythe-Brown, Lincoln, & Chatters, 2015; Taylor, Chatters, Woodward, & Brown, 2013). Compared to White families, African Americans families are more likely to be extended and to live in multigenerational households (Hofferth, 1984). Older Black individuals often live in multigenerational households with their adult children and grandchildren (Taylor, Chatters, & Jackson, 1993), and play an important role in caring for their grandchildren (Fuller-Thomson & Minkler, 2000; Hayslip & Kaminski, 2005). In addition, African American single and adolescent mothers are more likely than those in other racial/ethnic groups to be supported by extended family members (Hogan & Parish, 1990; Taylor et al., 1993). Similarly, European-American children were less likely to include extended family in their social networks than African-American or Hispanic-American children, and reported receiving less support from extended family members than did children of other ethnic groups (Levitt et al., 1993). Based on these findings, we predict that the social networks of non-white children will be characterized by a higher proportion of extended family than those of White children.

Children's networks are often considered to be a reflection of parents' networks and circumstances, specifically parental educational and economic resources (Cochran & Riley, 1990). Thus, it is useful to examine a number of parental characteristics, including mother's marital status and educational attainment. Lower socioeconomic status was associated with

smaller, less supportive social networks in a sample of Dutch older adults (Van Groenou & Van Tilburg, 2003). Similarly, higher education was associated with larger, more diverse, networks in a U.S. based sample of middle-aged and older adults (Ajrouch et al., 2005). This converging evidence suggests that mothers who are partnered and have attained higher levels of education provide more social network resources to their children, which, as a result, shapes the children's social networks in ways that increase the availability of social resources.

Implications of Network Structure Typologies

A number of studies that identified social network typologies based on network structure and support have also indicated that these typologies are differentially linked to health and well-being. For the most part, diverse, supportive networks are associated with the best outcomes, whereas restricted or unsupportive networks are associated with the worst outcomes. Fiori and colleagues identified social network typologies in older adults and found that individuals in the diverse network exhibited the lowest levels of depression (Fiori et al., 2006). In contrast, across multiple studies, depressive symptomology was highest for respondents in restricted networks characterized by the absence of or lack of support from both family and friends (Fiori et al., 2008, 2006; Fiori & Jager, 2011). Similarly, Takahashi and colleagues found that, among Japanese elders, those characterized by lone wolf network patterns had significant lower life satisfaction and self-esteem than other network types, including friend patterns (Takahashi et al., 1997).

As mentioned above, research on children's social networks is overwhelmingly focused on social support or specific types of relationships, rather than broader social networks. For example, Ueno (2005) examined friendship networks of a nationally representative sample of adolescents and found that number of friends was negatively associated with depressive

symptoms. In childhood, however, it is developmentally normative for networks to be small and comprised of only very close individuals, like families. Family structure in childhood is particularly influential for predicting depressive symptomology (Gavin et al., 2009). Levitt and colleagues (2005) found that children in the close family/friends and close/extended family typologies reported more positive self-concept and lower levels of loneliness when compared to children in the close family typology. This suggests that multiple sources of available support promote well-being.

We also consider sociodemographic characteristics and significant life events that contribute to depressive symptomology and include them as covariates. Twenge and Nolen-Hoeksema (2002) conducted a meta-analysis of children's responses to the Children's Depression Inventory to document differences across a number of sociodemographic characteristics. Their results suggested that girls score higher on the CDI beginning in adolescence, but that there were no significant differences across the other variables examined (i.e., race/ethnicity or socioeconomic status). Additionally, stressful life events have been shown to impact both social relations (Schulz & Tompkins, 1990) and psychological well-being (Compas, 1987) in childhood. Thus, we test whether patterns of children's social networks are differentially associated with depressive symptomology after accounting for other possible explanatory factors.

Research Questions and Hypotheses

Despite the well-established importance of children's social ties on their ongoing development, relatively little work examines patterns of broader social networks, and their implications for childhood well-being. This study addresses three research questions:

1. What are the patterns of social relations that can be identified among children using network structure? It is expected that patterns of social relations in childhood and early adulthood will be consistent with those previously identified in child samples (e.g., Levitt et al., 2005), with size and composition serving as defining characteristics. Specifically, I hypothesize that observed patterns will include family-focused, friend-focused, and diverse networks of family and friends.
2. Do personal characteristics of the child and mother predict different patterns of social relations? It is hypothesized that race will significantly predict network patterns, specifically that Black children's networks will be characterized by the inclusion of more extended family. Older age is expected to be predictive of more friend-focused networks. I also predict that children whose mother's report higher levels of education will have more diverse networks. With regard to gender and mother's marital status, no specific hypotheses are made.
3. Are social network typologies associated with childhood depressive symptomology? We expect that social network patterns that are characterized by limited availability of family ties or close others will be associated with higher depressive symptomology. It is also hypothesized that the number of significant life events experienced by children will be positively associated to depressive symptomology, clarifying the link between social network typologies and depressive symptomology.

Method

Sample & Procedure

The Social Relations and Health over the Life Course Study is a three-wave, longitudinal study that began in 1992. The original sample in Wave 1 (W1; 1992) was drawn from a stratified

probability sample of 1,702 people aged 8-93 in the greater Detroit metropolitan area. The present study used the W1 child sub-sample, which included 202 children aged 7 to 14, 95% of whom were between the ages of 8 and 12. Recruitment efforts for child respondents targeted mothers who were participating in the study. The present study utilizes data from respondents at Wave 1 of the study. Table 2.1 provides demographic characteristics of the sample.

Child respondents were asked to nominate members of their social network using the hierarchical mapping technique (Antonucci, 1985). Using this technique, respondents were presented with a set of three concentric circles containing the word “YOU” in the middle. Social network data were gathered by asking respondents to list all those whom they considered close and important and place them in the circles so that each circle represented varying levels of closeness. The inner circle includes those whom the respondent considers “so close and important it is hard to imagine life without them”, the middle circle includes those to whom the respondent “may not feel quite that close but who are still very important”, and the outer circle includes “people who are close enough and important enough in your life that they should still be placed in their personal network.” Respondents next provided detailed information about each network member (e.g., age, gender) and the nature of their relationship from which social network indicators were derived.

Measures

Social network variables. Total *network size* represents the number of people the respondent included on his/her diagram (i.e., inner, middle, and outer circles combined) with possible values ranging from 0 to 20. Less than 4% of respondents included more than 20 network members. *Contact frequency* with each network member was assessed with a single item, “How often are you in touch with [network member]?”, and averaged to represent the

average frequency with which respondents have contact with their network. *Proximity* indicates the percentage of network members that live within an hour's drive of the respondent. *Close others* in the network represents the percentage of the network that is in the inner circle, derived by dividing the number of network members in the inner circle by the total number of network members. Network composition includes the relative amounts of immediate and extended family, as well as gender and age compositions of respondents' networks. Percentages of the network that was *immediate family*, *extended family*, *female*, and *age-mates* were calculated by dividing the number of the network members in each category by the total number of network members (up to 10 to include the first ten people that the respondent nominated). Immediate family consisted of parents and siblings in childhood, including step-parents and step-siblings. Extended family included grandparents (including great-grandparents), cousins, and aunts/uncles. Age-mates included network members who were aged within one year (older or younger) of the respondent. Table 2.2 provides descriptive statistics of all social network structure indicators.

Depressive Symptoms. Children's depressive symptoms were assessed using the Children's Depression Inventory (CDI; Kovacs, 1985). On each of 19 items, children were asked to indicate which of three statements best applied to them (e.g., I am sad once in a while/ I am sad a lot / I am sad all the time). Statements were coded such that higher scores indicated greater depression. The sum score across all 19 items was calculated to create an overall depressive symptoms score with a maximum possible score of 38.

Stressful Life Events. Child respondents indicated which of 10 stressful life events (e.g., serious illness, starting a new school, bullying) occurred within the past year. These were summed to derive total number of stressful life events.

Sociodemographics. A number of personal and situational characteristics were collected from both child and mother reports. Sex (1=female), race (1=White, -1 = Black), and mother's marital status (1 = married/living with partner) were dichotomous variables. Childhood socioeconomic status was measured using mothers' reports of highest level of education attained in years. Age and years of education were also measured continuously in years.

Analysis Strategy

Identification of patterns of social relations. Latent profile analysis (LPA) was used to investigate patterns of social relations and identify profiles among respondents who share similar social network characteristics. Eight continuous social network indicators at each wave were entered into MPlus Version 7.4. Two-, three-, and four-class models were tested. With LPA, the approximate number of relevant profiles can be empirically determined using a number of model fit statistics, including Bayesian information criteria (BIC), Lo-Mendell-Rubin (LMR) test, and entropy (Tein, Coxe, & Cham, 2013). A lower BIC indicates better model fit. A significant result on the LMR test indicates that the model tested, k -profile, is a significant improvement over the $(k-1)$ -profile model. Higher entropy indicates better separation between profiles. Posterior profile membership probabilities were used to assign respondents to a profile in the best fitting model.

Association between sociodemographics and social network profiles. To determine whether profile membership is distinguishable by sociodemographic characteristics multinomial logistic regression analysis was conducted. This assesses if these characteristics are associated with the probability of membership in social network profiles. The sociodemographics examined in the model included gender (1= girl), race (1=white), age, mother's education, and mother's

marital status (1= married or living with a partner). Child age and mother's education were mean centered, and all dichotomous variables were effect coded before entering into the model.

Association between social network profiles and depressive symptoms. To investigate whether the identified social network profiles were differentially linked to depressive symptoms in childhood, multiple linear regression analysis was conducted. The initial model controlled for mother and child sociodemographic characteristics, including those listed above. Subsequent models accounted for total number of child-reported stressful life events.

Results

This section begins with a description of the children's social network profiles, including how they the identified profiles are distinguishable by sociodemographic characteristics. Next, we consider whether these profiles are differentially related to depressive symptomology, and the role of stressful life events in the association between social relations and depressive symptomology.

Profiles of Children's Social Networks

Latent class analysis was used to identify unobservable typologies of social relations among children. As the number of profiles tested increased, the BIC decreased and the entropy remained stable around 0.90. However, results from the LMR test indicated that a 4-profile solution did not significantly improve the model fit compared to the three-profile solution (LMR = 116.03, $p = .39$). Based on these fit statistics (Table 2.3), a three-profile model was adopted as the best fit to the data. The identified profiles of social relations, distinguished primarily by variations in network composition, included: Varied family focused, friend and family focused, and close family focused (Table 2.4). These were generally consistent with the hypothesis.

Description of Profiles. Of the three profiles, the majority of the sample was characterized by the Varied family typology (55%), while the rest of the sample was split evenly between the Friend and Family (22%) and the Close Family (22%) typologies. Members of Varied Family profile were characterized by relatively large networks consisting of both immediate and extended family, but with a larger percentage of extended family. The Friend and Family profile was characterized by average-sized networks consisting of mostly immediate family and non-kin, but a smaller percentage of extended family. Respondents who fall into this profile also reported the largest number of age-mates in their networks. Finally, the Close Family profile was characterized by relatively small-sized networks dominated by immediate family. In addition to being related to people in their networks, respondents in the close-family focused profile were also geographically and emotionally close, as indicated by the percentages of proximate and close others.

Based on the distinguishing feature of network composition, we explored whether there were variations in the types of relationship partners that children included in their networks by network typology. We examined whether or not respondents included a mother, father, sibling, grandparent, aunt or uncle, cousin, and friend in their network. A description of these data can be found in Table 2.5. Most distinctively, children in the Close Family profile all included at least one parent and no friends in their networks. In contrast, all of the children in the Friend and Family profile included at least one friend in their network, but only 76% of them included a parent.

In an effort to further clarify these social network patterns, we conducted a post-hoc analysis of social support differences across the three identified typologies. Specifically, we explored whether support exchanges differed across the three identified typologies. Respondents

were given a list of 18 positive social support functions adapted from Takahashi's Picture Affective Relationship Test (Takahashi, 2002) and asked to nominate one individual who fulfilled each function (Appendix A). These functions encompassed both the child respondent's receipt and provision of various types of support. Responses were used to calculate the total number of support functions filled and the number filled by each relationship partner. The following measures were then derived: percentage of positive support functions filled by immediate family, extended family, friends, mother, father, and siblings.

Analyses of the links between network structure profiles and support exchanges were conducted with a series of one-way ANOVAs. These models determined whether the types varied in terms of support exchanges with different relationship partners. Tukey pairwise comparisons were performed to determine which typologies were significantly different from each other. Results from these models revealed that the children in different network typologies differentially engaged in support exchanges with various relationship partners in expected ways (Table 2.7). For example, children in the Varied Family typology reported engaging in a greater proportion of support exchanges with extended family than those in the other profiles, whereas children in the Friend and Family typology reported a greater proportion of support exchanges with friends. These descriptive data serve to better clarify the patterns of network typologies observed from the LPA.

Sociodemographic Variation across Profiles

Results of the multinomial logistic regression are presented in Table 2.6. The Varied Family typology served as the reference group for this analysis. Results indicated that when controlling for all other variables in the model, race was the only significant predictor of profile membership. White children were significantly more likely to be in the Friend and Family

typology. Child gender, age, mother's marital status, and mother's education level were not predictive of profile membership.

Links to Depression

In order to test whether children's network typologies were differentially linked to depressive symptoms, multiple linear regression was used. In these analyses, the varied family focused profile served as the reference group. Two dummy coded variables were entered into the models, such that the Varied Family profile was being compared to the Friend and Family and Close Family profiles. All other categorical variables were effect coded and all continuous variables were mean centered before entering into the model. Results revealed that membership in the Close Family typology was not associated with depressive symptomology when compared to the Varied Family typology, whereas membership in the Friend and Family typology was associated with more pronounced depressive symptomology (Table 2.8).

Stressful Life Events. To further investigate this finding, subsequent post-hoc models incorporated the number of stressful life events in the last year. When controlling for stressful life events, network typology was no longer significantly associated with depression, whereas a greater number of stressful life events was related to higher depression (Table 2.9). Further, when the links between network typology and stressful life events were tested, results indicated that membership in the Close Family typology was associated with fewer stressful life events when compared to membership in the Varied Family typology (Table 2.10). These ancillary results provide some insight into the link between childhood network typology, stressful life events, and depressive symptomology.

Discussion

Children's social networks represent the social context in which development unfolds, but previous research on children's social relations was largely focused on specific social relationships (e.g., parent-child, friendships). The goals of this study were to (1) identify distinct patterns of social network structure among a sample of children, and (2) determine whether personal characteristics of mothers and children predicted these patterns. The results indicated that three distinct patterns of social network structure could be identified among children, and that these patterns could be predicted by race. This study provides an empirically based description of children's network typologies and specifically investigates whether they are shaped by personal characteristics.

Patterns and Predictors of Children's Networks

In the present study, three patterns of children's social networks were identified that are consistent with previous research (Levitt et al., 2005). The predominant pattern of children's social networks was the Varied Family profile, which was characterized by a large-sized network with the inclusion of mostly immediate and extended family. The Friend and Family typology was characterized by average-sized networks consisting of mostly immediate family and non-kin, but relatively little extended family. A more detailed assessment of network composition revealed that all of the respondents who were categorized into this typology included a friend in their social networks. Finally, about 22% of the sample could be categorized into the Close Family pattern, which was characterized by the inclusion of predominantly immediate family and by networks that were geographically proximate and emotionally close.

These patterns are also somewhat consistent with commonly identified patterns of adult samples. For example, the varied family typology in childhood best exemplifies "family-focused" networks of adulthood, whereas the Friend and Family typology best exemplifies

“diverse” networks. This consistency can indicate either the robustness of certain social network typologies across the lifespan, or it might reveal the limits of identifying social network typologies by providing an exhaustive list of possibilities. In other words, there may be only so many typologies that can be identified given the possible combinations of networks size, composition, contact frequency, and proximity.

Further, white children were more likely than Black children to exhibit the Friend and Family pattern than they were to exhibit the Varied Family pattern. This might be a consequence of parents or other caregivers shaping children’s social networks. In adult samples, non-Hispanic White individuals interact and exchange support with friends more often than Black individuals (Taylor et al., 2013). Because the measures of network composition were proportions, rather than totals, social networks with a relatively high proportion of non-kin, including friends, also had a relatively low proportion of family. Contrary to prior research with adult samples, Black children did not fall disproportionately into the Varied Family typology. Furthermore, mother’s marital status and educational attainment were not associated with membership across the classes. These findings might be explained by similarity in educational attainment of the mothers in this sample. Nguyen (2017) identified social network typologies among an ethnically diverse sample of older adults, and found that while typology membership was not differentiated by race, there was a race by education interaction. It is also surprising that there were no age differences in terms of network typology membership, given that age differences in social network size and composition are so commonly observed. It could be that the age range of the current sample (i.e., most respondents between 8 and 12-years-old) was not wide enough to capture the changes that occur during the transition to adolescence.

Links to Depressive Symptoms

Findings from this study showed that compared to the Varied Family typology, the Friend and Family typology was associated with the highest depressive symptomology. This pattern of results underscores the importance and developmental significance of family ties in childhood. It should be noted that because network composition was a relative measure, rather than absolute, children in the Friend and Family typology may have been lacking close family ties, and substituting with peer or other non-kin relations. Consequently, it may not be the availability of family support in the Close Family and Varied Family typologies that protects against depressive symptoms, but rather the lack of family support in the Friend and Family focused typology that makes those children more vulnerable. Studies of older adolescents suggest that parental support, in particular, is a robust protective factor against depression (Auerbach, Bigda-Peyton, Eberhart, Webb, & Ho, 2011; Colarossi & Eccles, 2003). For children and younger adolescents, who are more reliant on parents and other caregivers, the absence of family support, even in the presence of peer support, may be especially harmful to mental health and psychological well-being. Indeed, results from a recent meta-analysis showed that friend support was not as strongly linked to well-being as family support among children and adolescents (Chu, Saucier, & Hafner, 2010). In childhood, social networks that lack strong family ties, but are otherwise robust, still present vulnerability. It should be noted, however, that the observed levels of depressive symptomology are still relatively low across the sample. These findings should be interpreted with caution, particularly if considering clinical applications.

Interestingly, although the typologies were consistent with those identified by Levitt et al. (2005), they were not associated with well-being in the same way. Specifically, children in the Close Family typology reported poorer psychosocial adjustment (Levitt et al., 2005), but in the present study, children in the Close Family typology reported relatively low levels of depressive

symptomology compared to the others. When controlling for stressful life events, however, this association was no longer observed. More detailed analyses into the possible explanations for this link revealed that stressful life events were differentially associated with network typologies. Children in the Close Family typology reported experiencing significantly fewer stressful life events. These ancillary results suggest that stressful life events provide some insight into the link between children's network typology and depressive symptomology. Larger, more diverse social networks indicate greater availability of support, but also a greater chance for conflict or negativity. For example, it may be that children with larger, more diverse networks have a higher chance of being exposed to more stressful life events or interpersonal conflict that contributes to lower well-being. Accordingly, close, supportive social networks in childhood would be more advantageous in terms of providing adequate support, but protecting against stress. An alternative explanation for these discrepant findings is that the Close Family typology identified by Levitt and colleagues (2005) is more reminiscent of Takahashi's (2001) "lone wolf" classification. In cases where a Close Family typology is reflective of a tight-knit, supportive family network, it is a strength in childhood. On the other hand, in cases where a Close Family typology captures a "lone wolf" categorization, then it will likely be adversely related to well-being.

Despite the continuity of concepts of social relations, the observed links to depressive symptomology suggest that there is a difference in manifestation and meaning in childhood versus adulthood. In adult samples, for example, the Close Family pattern would likely be referred to as "restricted" and characterized by small networks of only the closest individuals (Fiori et al., 2007; Litwin & Shiovitz-Ezra, 2011; Park et al., 2013; Suanet et al., 2016). Results from these studies suggest that restricted networks are the most socially isolated and, thus, most

likely to be associated with poor well-being (e.g., depressive symptomology) in comparison to other network typologies. In childhood, however, the presence of close family is both culturally and developmentally appropriate, and even beneficial. A Close Family typology in childhood is an interpersonal resource, or strength, whereas in adulthood, it may instead be vulnerability. In contrast, the Friend and Family childhood typology would be considered “diverse” in most adult samples, and consequently, associated with better well-being. In the present study, respondents in the Friend and Family typology reported the greatest depressive symptomology.

Limitations and Future Directions

The findings of this study were based on a regionally representative sample of the Detroit metropolitan area, which in some ways limits the generalizability to different populations. However, the most notable limitation of this study is that these data were from 1992 and may be considered dated. For example, this area has seen considerable social and economic changes over the decades. Thus, we do not know the extent to which these findings can be generalized outside the study population, given the societal changes in how we form and maintain social ties. In addition, the small sample size may have limited our ability to detect more variation in children’s social networks or in the links between network typology and depressive symptomology. There is also evidence to suggest gender differences in the experience of depression and depressive symptomology (Meadows et al., 2006). Future studies with larger samples of children will be able to address this by testing for whether the link between social networks and depressive symptomology are different for boys and girls. Similarly, future studies could be used to assess cohort differences in children’s social networks across time.

Most research suggests that perceived relationship quality or social support measures are a stronger predictor of well-being, including in childhood (Chu et al., 2010). Indeed, the convoy

model outlines that social network structure does not have direct links to well-being, but rather is associated to well-being through social support and relationship quality (Kahn & Antonucci, 1980). The present study used only social network structure to identify typologies. Given that we found differences in support exchanges across the three typologies, it is clear that the network structure and function are closely linked. Thus, it appears that social support was also incidentally captured in the identified network typologies. Compared to adults, children's subjective evaluations of who is close and important enough to be included in their personal network may be more strongly influenced by their perceptions of support exchanges or relationship quality. Adults may nominate network members based on social roles (e.g., co-workers) or out of obligation (e.g., spouse), despite the quality of relationship. Children in the present study may have confounded network structure with network function, or in other words, nominated only those individuals who provided or received support. Future research should clearly delineate the influences of social network structure and support in childhood.

Summary and Conclusions

Despite these shortcomings, this study contributes to the literature in the following ways. Most notably, the measures include self-reported survey data from children. Many other studies of children's social relations rely on parent, usually mother, reports of their children's social relations, or take place in a laboratory setting. Even though children's social network data was self-reported, it is important to note that children can exert only so much control over their own social networks. Parents or other adult guardians may serve as gatekeepers with regard to their children's interactions with other family members or friends which then, consequently, may influence whom they nominate as being close and important (Cochran & Riley, 1990). This study also looks beyond the nuclear family to examine a larger constellation of social ties,

providing a more holistic picture of children's social worlds and the implications of these broader social connections. Findings from this study add to our understanding children's social networks and could potentially provide insight into ways to leverage social relations to improve health and well-being in childhood and beyond. Taken together, these findings highlight the need to incorporate developmental perspectives into the study of social relations across the lifespan.

Table 2.1.

Social Relations and Health Study Child Sample, Descriptive Statistics ($N = 203$)

	Wave 1
Age (years)	10.1 (1.5) [7-14]
Education (years)	5.0 (1.5) [2 - 8]
Mother's education	12.9 (1.9) [7-17]
Female	52%
Race	57% White 34% Black
Depressive Symptoms	4.15 (3.28) [0-20]
Stressful Life Events	3.09 (1.69) [0-8]

Note. Depressive symptoms were measured using the Childhood Depression Inventory (max score = 38).

Table 2.2.

Correlations, Means, and Standard Deviations of Social Network Characteristics

	1	2	3	4	5	6	7	8	<i>M (SD)</i>
1. Network Size	1								8.46 (5.01)
2. Contact Frequency	-0.21**	1							4.34 (0.56)
3. Close Others	-0.05	0.19**	1						57.61 (28.26)
4. Proximate	-0.10	0.49***	0.11	1					87.78 (21.01)
5. Immediate Family	-0.37***	0.47***	0.37***	0.29***	1				47.63 (27.20)
6. Extended Family	0.39***	-0.43***	-0.17*	-0.34***	-0.51***	1			31.17 (26.59)
7. Female	-0.02	0.12	0.04	0.09	0.22**	0.05	1		53.14 (21.30)
8. Age-mates	-0.02	-0.02	-0.24**	0.02	-0.46***	-0.38***	-0.37***	1	22.23 (25.15)

Notes. * $p < .05$; ** $p < .01$; *** $p < .001$

Table 2.3.

Fit Statistics for Latent Profile Analysis

K-classes	LL	BIC	Adjusted BIC	Entropy	Lo-Mendell-Rubin test	Class counts
2	-6278.252	12689.211	12610.006	0.899	230.544, $p = 0.000$	1- 157, 78% 2- 45, 22%
3	-6172.291	12525.062	12417.343	0.913	207.579, $p = 0.028$	1- 112, 55% 2- 45, 22% 3- 45, 22%
4	-6113.059	12454.374	12318.141	0.912	116.034, $p = 0.389$	1- 104, 51% 2- 44, 22% 3- 42, 21% 4- 12, 6%

Table 2.4.

Social Network Structure Characteristics and Sociodemographics by Network Type

	<i>M (SD)</i>		
	Varied Family Focused	Friend and Family-Focused	Close Family-Focused
<i>n</i> (%)	112 (55%)	45 (22%)	45 (22%)
Social Network Characteristics			
Network Size	10.47 (4.86)	7.64 (4.07)	4.27 (3.12)
Contact Frequency	4.16 (0.58)	4.37 (0.55)	4.77 (0.39)
% Close Others	54.59 (27.48)	47.35 (28.71)	75.41 (28.71)
% Proximate	82.95 (22.73)	89.81 (22.39)	97.76 (6.82)
% Immediate Family	37.40 (13.89)	31.96 (19.61)	89.03 (15.13)
% Extended Family	51.22 (16.77)	7.07 (10.89)	5.37 (10.15)
% Female	55.20 (14.76)	42.25 (29.81)	58.92 (21.65)
% Age-mates	12.91 (13.06)	59.09 (21.84)	8.60 (13.48)
Sociodemographics			
Age (years)	10.0 (1.4)	10.3 (1.7)	10.1 (1.5)
Child Grade (years)	4.9 (1.5)	5.1 (1.6)	5.0 (1.3)
Mother's Education	13.0 (1.8)	13.1 (2.0)	12.6 (2.1)
Mother Married/ Cohabiting	69%	87%	60%
Female	57%	47%	44%
Race	55% White 36% Black	78% White 11% Black	42% White 51% Black

Table 2.5.

Percentage of Respondents Who Included Social Partners in Networks by Typology

	Varied Family	Friend and Family	Close Family	Total
Mother	97.3	75.6	100	92.1
Father	83.0	68.9	77.8	78.7
Sibling	69.6	62.2	71.1	68.3
Grandparent	75.9	11.1	17.8	48.5
Aunt/Uncle	66.1	13.3	4.40	40.6
Cousins	27.7	4.40	0	16.3
Friends	42.0	100	17.8	49.5

Table 2.6.

Results of Multinomial Logistic Regression Examining Sociodemographic Predictors of Network Type

Variable	Varied Family vs. Friend and Family		Varied Family vs. Close Family	
	<i>b (SE)</i>	OR	<i>b (SE)</i>	OR
Gender	-0.25 (0.18)	0.78	-0.27 (0.18)	0.77
Race	0.45 (0.22)*	1.56	-0.19 (0.20)	0.83
Age	0.14 (0.13)	1.16	0.01 (0.12)	1.04
Mother's marital status	0.34 (0.26)	1.41	-0.09 (0.21)	0.92
Mother's education level	-0.03 (0.10)	0.97	-0.08 (0.10)	0.92

Notes. OR = Odds Ratio; * $p < .05$

Table 2.7.

Percentage of Support Functions Filled by Different Relationship Partners by Network Type

	Total	Varied Family	Friend and Family	Close Family	<i>F</i>
Immediate Family	55.96	56.85 _a	47.67 _b	62.03 _a	6.791***
Extended Family	6.31	9.04 _a	3.08 _b	2.74 _b	8.798***
Friends	31.25	28.44 _a	43.64 _b	25.84 _a	14.830***
Siblings	8.24	9.12 _a	6.21 _a	8.08 _a	1.322
Mother	36.22	35.19 _a	30.52 _a	44.49 _b	8.112***
Father	11.50	12.54 _a	10.94 _a	9.46 _a	1.274

Notes. * $p < .05$; ** $p < .01$; *** $p < .001$

For continuous variables, means in the same row that do not share subscripts differ at $p < .05$ in the Tukey pairwise comparison.

Table 2.8.

Depressive Symptoms as a Function of Child Network Typology

	<i>B</i>	<i>SE</i>	β
Intercept	4.366	0.287	
Gender (1=girl)	0.063	0.24	0.019
Race (1=white)	-0.128	0.274	-0.038
Age	-0.118	0.159	-0.054
Mother's Education	-0.129	0.134	-0.072
Mother's Marital Status	-0.295	0.296	-0.081
Close Family	-0.607	0.6	-0.077
Friend & Family	1.284	0.604	0.164*
Adjusted R ²		0.014	

Notes. Reference group Varied Family typology coded 0.

* $p < .05$; ** $p < .01$; *** $p < .001$

Table 2.9.

Depressive Symptoms as a Function of Child Network Typology, Controlling for Number of Stress Life Events

	<i>B</i>	<i>SE</i>	β
Intercept	2.03	0.522	
Gender (1=girl)	0.311	0.229	0.095
Race (1=white)	-0.203	0.257	-0.061
Age	-0.225	0.15	-0.104
Mother's Education	-0.113	0.125	-0.063
Mother's Marital Status	-0.111	0.279	-0.031
Stressful Life Events	0.741	0.142	0.378***
Close Family	0.03	0.574	0.004
Friend & Family	0.932	0.568	0.119
Adjusted R ²			0.139

Notes. Reference group Varied Family typology coded 0.

* $p < .05$; ** $p < .01$; *** $p < .001$

Table 2.10.

Child-Reported Stressful Life Events over the Past Year as a Function of Child Network Typology

	<i>B</i>	<i>SE</i>	β
Intercept	2.383	0.197	
Gender (1=girl)	-0.346	0.11	-0.207**
Race (1=white)	0.125	0.125	0.073
Age	0.165	0.073	0.149*
Mother's Education	0.001	0.061	0.001
Mother's Marital Status	-0.197	0.136	-0.107
Depressive Symptoms	0.176	0.034	0.346***
Close Family	-0.753	0.274	-0.187**
Friend & Family	0.248	0.279	0.062
Adjusted R ²		0.211	

Notes. Reference group Varied Family typology coded 0.

* $p < .05$; ** $p < .01$; *** $p < .001$

Appendix A

Social Support Functions in Childhood

Support/Affective Function	Social Relations and Health	Picture Affective Relationships Test (Takahashi, 2004)
1 <i>Seeking Proximity</i>	Who do you like to play with most when you are playing outside (around the house)?	When you play out of doors, who would you like to play with?
2 <i>Seeking Proximity</i>	Who do you like to play with most when you are playing in the school playground?	When you play at school, who would you like to play with?
3 <i>Receiving Emotional Support</i>	Who do you feel safest with?	Who makes you feel secure by being with you?
4 <i>Receiving Emotional Support</i>	If something really great were to happen to you, who would you most want to tell about it?	If something pleasant happened to you, who would you like to share it with?
5 <i>Receiving Emotional Support</i>	If something really sad happened, who would you most want to be with you?	If something sad happened to you, who would you like to be with?
6 <i>Receiving reassurance for behavior and/or being</i>	Who would you want to be with most if you hurt yourself?	If you got hurt, who would you want to be with?
7 <i>Receiving reassurance for behavior and/or being</i>	If you're reading a book, and come across a picture of a flower you don't know. Who would you most likely want to ask what it is?	If you found a flower which you didn't know the exact name of, who would you want to make sure of it?
8 <i>Receiving reassurance for behavior and/or being</i>	Who would you most want to look after you if you were sick and had a fever?	If you were sick, who would you want to be with?

9	<i>Sharing information and experiences</i>	If you could go into outer space, who would you most want to go with you?	If you could travel in space, who would you like to go with?
10	<i>Sharing information and experiences</i>	If you had a great treasure, who would you most want to show it to?	If you had a treasure, to whom would you like to show it?
11	<i>Sharing information and experiences</i>	Who would you most want to have sit next to you if you were having a really good meal at a restaurant?	When you are at a restaurant, who would you want to sit beside you?
12	<i>Giving nurture</i>	Who would you most want to offer advice to if he or she had a problem?	Who is the person whom you would like to give advice if s/he had trouble?
13	<i>Giving nurture</i>	Who would you definitely want to help the most if he or she were in trouble?	Who is the person whom you would like to help, if s/he has trouble?
14	<i>Giving nurture</i>	Who would you most want to celebrate with if something really good happened to that person?	Who is the person who you would like to share her/his happiness with you?
15	<i>Receiving encouragement and help</i>	If you were doing your homework and you didn't know what to do, who would you want to help you the most?	If you cannot select the theme of your homework by yourself, who would you want to advise you?
16	<i>Receiving encouragement and help</i>	Who would you want to help you out most if you got stuck in the middle of a math problem?	When you cannot solve a problem in math at school, who would you like to ask to teach it to you?
17	<i>Receiving encouragement and help</i>	If you can't decide what to play at school, who would you most want to help you decided (choose what to play)?	When you cannot pick out a game to play at school, who would you like to choose it for you?
18	<i>Receiving encouragement and help</i>	Who would you most want to give you money if you didn't have enough to buy something?	

CHAPTER III
SOCIAL NETWORKS FROM CHILDHOOD TO YOUNG ADULTHOOD:
STABILITY AND CHANGE

Introduction

Normative and non-normative changes in social networks occur across the lifespan, especially during periods of transition. The transition to adulthood is characterized by substantial change in social roles and responsibilities and interpersonal relationships that shape changes the structure of social networks. Theoretical life course perspectives, including the convoy model of social relations, and cross-sectional empirical evidence show differences in the social networks of young adults when compared to children and older adults. There exists limited longitudinal work, however, on changes in social networks from childhood to adulthood. In this study, we capitalized on three waves of in-depth social relations data to investigate continuity and change in social networks from childhood to early adulthood by examining intraindividual change in individual social network characteristics, as well as links between childhood and adulthood patterns of social network.

Theoretical Frameworks

Convoy Model of Social Relations

The convoy model of social relations, which describes social networks as

multidimensional and dynamic, provides an overarching theoretical framework for the present study (Antonucci et al., 2010; Kahn & Antonucci, 1980). The convoy model encompasses multiple dimensions of social relationships, including social network structure, function, and quality (Antonucci et al., 2010). Social network structure encompasses the objective characteristics of personal networks, including size, composition (e.g., age, gender of, and relationship to network members), proximity to, and contact with network members. These structural aspects of social relations represent the interpersonal resources that individuals can utilize to meet the demands of life and buffer against stress. Social networks are shaped by both personal (e.g., sex, age, educational attainment) and situational characteristics (e.g., social roles, culture). Social convoys move with an individual throughout the lifespan and are influenced by personal and situational characteristics that remain stable as well as those that change over time (Antonucci & Akiyama, 1987; Antonucci et al., 2011). As children become adolescents and then young adults, situational characteristics like social roles, societal expectations, and demands change, and optimally functioning social networks adapt accordingly. When functioning optimally, convoys evolve over time to accommodate individuals' changing needs accordingly, making them dynamic. In this way, social relations are multidimensional and dynamic, two tenets that are incorporated into the present study.

The convoy model has gained widespread recognition in the study of social relations, and many studies have applied it to samples of all ages. Although descriptions of social relations at different points across the lifespan are informative, it is also important to acknowledge change over time and with age. Change in social networks can refer to either the formation or loss of social ties, leading to the expansion or contraction of overall social networks, or they can refer to changes in the nature of existing social ties, such as geographic proximity or decreased contact

(Feld, Sutor, & Hoegh, 2007). Meaningful descriptions of changes within social networks are an essential base from which to understand the implications of stability and change in social networks. For instance, in order to more closely investigate which types of social network changes are optimal versus detrimental for development, a description of the ways in which social networks evolve is necessary. Then by considering outcomes, we might also be able to distinguish between changes in social relations that are normative or beneficial versus those that are problematic.

Life Course Perspectives

In addition to the convoy model, a number of life course perspectives address the age-related changes that occur in the structure of social networks and provide reasons for change. Attachment theory, though conceptually lifespan, was most often applied to descriptions and implications of the mother-child tie in infancy (Bowlby, 1969). This concept has since been expanded to encompass close, affectional ties across the lifespan (Ainsworth, 1989; Antonucci, 1976; Waters, Merrick, Treboux, Crowell, & Albersheim, 2011). In her lifespan theory of socioemotional selectivity theory, Carstensen (1992, 1995) describes how the social motivations of different developmental periods drive individuals' intentions to form, maintain, or adapt certain types of social ties. In early adulthood, when information seeking is the primary goal, individuals will seek out numerous social ties with a diverse set of partners to expand their social networks. Information can be obtained through interactions with a number of different sources, so maintaining a diverse set of social ties, including peripheral ties, is functional at this age (Carstensen, 1992). In contrast, older adults who, in recognition of limited time remaining, place more emphasis on emotion regulation (Carstensen, 2006), are more selective in terms of which social ties to prioritize. As such, the size, composition, and support exchanges with one's social

network can change over time to address changing motivations for forming and maintaining social ties.

Takahashi's Affective Relationships Model posits that social ties are formed and maintained for their potential to fulfill different support functions, such as giving nurture, providing emotional support, or sharing experiences (Lewis & Takahashi, 2005; Takahashi, 2003, 2005). According to this model, personal networks consist of multiple social figures because they all fulfill different support needs. For example, young children often list a parent as fulfilling the most support functions. In adolescence and young adulthood, support functions may be distributed among a more diverse set of social figures. After marriage, however, a spouse may become the focal figure, and in older adulthood, this might instead be an adult child. In this way, as the social needs of the individual change with age, so do the social partners who can fulfill those needs.

Social Networks across Developmental Periods

As mentioned above, among the guiding principles of the convoy model is stability and change in social networks. An optimally functioning social network will serve as a support system during times of stress, changing in ways to meet the demands of that developmental period and specific circumstances of the individual. Other life course perspectives echo this principle and, as a result, there is robust empirical evidence for changes in network size, composition, and contact frequency.

According to the convoy model, the closest relationships remain stable across time, forming a core network (Antonucci & Akiyama, 1987; Kahn & Antonucci, 1980). Other, more ancillary or role-based ties are subject to changes, depending on personal and situational factors. Indeed, cross-sectional and longitudinal studies of social networks across the lifespan

consistently report that global, personal, and friendship networks increase in size throughout adolescence and early adulthood, while family networks remain stable (Wrzus et al., 2013). Much of these changes are dependent on situational characteristics, namely role transitions and life events, including family formation, entry into the workforce, and increased geographic mobility (e.g., for educational or work opportunities). Studies of older adults' social networks suggest that they shrink over time, but this decrease in size is driven by changes in peripheral network members rather than close ones. These changes occur due to life circumstances (e.g., loss of spouse) or active pruning of networks to focus relationship efforts on only the closest ties. Thus, changes in the size and composition of social networks can be either normative and supportive or non-normative and problematic.

Studies of social contact are less common, but suggest that there are normative patterns of change in frequency of contact with social networks. Sander, Schupp, and Richter (2017) examined longitudinal data from adults aged 17 and above to investigate changes in the frequency of in-person visits. They distinguished between family and non-family visits, and found that the frequency of visits with family remain stable over time, while decreases in non-family visits were observed. This is consistent with the convoy model's expectation of stable close family networks. Interestingly, the declines in non-family visits occurred in middle and later adulthood (Sander et al., 2017). This curvilinear change in social contact across the lifespan, with an increase in contact during early adulthood and decrease in middle and older adulthood, has been observed across a number of studies, demonstrating support for socioemotional selectivity theory (Antonucci & Akiyama, 1987; Carstensen, 1992; Lansford, Sherman, & Antonucci, 1998).

Longitudinal research on changes in the geographic proximity of network is rare, but cross-sectional studies on age differences can inform us of potential age-related changes. Antonucci and Akiyama (1987) found that younger adults had more proximate networks than did older adults, but suggest that this somewhat counterintuitive finding may be due to the unique composition of older adults' social networks. Widowhood and other loss-related changes in social networks may result in the exclusion of proximate network members and the inclusion of other family who may live farther away. Similarly, Ajrouch and colleagues found that older adults reported less proximate networks than did younger adults, but also that education was a significant predictor of network proximity (Ajrouch et al., 2001). This highlights the importance of considering personal and situational characteristics when evaluating change in social networks. For example, relocating to pursue higher education or for employment may result in less proximate networks, as the geographic distance from family of origin or childhood friends increases. Thus, stability and change in each of these social network characteristics occur within the context of personal and situational characteristics, and more specifically, changes in these characteristics.

Transition to Adulthood

Thus far, few studies have examined children's social relations over long periods of time, but cross-sectional studies of different ages can inform our knowledge of how social relations develop from childhood and into adulthood. Social relationships are formed and developed by the unique goals of each developmental stage, and change over the lifespan in normative ways. Periods of transition are particularly useful in this regard for examining how changes in personal and situational characteristics are reflected in changes in individuals' social networks. The transition to adulthood is a period of shifting social roles, obligations, and societal expectations

(Arnett, 2000). The modern-day transition to adulthood can be defined by a set of transition markers, or developmental tasks (Schulenberg & Schoon, 2012). Developmental tasks refer to standards that span various domains used to judge individuals' successful adjustment to life stages (McCormick et al., 2011). Developmental tasks and transition markers of early adulthood include educational attainment, employment, romantic partnership, parenthood, and living independently (Settersten, 2007). These changes in situational characteristics during young adulthood have bidirectional effects on social networks. For example, studies document changes in the structure and support of adults' social networks after the birth of a child (Bost et al., 2002; Cronenwett, 1985). Additionally, the stress that stems from periods of instability during life transitions or significant life events can be minimized through supportive social networks. It is, therefore, important to identify what social resources are already in place during the transition to adulthood.

For the most part, individuals continue to maintain social ties with close family and friends as they transition to early adulthood. Although the presence of certain social ties remains stable, the nature of these ties may change. For example, marriage or parenthood often results in less frequent contact with friends (Kalmijn, 2012). The composition of social networks may also change with the addition of new social ties and the elimination of others. Romantic partners tend to become primary sources of support for many adults (Takahashi, 2005). This is typically reflected in social network composition changes through the addition to social networks of romantic partners, as well as with friends, co-workers, and children (Degenne & Lebeaux, 2005; Wrzus et al., 2013). For example, young adults might include a spouse and co-workers in their convoy to reflect family formation and entry into the workforce, both of which are developmental tasks of early adulthood. Thus, an increase in total network size and changes in

composition to include more extended family, friends, and other non-kin relationship types (e.g., neighbors or co-workers), are expected to occur during the transition to adulthood. Furthermore, we expect that proximity to network members will decrease, while contact frequency remains constant over time.

Advantage of Pattern-Centered Approaches

The conclusions drawn from previous studies regarding age-related differences in social network structure and function are consistent with normative developmental trends, but are derived primarily from cross-sectional research. A more comprehensive analysis of intraindividual changes in social relations across these age periods has yet to be conducted in order to properly assess stability versus change over time. Furthermore, previous findings are based on variable-centered approaches, but given established systemic linkages among social network characteristics, pattern-centered approaches are warranted. By leveraging such approaches, we would be able to capture transitions between different typologies of social networks over time.

Levitt and colleagues (2005) employed pattern-centered methodology to investigate stability in support patterns over the transition to adolescence. The results indicated that a relatively large proportion of children did remain stable in terms of typology membership, but among children who did exhibit changes in their social support patterns, most transitioned into typologies that emphasized the growing significance of peer support. This suggests that there is a great deal of stability in support patterns across adolescence, and that when changes do occur, they are typically in the direction we would expect based on developmental trends (e.g., increases in peer relationships). However, this study shed light on changes in support patterns

among adolescents over a two-year period. Longitudinal studies of stability and change in social networks spanning longer time periods, from middle childhood to adulthood, remain limited.

Research Questions and Hypotheses

The purpose of this study is to examine social networks over the transition to adulthood by using variable-centered and pattern-centered approaches. We aim to identify stability or change in social networks, as well as assess how childhood patterns of social networks are associated with stability and change, through two research questions:

1. Do individual characteristics of social network structure stay stable or change over time from childhood to adulthood, and does this vary across childhood social network patterns? Network size and the proportion of the network composed of age-mates (same aged peers) are expected to increase over time, whereas the proportion of extended family and proximity of networks is expected to decrease. Contact frequency with network members is expected to remain stable.
2. What are the patterns of social relations that can be identified among young adults using network structure, and to what extent do patterns of social networks change over time? Patterns of social network structure are expected to reflect the increasing diversity of young adults' social networks, and be distinguishable by size, composition, contact frequency, and proximity. Given that the transition to adulthood marks significant life changes, considerable change in these patterns over time, reflecting diversification and expansion of social networks, is expected.

Method

Sample & Procedure

The Social Relations and Health over the Life Course Study is a three-wave, longitudinal study that began in 1992. The original sample in Wave 1 (W1; 1992) was drawn from a stratified probability sample of 1,702 people aged 8-93 in the greater Detroit metropolitan area. The present study used a sample of 202 children aged 7-14 in the first wave of the study, 95% of whom were between the ages of 8 and 12. Recruitment efforts for child respondents targeted mothers who were participating in the study. In Wave 2 (W2; 2005), 149 (73.2%) of the original child sample in Wave 1 was re-interviewed by telephone. In Wave 3 (W3; 2015), 114 (57.1%) of the original child sample were interviewed again. Of the original child sample, 93 respondents (46%) participated in all three waves, 56 respondents (28%) participated only in W1 and W2, 21 respondents (10%) participated only in W1 and W3, and 32 respondents (16%) participated only in W1. Table 3.1 provides demographic characteristics of the samples at each wave. An attrition analysis indicated that respondents who were female and identified as White in W1 were more likely to participate in subsequent waves.

In each wave, respondents were asked to nominate members of their social network using the hierarchical mapping technique (Antonucci, 1985). Using this technique, respondents were presented with a set of three concentric circles containing the word “YOU” in the middle. Social network data were gathered by asking respondents to list all those whom they considered close and important and place them in the circles so that each circle represented varying levels of closeness. The inner circle includes those whom the respondent considers “so close and important it is hard to imagine life without them”, the middle circle includes those to whom the respondent “may not feel quite that close but who are still very important”, and the outer circle includes “people who are close enough and important enough in [the respondent’s] life that they should still be placed in their personal network.” Respondents next provided detailed

information about each network member (e.g., age, gender) and the nature of their relationship from which social network indicators were derived.

Measures

Social network variables. Total *network size* represents the number of people the respondent included on his/her diagram (i.e., inner, middle, and outer circles combined) with possible values ranging from 0 to 20. Less than 4% of respondents included more than 20 network members. *Contact frequency* with each network member was assessed with a single item, “How often are you in touch with [network member]?”, assessed on a five-point scale from daily (5) to irregularly (1). These measures were averaged to represent the average frequency with which respondents have contact with their network. *Proximity* indicates the percentage of network members that live within an hour’s drive of the respondent. *Close others* in the network represents the percentage of the network that is in the inner circle, derived by dividing the number of network members in the inner circle by the total number of network members. Network composition includes the relative amounts of immediate and extended family, as well as gender and age compositions of respondents’ networks. Percentages of the network that was *immediate family*, *extended family*, *female*, and *age-mates* were calculated by dividing the number of the network members in each category by the total number of network members (up to 10 to include the first ten people that the respondent nominated). Immediate family consisted of parents and siblings in childhood, including step-parents and step-siblings. In adulthood (i.e., W2 and W3) this categorization was expanded to include spouses and children. Extended family included grandparents (including great-grandparents), cousins, and aunts/uncles. In adulthood (i.e., W2 and W3) this categorization was expanded to include in-laws. Age-mates included network members who were aged within one year (older or younger) of the respondent in

childhood (i.e., W1), and within two years (younger or older) in adulthood (i.e., W2 and W3). Table 3.2 provides descriptive statistics of all social network structure indicators at each time point, as well as correlations among the waves for each social network indicator.

Childhood Network Typologies. Childhood network typologies were derived using latent profile analysis in a previous study (see Chapter II, “Beyond the Nuclear Family: Pattern-Centered Investigation of Children’s Social Networks”). Typologies include Varied Family, Friend and Family, and Close Family. In order to determine whether there was selective attrition based on childhood network typology, a chi-square test of goodness-of-fit was performed. Results from these tests showed that the distribution of respondents across the three typologies in W1 was equal to the distribution of the respondents who participated in W2, $\chi^2(2, n = 149) = 0.144, p > .05$, and in W3, $\chi^2(2, n = 114) = 0.178, p > .05$. In other words, children in each of the childhood network typologies were equally likely to participate in subsequent waves.

Sociodemographics. A number of personal and situational characteristics were collected from both child and mother reports in W1. Gender (1 = female), race (1 = White, -1 = Black), and mother’s marital status (1 = married/living with partner) were dichotomous variables. Childhood socioeconomic status was measured using mothers’ reports of highest level of education attained in years at W1. Age and years of education were also measured continuously in years. In W2 and W3, information was also collected about respondents’ educational attainment (highest level of education in years), marital status (married or living with a partner = 1), and work status (working full time = 1).

Analysis Strategy

Stability and Change in Social Network Characteristics. In order to assess continuity versus change in social network structure across the three waves, multilevel models using SAS

PROC MIXED were estimated separately for each of the eight network structure variables. Multilevel models are advantageous because they are not affected by an unbalanced design and all available data can be used. To assess whether social network characteristics varied by childhood network typology and over time, growth curve models included childhood network typology, time, and the interaction between childhood network typology and time as predictors, with respondent sex, race, childhood SES (mother's education at W1), and age as covariates. Time represented years in the study and was centered on W1 (i.e., W1 = 0, W2 = 12, and W3 = 22). Childhood network typology was a categorical variable with the varied family typology serving as the reference group. These models consisted of two levels, including upper level respondent characteristics (e.g., respondent sex, race, childhood SES, childhood network typology) and lower levels time-varying measures (e.g., social network structure characteristics and respondent age). The continuous covariates were centered on the sample mean, and categorical covariates were effect coded. Each network structure model was estimated with a random intercept and random linear slope, but in the case of nonconvergence, variances of the slopes were fixed to zero.

Patterns of Social Relations Over Time. Latent profile analysis (LPA) was used to investigate patterns of social relations and identify profiles among respondents who share similar social network characteristics. Eight continuous social network indicators were used to derive typologies at W2 and W3 separately. Each cross-sectional sample included only respondents who participated in that wave (i.e., 149 in W2 and 114 in W3). Two-, three-, and four-class models were tested in MPlus Version 7.4. With LPA, the approximate number of relevant profiles can be empirically determined using a number of model fit statistics, including Bayesian information criteria (BIC), Lo-Mendell-Rubin (LMR) test, and entropy (Tein et al., 2013). A

lower BIC indicates better model fit. A significant result on the LMR test indicates that the model tested, k -profile, is a significant improvement over the $(k-1)$ -profile model. Higher entropy indicates better separation between profiles. Posterior profile membership probabilities were used to assign respondents to a profile in the best fitting model. To examine the links among membership in social network typologies at each wave, chi-square tests of independence were performed. These compared membership in childhood network typologies to membership in adulthood network typologies in W2 and W3.

Results

Descriptives

Descriptive information about the sample across the three waves is displayed in TABLE 3.1. The average age of respondents was 10 years at W1, 23 years at W2, and 33 years at W3. Just over half of the respondents were women at both waves, and the mean educational attainment was 13.5 years at W2 and 14.6 at W3. At W2, most respondents were not married or living with a partner, had no children, and only about half reported working full time. In contrast, by W3, most respondents were married or living with a partner, had children, and were working full time. Descriptive information about and correlations among the social network characteristics over time are displayed in Table 3.2. All of the social network characteristics between W2 and W3 are significantly correlated, but the strength of the association ranges from weak (e.g., percentage of network comprised of close others) to strong (e.g., percentage of network comprised of immediate family). Network characteristics of childhood that are correlated with those in adulthood include contact frequency, percentage of immediate family, percentage of extended family, and percentage of female in networks. These associations range

from weak to moderate. Significant correlations between individual social network characteristics over time suggest stability.

Stability and Change in Social Network Characteristics

Results from multilevel growth curve models investigating whether social networks change over time from childhood to adulthood revealed which characteristics change over time and which remain stable. Models controlling for sociodemographic characteristics and childhood network typology, showed a main effect of time for network size, percentage of networks composed of immediate family, contact frequency, and network proximity (Tables 3.3-3.4). Specifically, overall network size and the percentage of networks composed of immediate family increased over time, whereas frequency of contact with and proximity of social networks decreased. In contrast, percentage of network composed of close others, extended family, females, and age-mates did not change significantly over time.

To further investigate this pattern of results, interaction models tested whether change in network characteristics varied by childhood network typology. There were no significant interactions between time and childhood typology for proximity and proportion of networks composed of females. This indicates that, regardless of childhood networks typology, proximity of social networks decreases from childhood to early adulthood and proportion of females in networks remains stable. Significant interactions were observed for all other network characteristics. We conducted simple slopes analysis to further investigate these interactions.

The size of the overall network increased for respondents who were in the Friend and Family and Close Family typologies in childhood, but remained stable for those who were in the Varied Family typology (Figure 3.1). Similarly, overall frequency of contact with networks decreased for respondents who were in the Friend and Family and Close Family typologies in

childhood, but remained stable for those who were in the Varied Family typology (Figure 3.2). Compared to respondents in the Varied Family typology, those in the Close Family typology experienced a decrease in percentage of close others in their networks (Figure 3.3). The percentage of immediate family in networks significantly decreased for respondents in the Close Family typology, but increased for respondents in the Varied Family childhood typology (Figure 3.4). In contrast, percentage of networks composed of extended family decreased significantly for respondents in the Varied Family typology compared to both the Close Family and Friend and Family typologies (Figure 3.5). In comparison to the Varied Family typology, respondents who were in the Friend and Family childhood typology experienced an increase in the percentage of extended family in networks. Finally, percent of networks composed of age-mates decreased significantly for respondents who were in the Friend and Family childhood typology, and increased for those who were in the Varied Family typology (Figure 3.6). There were no significant differences between respondents in the Varied Family and Close Family typologies with respect to change in percentage of age-mates.

Social Network Typologies in Early Adulthood

Latent class analysis was used to identify unobservable typologies of social relations among respondents at two time points across early adulthood. Results for each cross-sectional analysis will be reported, followed by a description of how the typologies are linked across time.

Wave 2. For W2, as the number of profiles tested increased, the BIC decreased and the entropy remained stable, approximately 0.86. Results from the LMR adjusted likelihood ratio test indicated that a 5-profile solution did not significantly improve the model fit when compared to a 4-profile solution (LMR = 46.017, $p = .39$). Based on these fit statistics and guided by theoretical significance, a 4-profile model was adopted to best fit the data. The identified profiles

of social relations included: Friend-Focused (36%), Diverse Distal (13%), Varied Family (32%), and Close Family (19%) typologies (Table 3.5).

The Friend-Focused typology was characterized by an abundance of non-kin (i.e., relatively low proportion of immediate and extended family) and age-mates in networks. Upon closer examination, it was determined that non-kin most likely referred to friends, or other same-aged peers. The Diverse Distal and Varied Family typologies were comparable on a number of measures, including network size, percentage immediate family, and percentage close others. However, the Diverse Distal typology was characterized by a relatively low percentage of geographically proximate network members. The Varied Family typology, on the other hand, was distinguished by a family-focused composition of both immediate and extended family. The Close Family typology was characterized by relatively small networks composed of mostly immediate family.

Wave 3. For W3, as the number of profiles tested increased, the BIC decreased and the entropy remained stable around 0.90. Results from the LMR adjusted likelihood ratio test indicated that a 3-profile solution did not significantly improve the model fit when compared to a 2-profile solution ($LMR = 41.927, p = .61$). Based on these fit statistics and guided by theoretical significance, a 2-profile model was adopted to best fit the data. The identified profiles of social relations included: Diverse Distal and Diverse Proximate (Table 3.6). Both of these typologies were comparable on all social network indicators except for network proximity.

Social Network Typology Membership Over Time

Tables 3.7 – 3.9 show a cross-tabulation of profile membership over time. For each pair of waves, chi-square tests of association were conducted to determine whether typology membership at one time point was associated with typology membership at another time point.

Results of this analysis for W1 and W2 show that typology membership is only marginally associated between childhood and early adulthood, $\chi^2 (6, n = 149) = 12.52, p = .051$ (Table 3.7). Most of the children who were in the Varied Family typology in childhood remained in the Varied Family typology in early adulthood (W2) or transition into the Friend and Family typology. The majority of respondents who were in the Friend and Family typology as children remained in the Friend and Family typology after the transition to adulthood. Finally, most respondents who were in the Close Family typology as children either remained in the Close Family typology or transition into the Friend and Family typology. A subsequent analysis of the association between childhood typology membership and young adulthood typology membership at W3 yielded null results, $\chi^2 (2, n = 114) = 0.77, p > .10$, showing that childhood typology membership was not associated with membership in either of the network typologies identified at W3. Respondents were more likely to be in the Diverse Proximate typology at W3 regardless of childhood network typology (Table 3.9).

Results also showed that typology membership in W2 is significantly associated with typology membership in W3, $\chi^2 (3, n = 93) = 26.17, p < .001$. The majority of respondents who were in the diverse distal typology at W2 remained in the Diverse Distal typology at W3, whereas the majority of respondents across the other typologies (i.e., Varied Family, Friend and Family, and Close Family) transitioned into the Diverse Proximate typology (Table 3.8). This may indicate the relative stability of social networks across early adulthood, but these results should be interpreted with caution given the small sample size ($n = 93$) and limited number of classes identified in W3.

Discussion

Continuity and change in social networks and the nature of social ties is central to many theories of social relations across the lifespan. The present study contributes to the literature by investigating stability and change in social networks from childhood to adulthood. In particular, we investigated whether specific social relations characteristics change over time using a variable-centered approach. We also examined descriptive data regarding transitions between different social network typologies from childhood to adulthood. Findings from these two approaches suggest that while there is some stability in social networks over time, a number of changes do occur that reflect the age-normative trends typical of the transition to adulthood.

Change in Social Network Characteristics

Results from multilevel growth curve models indicated that the majority of social network characteristics exhibit intraindividual change over time from childhood to adulthood, supporting some of the hypotheses. Overall, network size and percentage of networks comprised of immediate family increased, whereas contact frequency and proximity decreased over time. However, there was variation across different childhood network typologies in the direction and magnitude of the change. For example, social network size, on average, increases over time, but this increase is only experienced among those who were in Close Family and Friend and Family childhood typologies of social networks. This is logical considering the extent to which individuals can change on any measure depends on where they begin. To that point, some of these changes may simply reflect floor or ceiling effects, which is a limitation of this work. For example, it is likely that the network size of respondents in the Varied Family typology did not significantly increase over time because they were already large to start. It is interesting, however, that the childhood typology that exhibited the most change was the Close Family typology. Those changes indicated increased diversification of social networks (e.g., larger

networks, lower percentage of immediate family in networks), as would be expected by socioemotional selectivity theory (Carstensen, 1995; Lansford et al., 1998).

Patterns of Social Networks over Time

Four typologies of social network patterns were identified in W2: Diverse Distal, Varied Family, Close Family, and Friend-Focused. Three of the four are consistent with the typologies previously identified among children (Levitt et al., 2005). This pattern of results is also consistent with the types of social networks that have been identified in middle-aged and older adult samples (e.g., Fiori, Antonucci, & Cortina, 2006). Specifically, the Diverse Distal typology is comparable to other “diverse” networks that have been identified in the literature. This regularity in the identification of similar social network typologies across different age groups may reflect the robustness of certain network typologies across the lifespan, or rather, continuity in social networks across age. It is noteworthy, however, that while size and composition were the major distinguishing factors among childhood network typologies, in early adulthood, there is more variation among other social network characteristics, including contact frequency and proximity. This suggests that even when there is continuity in the presence or absence of certain social ties, as is expected based on the convoy model (Antonucci et al., 2011), the nature of those ties can change (Feld et al., 2007).

Similarly, the meaning of certain types of relationships also changes. For instance, in childhood, immediate family refers to parents and siblings, but in young adulthood, the definition expands to include spouses and children. Consequently, a child in a “Close Family” typology may have a very different social network composition than a young adult who is married with children in the “Close Family” typology. This is an example of heterotypic continuity, defined by continuity of concepts (e.g., close family), but differences in manifestation across developmental

periods (Caspi & Roberts, 2001; Chen, Brody, & Miller, 2017). Jager (2011) also captured a similar concept in his examination of convergence and nonconvergence in relationship quality across adolescence and young adulthood. Convergence, in this study, referred to similar relationship quality across multiple social partners (e.g., high positive quality with parents and high positive quality with friends). Results suggested that convergence, or stability in relationship quality over time, was common.

Using the typologies that were identified at each of the three time points, we were able to assess continuity in social network typologies through descriptive data on respondents' typology membership over time. Because some of the typologies that were identified were relatively similar over time (e.g., Close Family, Varied Family), consistent membership in those typologies represents stability in social networks. Descriptively, it appears that there is some stability between childhood and early adulthood, with less than half of the sample remaining in the same social network typology across W1 and W2. This finding suggests that some individuals may be consistently family-focused or friend-focused, regardless of developmental stage (Levitt et al., 2005; Takahashi et al., 1997). However, most respondents exhibited change in social networks in the directions we would expect based on shifts in social roles (Arnett, 2000) and social motivations (Carstensen, 1992) that are characteristic of the transition to adulthood. For example, a large proportion of respondents from the Close Family and Varied Family childhood typologies transitioned into the Friend typology in early adulthood, demonstrating the growing significance of peer relationships at that developmental stage. These trends in social network changes over time are congruent with those results from the variable-centered analyses. Overall, there is some stability and long-lasting influence of childhood social networks, but the majority of the change that occurs is reflective of age-normative trends and transitions.

Limitations and Future Directions

A major limitation of these data is the small sample size, which limits our ability to identify typologies of social networks in adulthood and to empirically identify transitions between typologies over time (Lanza & Cooper, 2016). For example, a two-profile solution was the best fit to the W3 data, but we know from previous research that there is much more heterogeneity in terms of social network structure throughout adulthood. On the other hand, relatively little research has been conducted on social networks of early adulthood, so the typologies identified in this study may be reflective of a period of stability and homogeneity in social relations. Further, it is difficult to assess continuity and change in patterns of social relations when the typologies that are identified in each developmental period are different. We would not necessarily expect for the same patterns of social relations to emerge across different age groups, but more research needs to be conducted on these understudied developmental periods. Future research using a larger sample should address these limitations, allowing for the identification of more typologies of social relations within the data, as well as a closer examination of the personal and situational characteristics that distinguish these typologies.

Another set of limitations stems from the theoretical and methodological challenges of conducting longitudinal research, especially over long periods of time that span vastly different developmental periods. In the present study and previous study (see Chapter II, “Beyond the Nuclear Family: Pattern-Centered Investigation of Children’s Social Networks”), the same set of social network structure characteristics were used to identify typologies across all ages, from childhood to adulthood. However, variability in these social networks characteristics changes with age such that they become more salient at some developmental periods but not others. For example, distinguishing between immediate and extended family in childhood is appropriate

because of the different roles that these relationship types occupy in a child's life. However, in many studies of adult social relations, particularly those that identify typologies, this distinction is not made. In contrast, contact frequency and proximity are appropriate distinguishing factors between adults' social networks, but not for children's. By using a more developmentally appropriate set of network typology indicators we might be able to discern more ecologically valid typologies. In addition to network structure, relationship quality and social support exchanges within networks should be considered. As with network structure, careful consideration is needed in terms of what types of support and relationship quality measures could be used depending on the age. Incorporating these measures with consideration for heterotypic continuity of social network function would greatly strengthen the implications of these findings.

Finally, a natural extension of this work is to investigate the effect of certain transitions and social network changes on outcomes to determine which types of transitions or changes are beneficial and which are maladaptive. According to attachment theory, a secure attachment style with mothers would promote children's exploration of the world and enhance development (Ainsworth, 1989; Bowlby, 1969). Analogously, it could be that diverse, supportive family networks in childhood serve as a secure base from which children go on to form subsequent relationships and successfully navigate the interpersonal challenges of early adulthood. Such transitions from a Varied Family typology, for instance, to a Friend-focused typology, may reflect successful transition to adulthood. Without information about whether or not different types of transitions or social network changes are associated with well-being, it is impossible to make conclusive statements about what changes or transitions are developmentally advantageous.

Conclusions

The present study provides initial steps in examining continuity of social networks from childhood to adulthood by leveraging the strengths of a unique dataset and applying innovative methodological approaches. The present study delineated the aspects of social networks that exhibit continuity over time, as well as those that change, and linked these patterns to childhood social networks. Furthermore, we identified social network typologies that exist in early adulthood, and provided descriptive information about transitions between social network typologies over time. This research lays the framework for subsequent studies that can more rigorously investigate changes in social networks, with the ultimate goal of developing diagnostic profiles that might identify individuals at risk for or undergoing problematic transitions to adulthood.

Table 3.1

Social Relations and Health Longitudinal Study Child Sample, Descriptive Statistics

	Wave 1 (<i>N</i> = 203)	Wave 2 (<i>N</i> = 149)	Wave 3 (<i>N</i> = 114)
Age (years)	10.3 (1.41)	23.4 (1.6)	33.4 (1.6)
	[7-14]	[20-27]	[30-37]
Education (years)	5.0 (1.5)	13.5 (2.0)	14.6 (2.0)
	[2-8]	[9-17]	[9-17]
Female	52%	56%	55%
Race	57% White 34% Black	63% White 32% Black	65% White 26% Black
Married/ Cohabiting		26%	60%
Have children		34%	60%
Working Full Time		47%	70%

Note. 93 respondents had complete data (i.e., participated in all three waves).

Table 3.2

Correlations and Descriptive Statistics of Social Network Characteristics from Childhood to Adulthood

	W1 <i>N</i> = 203	W2 <i>N</i> = 149	W3 <i>N</i> = 114	<i>M</i>	<i>SD</i>	Range
Network Size						
W1	1			8.46	5.02	1 to 20
W2	0.121	1		9.62	4.54	0 to 20
W3	0.082	0.334****	1	9.85	4.72	3 to 20
% Close Others						
W1	1			57.62	28.26	0 to 100
W2	0.09	1		49.59	23.29	0 to 100
W3	-0.028	0.240*	1	53.03	20.87	14.3 to 100
Contact Frequency						
W1	1			4.34	0.59	2 to 5
W2	0.209**	1		4.29	0.45	2.8 to 5
W3	0.092	0.301**	1	4.09	0.48	2.8 to 5
% Proximate						
W1	1			87.78	21.01	0 to 100
W2	0.143	1		82.46	26.22	0 to 100
W3	0.123	0.529****	1	73.93	30.87	0 to 100
% Immediate Family						
W1	1			47.63	27.20	0 to 100
W2	0.253**	1		50.67	21.99	0 to 100
W3	0.200*	0.557****	1	59.14	24.51	0 to 100
% Extended Family						
W1	1			31.17	26.59	0 to 100
W2	0.188*	1		18.25	18.51	0 to 66.7
W3	0.128	0.342****	1	12.91	16.82	0 to 62.5
% Females						
W1	1			53.14	21.30	0 to 100
W2	0.333****	1		50.87	18.73	0 to 100
W3	0.249**	0.496****	1	53.78	17.67	20 to 100
% Age-mates						
W1	1			22.24	25.15	0 to 100
W2	0.105	1		28.39	20.64	0 to 85.7
W3	0.124	0.323****	1	22.01	17.28	0 to 70

Notes. * $p < .05$; ** $p < .01$; *** $p < .001$

Table 3.3

Social Network Structure Characteristics as a Function of Time from Childhood to Adulthood (Social Relations Study Waves 1-3).

	Network Size		% Close Others		Contact Frequency		Proximity	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Intercept	9.38 *** (0.35)	10.32 *** (0.38)	54.85*** (2.10)	53.78*** (2.41)	4.28*** (0.04)	4.18*** (0.05)	83.78*** (1.72)	82.95*** (1.85)
Female	0.34 (0.22)	0.33 (0.22)	1.30 (1.16)	1.29 (1.16)	0.05 (0.03)	0.05 (0.03)	1.80 (1.15)	1.81 (1.15)
White	0.72** (0.23)	0.69** (0.23)	-2.37 (1.24)	-2.36 (1.24)	-0.05 (0.03)	-0.05 (0.03)	1.08 (1.21)	1.08 (1.21)
Age	-0.02 (0.11)	-0.008 (0.11)	0.65 (0.56)	0.64 (0.56)	0.01 (0.01)	0.01 (0.01)	-0.58 (0.59)	-0.61 (0.59)
Child SES	0.24* (0.12)	0.26* (0.12)	0.07 (0.62)	0.13 (0.62)	-0.02 (0.01)	-0.02 (0.01)	-2.38*** (0.61)	-2.39*** (0.61)
Time	0.06* (0.02)	-0.06 (0.03)	-0.25 (0.13)	-0.15 (0.17)	-0.01** (0.003)	0.001 (0.003)	-0.57*** (0.13)	-0.43* (0.18)
Childhood Typology								
Close Family	-3.31*** (0.56)	-5.60*** (0.72)	10.23*** (2.94)	19.39*** (4.51)	0.31*** (0.06)	0.59*** (0.09)	13.43*** (2.90)	15.49*** (3.46)
Friend & Family	-1.12* (0.55)	-2.97*** (0.72)	-1.46 (2.91)	-5.77 (4.52)	0.04 (0.06)	0.21* (0.09)	4.76 (2.90)	6.46 (3.49)
Time x Typology								
Close Family		0.30*** (0.06)		-0.87*** (0.32)		-0.03*** (0.01)		-0.37 (0.34)
Friend & Family		0.23*** (0.06)		0.39 (0.31)		-0.02** (0.01)		-0.29 (0.33)
Variance Estimates								
Intercept	2.32 (2.68)	1.56 (2.47)	240.50** (86.86)	214.77** (84.58)	0.14*** (0.03)	0.12*** (0.03)	20.04 (60.91)	19.21 (60.86)

Slope	0.03*	0.01	0.96 *	0.74*	-0.0006**	0.006**	1.09**	1.06**
	(0.01)	(0.01)	(0.44)	(0.43)	(0.0001)	(0.002)	(0.43)	(0.43)
Residual	16.19***	15.85***	462.96***	465.75***	0.15***	0.15***	385.88***	385.64***
	(2.07)	(1.99)	(59.29)	(59.47)	(0.02)	(0.02)	(52.35)	(52.37)
-2LL	2742.7	2710.3	4325.9	4314.7	656.8	636.7	4278.5	4277.0

Notes. -2LL = -2 log likelihood. Child SES = mother's education level at Wave 1. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 3.4

Social Network Composition as a Function of Time from Childhood to Adulthood (Social Relations Study Waves 1-3).

	% Immediate Family		% Extended Family	% Female		% Agemates
	Model 1	Model 2		Model 1	Model 2	
Intercept	41.04*** (1.75)	37.15*** (1.81)	50.09*** (1.49)	53.55*** (1.53)	53.68*** (1.68)	14.68*** (1.62)
Female	1.71 (1.08)	1.53 (1.05)	-0.81 (0.82)	6.89*** (0.98)	6.88*** (0.98)	-1.93* (0.89)
White	-0.77 (1.14)	-0.81 (1.11)	-2.01* (0.87)	-2.32* (1.04)	-2.33* (1.03)	2.85** (0.94)
Age	1.79*** (0.51)	1.54** (0.48)	-0.47 (0.39)	0.56 (0.45)	0.56 (0.45)	0.62 (0.42)
Child SES	-1.14* (0.57)	-1.09 (0.55)	-0.34 (0.44)	0.45 (0.52)	0.48 (0.52)	1.26** (0.47)
Time	0.52*** (0.11)	0.93*** (0.12)	-1.81*** (0.11)	-0.01 (0.09)	-0.02 (0.12)	0.59*** (0.12)
Childhood Typology						
Close Family	28.15*** (2.71)	48.76*** (3.39)	-44.20*** (2.78)	3.03 (2.48)	5.26 (3.15)	-4.05 (3.04)
Friend & Family	-1.92 (2.70)	-4.73 (3.40)	-41.00*** (2.79)	-6.78** (2.46)	-9.59** (3.17)	41.49*** (3.05)
Time x Typology						
Close Family		-2.24*** (0.23)	2.09*** (0.20)		-0.27 (0.23)	-0.02 (0.22)
Friend & Family		0.29 (0.23)	2.19*** (0.20)		0.31 (0.22)	-2.30*** (0.22)
Variance Estimates						
Intercept	42.62* (24.31)	76.98*** (22.26)	29.30* (14.46)	137.73*** (40.29)	134.39*** (39.93)	27.89 (17.61)

Slope				0.52** (0.21)	0.48* (0.21)	
Residual	418.15*** (34.40)	308.49*** (25.62)	233.73*** (19.44)	192.11*** (26.54)	192.54*** (26.54)	285.63*** (24.10)
-2LL	4204.3	4110.0	3940.1	4026.4	4021.8	4023.9

Notes. -2LL = -2 log likelihood. Child SES = mother's education level at Wave 1. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 3.5

Characteristics of Social Network Typologies in Wave 2 ($n = 149$)

	Friend (36%)	Diverse Distal (13%)	Varied Family (32%)	Close Family (19%)
Social Network Characteristics				
Network Size	9.96 _a	12.37 _a	10.06 _a	6.45 _b
Contact Frequency	4.29 _b	3.82 _a	4.28 _b	4.61 _c
% Proximate	89.77 _b	25.76 _a	89.00 _b	95.40 _b
% Close Others	38.78 _b	50.25 _{a,b}	54.62 _a	61.14 _a
% Immediate Family	41.38 _a	50.65 _a	41.76 _a	82.44 _b
% Extended Family	7.59 _a	10.76 _a	40.89 _b	6.30 _a
% Female	50.14 _b	37.50 _a	57.24 _b	50.67 _{a,b}
% Age-mates	43.40 _c	31.62 _a	20.13 _{a,b}	11.72 _b
Personal and Situational Characteristics				
Age (years)	23.26	23.84	23.17	23.55
Education (years)	14.09	14.42	13.18	12.34
Women (%)	57.4	47.4	57.4	58.6
Race (%)				
White	77.8	78.9	46.8	51.7
Black	18.5	10.5	44.7	48.3
Married/Cohabiting (%)	11.1	42.1	23.4	44.8
Have children (%)	18.5	31.6	31.9	65.5
Work full time (%)	51.9	42.1	44.7	44.8

Notes. Means in the same row that do not share subscripts differ at $p < .05$ in the Bonferroni comparison.

Table 3.6

Characteristics of Social Network Typologies in Wave 3 ($n = 114$)

	Diverse Distal (%)	Diverse Proximate (%)
Social Network Characteristics		
Network Size	11.81	9.24
Contact Frequency	3.74	4.20
% Proximate	26.18	88.74
% Close Others	52.31	53.25
% Immediate Family	55.41	60.30
% Extended Family	15.64	12.06
% Female	49.96	54.96
% Age-mates	26.73	20.55
Personal and Situational Characteristics		
Age (years)	33.33	33.43
Education (years)	15.41	14.34
Women (%)	37	61
Race (%)		
White	59.3	66.7
Black	22.2	27.6
Married/Cohabiting (%)	63	51
Have children (%)	37	66.7
Work full time (%)	81.5	66.7

Table 3.7

Cross-tabulation of Network Typology Membership at Wave 1 and Wave 2 ($n = 149$).

Childhood Typology (Wave 1)		Adulthood Typology (Wave 2)			
		Diverse Distal ($n = 19$)	Varied Family ($n = 47$)	Friend Focused ($n = 54$)	Close Family ($n = 29$)
Varied Family ($n = 82$)	n (%)	12 (14.60)	32 (39.00)	27 (32.90)	11 (13.40)
Friend and Family ($n = 35$)	n (%)	5 (14.30)	9 (25.70)	15 (42.90)	6 (17.10)
Close Family ($n = 32$)	n (%)	2 (6.3)	6 (18.8)	12 (37.5)	12 (37.5)

Table 3.8

Cross-tabulation of Network Typology Membership at Wave 2 and Wave 3 ($n = 93$).

Adult Typology (W2)		Adulthood Typology (Wave 3)	
		Diverse Distal ($n = 21$)	Diverse Proximate ($n = 72$)
Diverse Distal ($n = 11$)	n (%)	9 (81.80)	2 (18.20)
Varied Family ($n = 28$)	n (%)	4 (14.30)	24 (85.70)
Friend Focused ($n = 37$)	n (%)	7 (18.90)	30 (81.10)
Close Family ($n = 17$)	n (%)	1 (5.90)	16 (94.10)

Table 3.9

Cross-tabulation of Network Typology Membership at Wave 1 and Wave 3 ($n = 93$).

Childhood Typology (Wave 1)		Adulthood Typology (Wave 3)	
		Diverse Distal ($n = 27$)	Diverse Proximate ($n = 87$)
Varied Family ($n = 63$)	n (%)	16 (25.40)	47 (74.60)
Friend and Family ($n = 27$)	n (%)	5 (18.50)	22 (81.50)
Close Family ($n = 24$)	n (%)	6 (25.00)	18 (75.00)

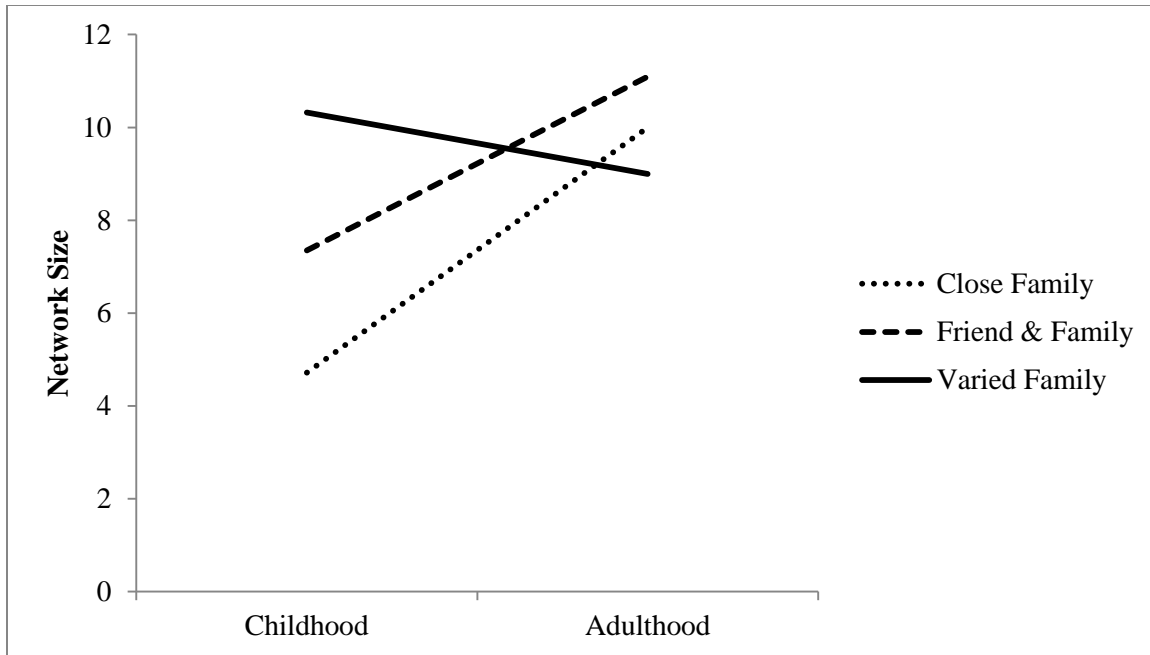


Figure 3.1. Change in network size over time by childhood social network typology. Network size significantly increases for respondents who were in the Friend and Family childhood typology, $b = 0.17$, $p < .001$, and in the Close Family typology, $b = 0.25$, $p < .001$, in comparison to respondents who were in the Varied Family childhood typology.

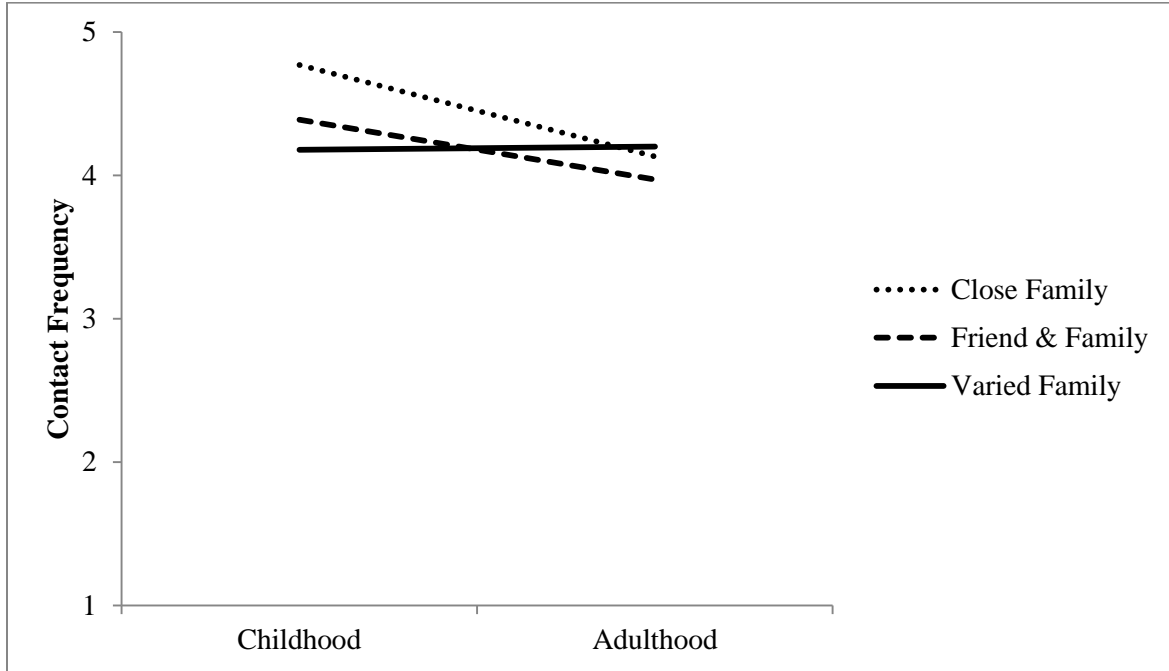


Figure 3.2. Change in frequency of contact over time by childhood social network typology. Contact frequency with network decreased for respondents in the close family typology, $b = -0.03$, $p < .001$, and friend and family typology, $b = -0.02$, $p < .01$.

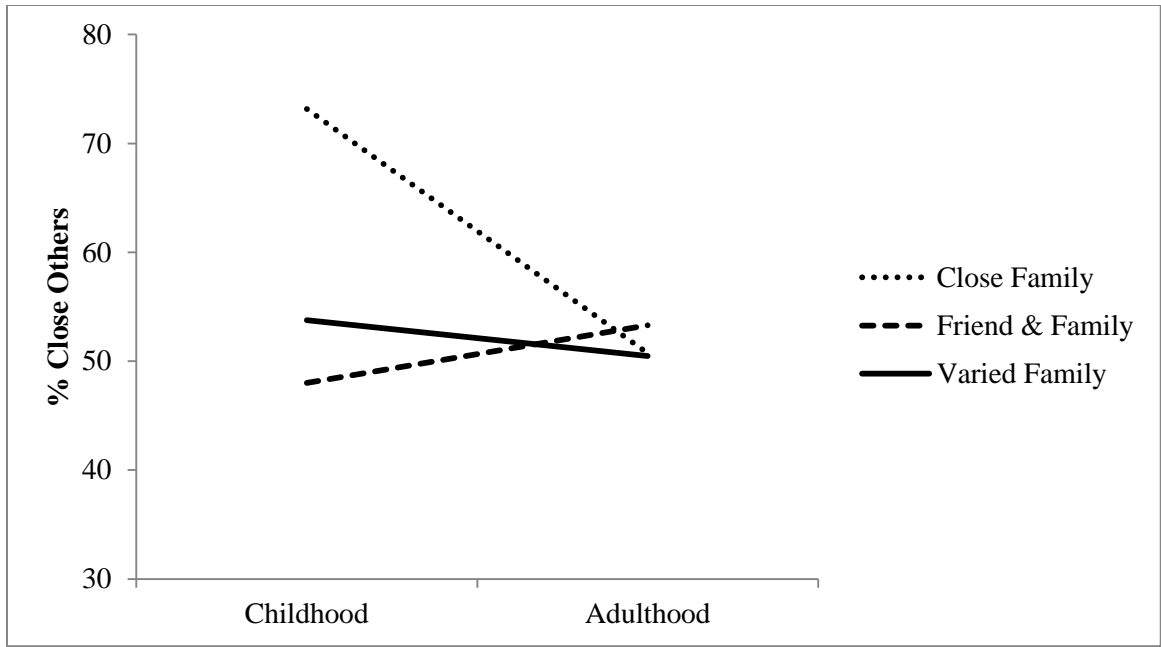


Figure 3.3. Change in percentage close others in network over time by childhood social network typology. Percentage of close others in networks significantly decreased only for respondents who were in the Close Family typology as children, $b = -1.02$, $p < .001$.

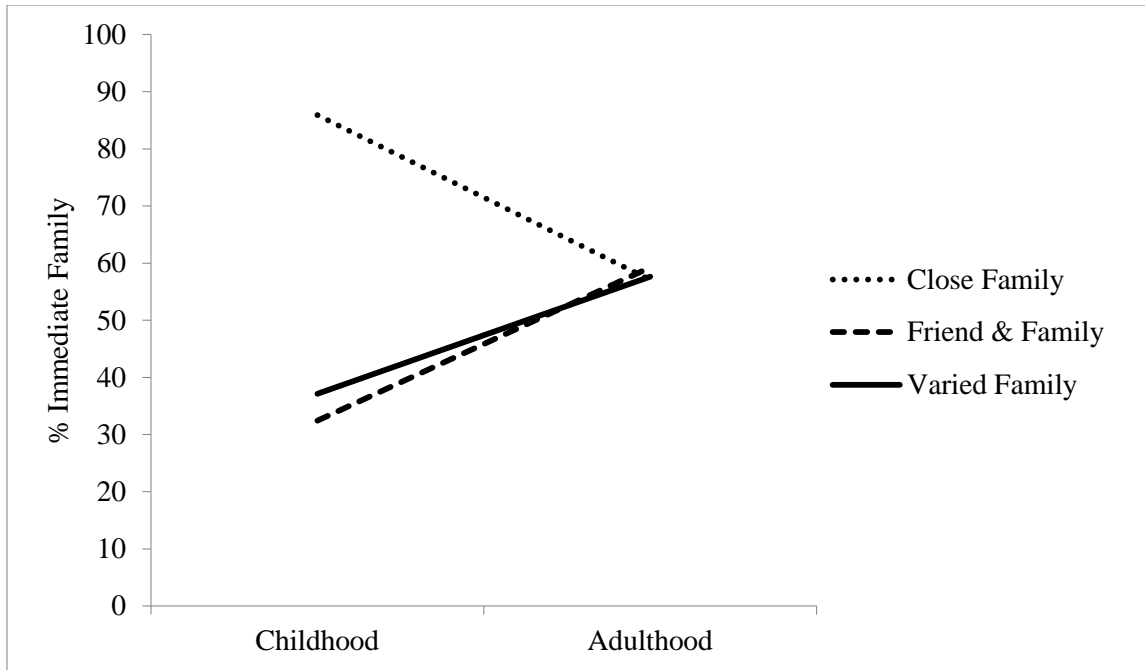


Figure 3.4. Change in percentage immediate family in network over time by childhood social network typology. Percentage of immediate family in the network increased over time for respondents who were in the Varied Family and Friend and Family childhood typologies, $b = 0.93$, $p < .001$, and decreased for respondents who were in the Close Family typology, $b = -1.31$, $p < .001$.

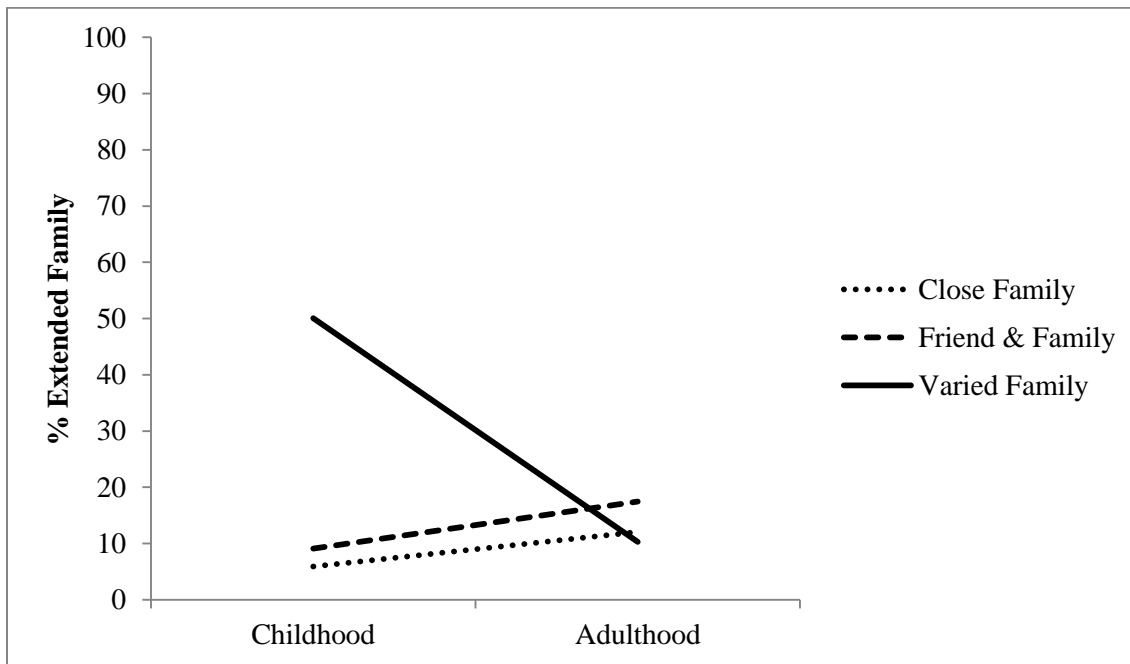


Figure 3.5. Change in percentage extended family in network over time by childhood social network typology. The percentage of immediate family in the network decreased over time for respondents who were in the Varied Family childhood typology, $b = -1.81$, $p < .001$, and increased for respondents who were in the Friend and Family typology, $b = 0.38$, $p < .05$. In comparison, respondents in the Close Family childhood typology remained stable, $b = 0.28$, $p > .05$.

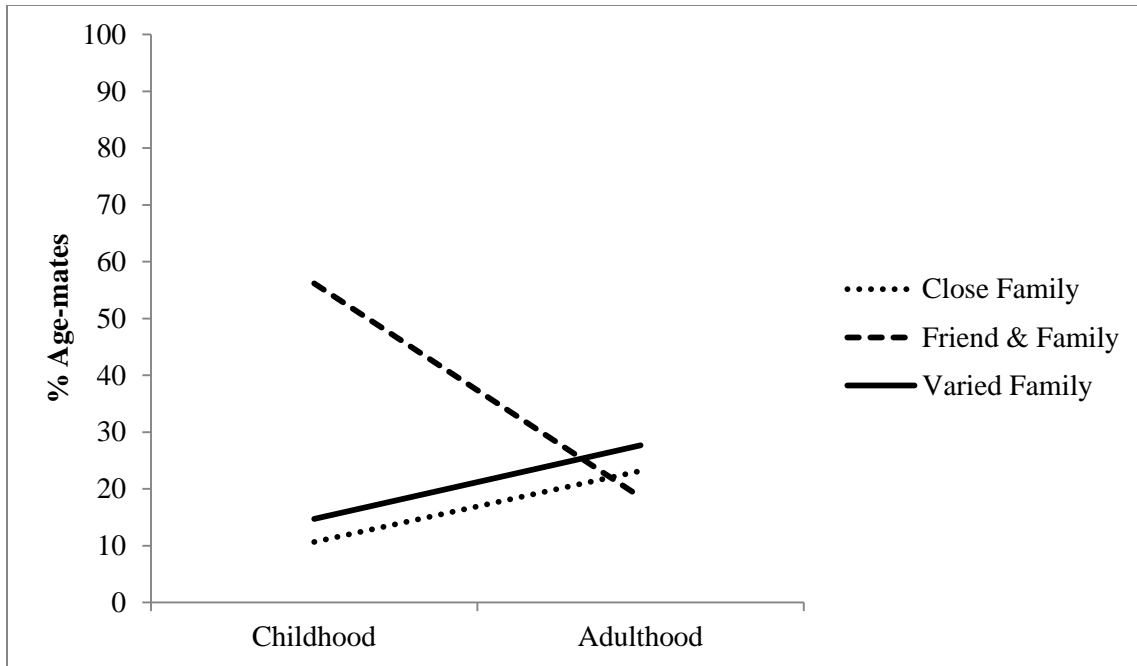


Figure 3.6. Change in percentage age-mates in network over time by childhood social network typology. Percentage of age-mates in the network increased significantly over time for respondents who were in the Varied Family and Close Family childhood typologies, $b = 0.60$, $p < .001$, and decreased for respondents who were in the Friend and Family typology, $b = -1.70$, $p < .001$.

CHAPTER IV

**BEYOND SOCIAL NETWORKS IN OLDER ADULTHOOD:
BENEFITS OF ACTIVITY ENGAGEMENT FOR LONELINESS**

Introduction

Close social ties and social integration influence physical health, psychological well-being, and quality of life across the lifespan. Emotional well-being is particularly important in later life (Charles & Carstensen, 2010). Social isolation and loneliness among aging individuals are growing public health concerns. Both have been linked to mortality, poor physical functioning, and lower psychological well-being, exacting tolls on individuals, families, and society (Cacioppo & Cacioppo, 2014; Hawkley & Cacioppo, 2007; Ong, Uchino, & Wethington, 2016). Though related, isolation and loneliness are distinct constructs (Peplau & Perlman, 1982). For instance, it is possible to be socially isolated without feeling lonely, or vice versa. Social isolation is the absence of social ties, whereas loneliness is a subjective feeling of lacking social connection. In other words, loneliness is the perception of social isolation. Social integration, as measured by social network characteristics, social support, or participation in social activities, can minimize the experience of various dimensions of isolation and loneliness (Hawkley et al., 2008). Less is known, however, about the implications of broader activity engagement on loneliness. By integrating models of successful aging into theories that guide our knowledge of social relations in older adulthood, the present study investigates associations

between social network characteristics and patterns of activity engagement. Further, this study examines if activity engagement moderates the link between social network characteristics and emotional well-being. Specifically, I examine whether activity engagement can compensate for limited availability of and contact with close social partners, and buffer the experience of loneliness.

Social Relations & Loneliness in Older Adulthood

According to the convoy model of social relations, age is a key determinant of the structure and function of social relations (Antonucci et al., 2010; Kahn & Antonucci, 1980). Compared to younger adults, older adults report smaller social networks and less frequent contact with people in their networks (Lansford et al., 1998). Life circumstances and situational factors shape the structure of social networks. Loss of a spouse or same-aged family members and friends is demographically more common among older individuals. These losses result in shrinking social networks. Similarly, health problems or chronic conditions, such as reduced physical mobility, might hinder older adults ability to form new ties or maintain existing ones.

On the other hand, individuals also play an active role in shaping their social networks. Older adults are more likely than younger adults to spend time and engage in social support exchanges with close family and long-time friends (Antonucci & Akiyama, 1987). Socioemotional selectivity theory (SST) sheds light on the observed changes in adults' social networks as they age. According to SST, older adults are motivated by shifting time perspectives to prioritize emotion regulation and meaning in life, and as a result, focus on close, meaningful relationships (Carstensen, 1995, 2006). Consequently, reductions in network size as individuals age can be attributed to loss of peripheral ties, rather than close ties (Fung et al., 2001).

Nevertheless, when an individual's desire for social connection is not satisfied, feelings of loneliness emerge. Various aspects of social networks, including network structure and social support, have been linked to loneliness in adulthood (de Jong-Gierveld, 1987; Hawkey et al., 2008). In the present study, the focus is on two aspects of social network structure—network size and frequency of contact. Older individuals with smaller social networks are more likely to be lonely (Hawkey et al., 2008). However, previous research on network size and loneliness seldom distinguishes between different types of relationships. The present study addresses this gap by assessing the number of close children, other family, and friends. Similarly, frequent contact with friends and relatives is associated with lower levels of loneliness (Luhmann & Hawkey, 2016). The frequency of contact with close others has been shown to influence well-being beyond network size, or the presence of close relationships.

There is also evidence that more peripheral social ties are important for older adults' well-being, indicating the strength of weak ties (Fingerman, 2009; Granovetter, 1973, 1983). For aging individuals faced with threats of social isolation and loneliness, the broader social integration and social capital derived from engagement in different activities can be particularly influential, especially in the absence of other close ties or infrequent contact.

Beyond Social Relations: Activity Engagement

Participation in various social and solitary activities beyond everyday obligations has been central to social gerontological theories, from activity theory to more contemporary models of successful and active aging (Havighurst, 1961; Rowe & Kahn, 1997; WHO, 2002). In the classic MacArthur model, Rowe and Kahn (1987, 1997) defined successful aging as having three major components: freedom from disease and disability, maintenance of high physical and cognitive function, and continued engagement with life. Engagement with life encompasses

maintenance of interpersonal relationships and productive activities. In a prospective study, House, Robbins, and Metzner (1982) tapped into both aspects of engagement with life and found that social relationships and participation in a wide range of activities had independent effects on mortality. The concept of active aging places a stronger emphasis on the link between activity engagement and health, by expanding the definition of “active” to incorporate continued participation in a variety of activities (Foster & Walker, 2015; WHO, 2002). Thus, participating in a number of diverse activities provides older adults with opportunities to stay actively engaged and socially integrated.

Studies over the years have defined activity engagement in a variety of ways. Activity engagement encompasses several dimensions, including number and type of activities in which an individual participates, as well as time spent doing activities (Newton, Pladevall-Guyer, Gonzalez, & Smith, 2016). Activities can span several domains and include leisure activities, productive activities, and interpersonal relationships (Huijg et al., 2016). Most studies broadly define activity engagement as frequency of participating in various activities over the past week or month. This conceptualization, however, may not capture an individual’s full repertoire of activity engagement. In the present study, activity engagement is measured as ever participating in a broad range of activities from multiple domains. Individual variations in the number of activities an older adult does, as well as type and variety of activities, may have different implications for health and well-being. Consequently, methodological approaches that combine these multiple dimensions of activity engagement result in a more holistic understanding of how the way older adults spend their time promotes or hinders successful aging.

Empirical Evidence for Patterns of Activity Engagement

Most research on activity engagement focuses on certain types/domains of activities, such as volunteering, caregiving, social or interpersonal, physical, or leisure. For example, Mooney et al. (2015) identified five classes of physical activity among older adults using self-reports of past week engagement in 12 activities (e.g., walking, home repair, caring for others): Least active, walkers, domestic/gardening, athletic, and domestic/gardening athletic. Similarly, Burr, Mutchler, and Caro (2007) identified four clusters of productive activity among middle-aged and older adults: Helpers, home maintainers, worker/volunteers, and super helpers. In both of these studies, patterns of activity were distinguishable by different sociodemographic characteristics. Morrow-Howell et al. (2007) identified five activity profiles among older adults using 36 activities that were factored into nine domains: Low activity, moderate activity, high activity, working, and physically active. The low activity group was most susceptible to negative physical and mental health outcomes, and the high activity group could be characterized by “active aging” with the associated benefits. More recently, Amano, Park, and Morrow-Howell (2017) also identified patterns of activity using a broad set of indicators. Results yielded similar patterns including: high activity, active leisure, passive leisure, and low activity. Both of these studies uniquely combined multiple domains of activities for a more comprehensive examination of activity engagement in older adulthood. These studies do not identify distinct domains, but rather, recognize that the activities span multiple domains. The present study aims to achieve the same breadth of activities by including a broad range of 18 activities spanning different domains, in conjunction with a person-centered approach.

Social Determinants of Activity Patterns

Previous research on patterns of activity engagement assesses sociodemographic and sociocultural predictors of these patterns. Patterns among older adults have been shown to vary

by personal and situational characteristics, with differences emerging between men and women, single and partnered individuals, and people who are working and retired. According to the World Health Organization, social determinants of active aging, including supportive social networks and close social ties, are also important to consider in terms of activity engagement (WHO, 2002). The close social networks in which individuals are embedded influence their participation in various activities. In their examination of activity profiles, Morrow-Howell et al. (2014), investigated a number of social network characteristics, both structural and functional and found significant effects of both structural (e.g., number of social partners) and functional (e.g., social support) aspects of social relations. For example, individuals in either the high activity or physical activity profile could be distinguished in their reporting of more close friends. Thus, individuals' social network characteristics may also shape their engagement with life, above and beyond sociodemographic, cultural, and health influences. Greater number of social ties as well as more frequent contact with close others are expected to be associated with greater activity engagement.

Implications of Activity Engagement for Loneliness

Social isolation and loneliness are particularly concerning for aging individuals due to links with poor physical health and increased risk of mortality (Holt-Lunstad et al., 2015). Social network characteristics and social support are robust predictors of loneliness across the lifespan, including older adulthood. Given the significance of activity engagement for older adults, the broader social connections that can be derived from activity engagement are worth investigating in terms of loneliness. Previous studies have demonstrated that activity engagement influences a number of psychological and emotional well-being outcomes, but loneliness has received less empirical attention. Studies that incorporate social participation in models predicting loneliness

result in mixed findings (Hawkley et al., 2008; Luhmann & Hawkley, 2016). A more targeted investigation of activity engagement is warranted to specify these links.

Queen and colleagues (2014) investigated whether loneliness influenced daily activities with a brief day reconstruction measure used to obtain information about the number and type of daily activities, as well as how respondents felt while participating in these activities. They found that across ten physical, cognitive, social, and leisure activities, loneliness was not associated with the number or variety of activities performed during the day. Lonelier individuals did, however, engage in more activities alone than with others, suggesting that feelings of loneliness are linked to the social context of different activities. The present study extends this work by looking more broadly at activity engagement in general, rather than activity engagement within a single day.

Although many studies conceptualize loneliness as a single construct, there is evidence that it can be further delineated into multiple facets. For example, several studies make the distinction between social and emotional loneliness (Dykstra, 2009; Dykstra & Fokkema, 2007). Hawkley and colleagues examined mental representations of loneliness and social connectedness, and identified three distinct dimensions (Hawkley, Browne, & Cacioppo, 2005). Isolation includes feelings of aloneness or social isolation. Relational connectedness describes feelings of familiarity, closeness, and support. Finally, collective connectedness captures feelings of group identification or cohesion. The present study probes these distinct dimensions of loneliness to assess how objective measures of social integration (e.g., number of close ties and frequency of contact with close others) and patterns of activity engagement are related to subjective feelings of social isolation, connectedness, and loneliness.

Interactions with Social Relations

Typically, social relations are thought to be a form of social capital. Participation in a variety of activities can be thought of as another form of social capital. Both forms of social capital can interact to influence feelings of loneliness through two competing mechanisms. The substitution hypothesis suggests that one form of social capital (e.g., activity engagement) can substitute for a lack of other forms (e.g., social relations). In this case, participation in a number of diverse activities could substitute for a lack of social ties, including low numbers of close children, family, or friends and low or lack of social contact with close others. On the other hand, amplification describes a cumulative advantage perspective. Activity engagement, in conjunction with strong social ties, might result in better emotional well-being. Specifically, those who engage in a diverse set of activities might be better able to leverage the benefits of strong social networks to combat loneliness.

Previous research on volunteerism has demonstrated support for both of these mechanisms whereby the social capital derived from social networks exerts an influence (Ajrouch et al., 2014; Wilson & Musick, 1997). For example, Ajrouch and colleagues found that geographically proximate networks and social contact substituted for low levels of education to predict volunteerism. In the present study, it is proposed that activity engagement captures multiple aspects of social capital which potentially substitute for deficits resulting from weak social ties or amplify the benefits of strong social ties.

Research Questions and Hypotheses

Past research on social relations over the lifespan has established the links between limited or poor quality social ties and loneliness in older adulthood. However, the broader social integration that is derived from diverse activity engagement may buffer against the detrimental

effects of resource-poor social networks on loneliness. The present study investigates three main research questions:

1. What patterns of activity engagement can be identified among older adults? I hypothesize that patterns of activity engagement that are distinguished by number and diversity of activities will be identified.
2. What are the social determinants of these patterns? I hypothesize that social network characteristics will influence these patterns, such that greater social ties and more frequent contact with social partners will be associated with greater activity engagement.
3. Are these activity engagement patterns associated with different types of loneliness? Does activity engagement moderate the link between social network characteristics and loneliness? I hypothesize that patterns reflecting greater social integration and active engagement will be associated greater loneliness, specifically greater isolation and lower collective connectedness. Additionally, I hypothesize that activity engagement patterns will moderate the link between social network characteristics and loneliness either through substitution or amplification. Specifically, through substitution, patterns that reflect greater activity engagement will be protective against weak social ties (i.e., low numbers of social partners or low levels of social contact). Similarly, through amplification, patterns that reflect high activity engagement will strengthen the benefits of strong social ties for loneliness.

Method

Sample

This study used cross-sectional data from the 2010 wave of the Health and Retirement Study (HRS). The HRS is a nationally representative biennial panel study of Americans aged 51

and older. Details of the HRS longitudinal panel design, sampling, and all questionnaires are available on the HRS website (<http://hrsonline.isr.umich.edu>; see also Sonnega, Faul, Ofstedal, Langa, Phillips, & Weir, 2014). At each wave, a random 50% of participants completed an in-person interview and also received a self-administered Psychosocial and Lifestyle Leave-Behind Questionnaire (SAQ) that assessed multiple domains of psychosocial functioning (Smith, Ryan, Fisher, Sonnega, & Weir, 2017). The core questionnaire was administered to participants at each wave. Participants who were non-community dwelling, used a proxy, and were younger than 50 years old were excluded from the present study, resulting in an analytic sample of 7,731 respondents from the 2010 wave and a replication sample of 6,955 respondents from the 2012 wave (Table 4.1). On average, respondents were 67 years old. The majority of the sample was female, White, partnered, and not working for pay.

Measures

Activity participation. As part of the self-administered questionnaire, participants were asked to indicate how often they do a list of 20 activities on the following scale: 1 (daily); 2 (several times a week); 3 (once a week); 4 (several times a month); 5 (at least once a month); 6 (not in the past month); 7 (never/not relevant). Due to high rates of endorsement (> 95%), watching television and reading were excluded. For this study, similar to Amano et al. (2017), responses were recoded and dichotomized into 0 (never/not relevant) and 1 (all other options). Participants who responded to fewer than two activities were excluded from this analysis. All other missing responses were recoded as 0 (< 2.5% of responses per activity). Activity endorsement for the sample is displayed in Table 4.2.

Social Network Characteristics. The social network characteristics measured captured network size, composition, and contact frequency. Size and composition were assessed with

respondents reporting first whether or not they had children, close family, or friends, then reporting the number of close relationships they had with children, other family members, and friends. Network size was capped at 20 for each relationship type (less than 2% respondents reported having more than 20 close relationships of each type). The extent to which respondents were in contact with their social networks, including children, other family, and friends was assessed with items spanning three different modes: In person, by telephone, and through writing/email. Each of these items were measured on a 6-point scale from, when reverse-coded, less than once a year or never (1) to three times a week or more (6), and were averaged to create a single score for frequency of contact for each type of relationship (i.e., children, close family, friends). Because the scores were normally distributed across the sample, a continuous measure was used such that higher scores reflected more frequent contact.

Loneliness. Three domains of loneliness were measured using a shortened version of the UCLA Loneliness Scale (Hawkley et al., 2005). All items were measured on a 3-point scale from often (1) to hardly ever or never (3). The index of loneliness was created by reverse-coding five items and averaging the scores across all 11 items. The final score was set to missing if there were more than five items with missing values. Isolation was assessed with two items (i.e., “I feel left out” and “I feel isolated from others”), relational connectedness was also assessed with two items (i.e., “There are people I can turn to” and “There are people I can talk to”), and collective connectedness was assessed with three items (i.e., “I feel part of a group of friends”; “I have a lot in common with the people around me”; and “I feel in tune with the people around me”). Items for these subscales were also reverse-coded so that higher scores reflected greater isolation, relational connectedness, and collective connectedness.

Sociodemographic characteristics and health. Respondents' sociodemographic and health characteristics were assessed in the HRS core interview. Sex (1= female), race (1= White), and education were time-invariant, whereas all other variables were time-varying. Education was classified into three categories based on years of education: Less than high school diploma/GED (less than 12 years), high school diploma/GED (12 years), and more than high school (greater than 12 years). Age was a continuous measure of respondents' age at each wave, centered at 50 for analysis. Marital status (1= married or partnered) and work status (1= working for pay) were dichotomized. Number of self-reported chronic illnesses (e.g., diabetes; range = 0 to 7) and number of functional limitations (e.g., difficulty climbing stairs; range = 0 to 23) were continuous measures (Fisher, Faul, Weir, & Wallace, 2005). Self-rated health was a single-item measure that was reverse coded so that a higher score corresponds to better self-rated health (range = 1 [poor] to 5 [excellent]).

Analysis Strategy

First, patterns of activity engagement were identified and described using the full analytic sample ($N = 7,731$). Latent class analysis was conducted using PROC LCA in SAS 9.4 in order to identify activity engagement patterns based on respondents' participation in 18 activities. One- through six-class models were tested. Model fit was determined using a combination of Bayesian information criteria (BIC) and entropy. Posterior class membership probabilities were used to assign respondents to a class in the best fitting model. Multinomial logistic regression was used to describe the extent to which class membership was distinguishable by social network factors. Sociodemographic and health characteristics were included as covariates in the model due to their links to activity engagement.

Next, to examine the cross-sectional association between class membership and loneliness, multiple linear regression was conducted. Separate models were estimated for each loneliness construct, controlling for sociodemographic, health, and social network characteristics. Finally, additional models tested the interaction between class membership and each social network characteristic (number of close: children, family, friends; contact with: children, family, friends). These models initially tested all possible interactions simultaneously, and then were trimmed to include only statistically significant network characteristics (i.e., number, social contact, or both).

Due to missing data in respondents' health, social network characteristics, and loneliness, analyses that included these measures to address research aims 2 and 3 used a smaller sample with complete data ($n = 5,451$). Of the full sample ($N = 7,731$), four respondents were missing data on health characteristics, 514 respondents were missing data on the number of close relations (i.e., with children, other family, or friends), 1,946 respondents were missing data on social contact (i.e., with children, other family, or friends). Further, 108 respondents were missing information about loneliness. Thus, Logistic regression was used to determine the extent to which sociodemographic and health characteristics influenced the probability of having complete data. Respondents who were women ($b = 0.23, p < .001$), older ($b = 0.008, p < .001$), married or partnered ($b = 0.48, p < .001$), and rate themselves as healthier ($b = 0.06, p < .05$) were more likely to have complete data. Respondents with more than a high school education (compared to those with only a high school education or less) and those who reported more depressive symptoms ($b = -0.04, p < .01$) were less likely to have complete data. There were no significant effects of race, working status, number of chronic diseases, or functional limitations.

Additional analyses determined if there was a differential attrition across the identified classes of activity engagement.

Results

Descriptive Analyses

Descriptive statistics are displayed in Table 4.1 for the 2010 analytic sample.

Respondents participated in an average of 13 activities, with activity endorsements ranging from 98% (watch television) to 28% (make clothes, knit, etc.; Table 4.2).

Patterns of Activity Engagement

Latent class analysis was used to identify unobservable subgroups of activity participation in the 2010 sample, and replicated in the 2012 sample. A three-class model was determined to be the best fit to the data (Table 4.3). Additional analyses were conducted using alternative dichotomous activity participation coding schemes, including 1) at least once a week versus less than once a week, and 2) at least once a month versus less than once a month. Although these analyses yielded the same three-class solution, the coding used in the present study resulted in the best fitting model.

The three classes were characterized both by the number and diversity of activities, capturing varying levels of activity engagement and social integration: restricted activities, average activities, and diverse activities. Probabilities for the two-category activity participation indicators (i.e., none versus all other frequency options) conditional on latent class membership are presented in Table 4.4 and illustrated in Figure 4.1.

The restricted engagement class (24.1%) was characterized by people who report participating in only the most highly endorsed activities, such as spending time with grandchildren, praying privately, home maintenance or gardening, cooking something special,

and walking for at least 20 minutes. On average, people in the low engagement class reported doing 7 out of the 18 activities. The average engagement class (46.3%;) consisted of respondents who report participating in the activities the low engagement class does and a number of other social (e.g., participating in a sport/social/other club) and cognitive (e.g., playing word games) activities. On average, respondents in this class reported doing 13 out of the 18 activities. The diverse engagement class (29.6%) was characterized by above average levels of participation in prosocial (e.g., volunteering and charity work) and enrichment (e.g., taking an educational/training course) activities, in addition to the activities typical of the low and average engagement activity classes. On average, respondents in this class reported doing all 18 activities. The descriptive characteristics of the three classes are presented in Table 4.5.

Subsequent analyses used a subset of the sample with complete data ($n = 5,451$). Therefore, we assessed selective attrition by activity engagement class in order to prevent biased results. Of the complete data subsample, 32.5% of respondents were classified by diverse activities (versus 29.6% of full sample), 47.5% were classified by average activities (versus 47.5% of full sample), and 20% were classified by restricted activities (versus 24.1% of full sample). First, we examined whether this subsample differed significantly from the full sample regarding activity class membership using two methods. A chi-square goodness of fit test was calculated to determine whether the distribution of respondents across activity engagement classes in the subsample match that of the full sample. We also estimated a logistic regression model to assess whether class membership predicted the likelihood of having complete data. Results indicated that significant deviation from the hypothesized value was found ($\chi^2(2) = 55.035, p < .001$). Similarly, results of logistic regression suggested that those in the restricted activities class were less likely to have complete data ($b = -0.57, p < .001$), but those in the

diverse activities class were more likely to have complete data ($b = 0.30, p < .001$).

Descriptively, however, the distribution of the subsample across the classes follows the same pattern as the full sample, and the results of these selection analyses (i.e., statistically significant chi-square goodness of fit test and logistic regression results) could be attributed to the large sample size. Thus, we moved forward with the analyses using the complete data subsample.

Social Network Characteristics of Activity Engagement Classes

Results of the multinomial logistic regression are displayed in Table 4.6.

Sociodemographic characteristics were associated with class membership as expected. The average activities class was the reference group in this analysis. Respondents who were married or partnered, working for pay, and who had more than a high school education were more likely to be in the diverse activities class than the average activities class. Those who were older and with less than a high school education were less likely to be in the diverse activities class.

Conversely, respondents who were older and with less than a high school education were more likely to be in the restricted activities class compared to the average activities class, whereas respondents who were women, white, married or partnered, working for pay, and with more than a high school education were less likely to be in the restricted activities class.

Furthermore, social network characteristics were also associated with activity engagement class membership in generally expected ways (Table 4.6). A greater number of close children and friends were associated with membership in the diverse activities class compared to the average activities class. Similarly, more frequent contact with children, other family, and friends was also associated with higher probability of membership in the diverse activities class. In contrast, having more close family was associated with higher probability of membership in the restricted activities class in comparison to the average activities class, whereas having more

friends, and greater contact with children and with friends was associated with lower likelihood of membership in the restricted activities class. Though not the focus of this study, it should also be noted that the classes were distinguishable by sociodemographic characteristics (e.g., education) and health characteristics (e.g., functional limitations).

Association Between Activity Engagement and Loneliness

The association between activity engagement class and loneliness was tested with a series of linear regression models using the complete data sample ($n = 5,451$). In these analyses, the average activities class served as the reference group. Two sets of effect coded variables were entered into the models (e.g., -1, 0, 1) such that those in the average activities class were being compared to those in the diverse activities and restricted activities classes. All other categorical variables were dichotomously effect coded (-1, 1) and all continuous variables were mean centered. The correlation matrix in Table 4.7 shows that the continuous variables exhibit low to moderate levels of correlation, indicating that multicollinearity is not a problem among the predictor variables in the model.

Overall Loneliness. Results of the regression models testing the association between activity engagement and overall loneliness are presented in Table 4.8. The main effects model (model 1) shows that activity class membership is not associated with loneliness. The interaction model (model 2) tests whether activity class moderates the link between social network characteristics and loneliness. According to this model, compared to the average activities class, membership in the diverse activity class moderates the link between number of close children and loneliness (Figure 4.2). For those in the diverse activity class, the number of close children is not significantly associated with loneliness; whereas for those in the average activity class, greater number of close children is associated with lower levels of loneliness. Thus, a buffering

effect of diverse activity engagement is observed. There were no significant interactions between activity engagement and social contact.

Isolation. Results of the models linking activity engagement to isolation revealed somewhat counterintuitive findings (Table 4.9). Membership in the restricted activity class was associated with lower levels of isolation, compared to membership in the average activities class. Membership in the diverse activities class was associated with higher levels of isolation. There were no significant interactions between class membership and social network characteristics. However, when activity engagement was entered into the model independently, the direction of the association reversed such that it was in the expected direction. Specifically, diverse activity engagement was associated with lower levels of isolation ($b = -0.09, p < .001$) and restricted activity engagement was associated with higher levels of isolation ($b = 0.09, p < .001$). These suppression effects of covariates merit further exploration, so the models were re-estimated by sequentially omitting each set of covariates. When contact frequency variables were omitted from the model while controlling for sociodemographics, health, and social network size, activity engagement patterns were not significantly linked to isolation. This suggests that the protective effect of diverse activity engagement and the detrimental effect of restricted activity engagement on perceived isolation are confounded with frequency of contact with close others.

Relational Connectedness. The main effects model (Model 1) shows no significant effect of activity class membership on relational connectedness (Table 4.10). Further, activity engagement did not moderate the link between any social network characteristics and relational connectedness. These results suggest activity engagement is not associated with relational connectedness beyond social network characteristics (i.e., number of close ties and frequency of contact).

Collective Connectedness. The main effects model shows that compared to the average activity class, membership in the diverse activity class is associated with higher levels of collective connectedness, whereas membership in the restricted activities class is associated with lower levels of collective connectedness (Table 4.11). Next, interaction models were estimated to test whether activity engagement moderates the link between social network characteristics and collective connectedness. The interaction between number of close children and diverse activities class is illustrated in Figure 4.3. Among those in the diverse activities class, a greater number of close children is associated with lower levels of collective connectedness; whereas among those in the average activities class, a greater numbers of close children is associated with higher levels of collective connectedness. In other words, those in the diverse activities class report relatively high levels of collective connectedness, even when they have few or no close children, compared to those in the average activities class.

Discussion

The present study focuses on older adults' broader social integration and emotional well-being by incorporating models of successful and active aging into the study of social relations. Specifically, patterns of activity engagement were identified and linked to different dimensions of loneliness. There is a robust literature that specifies the influences of social network characteristics on loneliness, but links between activity engagement and different facets of loneliness have not been fully explored. Results of the present study indicated that activity engagement was directly linked to isolation and collective connectedness, even after controlling for the influence of social network characteristics. Further, moderating effects of activity engagement patterns demonstrated substitution effects of diverse activity engagement on loneliness and collective connectedness.

Patterns of Activity Engagement

Three patterns of activity engagement were identified in the present study among a large sample of older adults, including restricted activities, average activities, and diverse activities classes. These patterns are similar to others that have been previously identified in the literature, distinguished by number and diversity of activities (Amano et al., 2017; Morrow-Howell et al., 2014). Individuals in the restricted activities class exhibited high levels of participation in activities that are typically restricted to the home (e.g., cooking a special meal) or close social network (e.g., spending time with grandchildren). In contrast, those in the diverse activities class reported participation in all activities, including those that are more community-based (e.g., volunteering or charity work). These characterizations of the identified activity engagement patterns suggest that they vary in terms of social integration, and thus, may be distinguished by social network characteristics and differentially linked to loneliness.

Social Network Characteristics and Activity Engagement

Social network characteristics were associated with activity engagement class membership in largely expected ways. More frequent contact with children and friends were associated with increased likelihood of membership in the diverse activities class, and decreased likelihood of membership in the restricted activities class. Contact with other family was only associated with increased likelihood of membership in the diverse activities class, and was not significantly related to membership in the restricted activities class. Interestingly, a greater number of close family members was associated with membership in the restricted activities class, compared to the average activities class. This finding is consistent with the fact that the activities endorsed by the restricted activities class are most often done with family. Individuals in the restricted activities class are likely spending most of their time doing those activities with

family members. Thus, those individuals would not necessarily be socially isolated, but rather integrated in a close-knit, family network. On the other hand, respondents with a greater number of close children were more likely to be in the diverse activities class, suggesting that the type of relationships older individuals have may influence the activities in which they participate.

Activity Engagement and Loneliness

To address the final research aim investigating links between activity engagement and loneliness, three distinct facets of loneliness were examined in addition to overall loneliness. Results indicated that, even after accounting for social network characteristics, patterns of activity engagement were associated with isolation and collective connectedness, but not associated with relational connectedness.

The findings regarding isolation were counterintuitive, suggesting that restricted activity engagement was related to lower levels of perceived isolation and diverse activity engagement was associated with higher levels of isolation. Further investigation into these findings, however, indicates that they can likely be explained statistically by a suppression effect of the social network characteristics. There are a number of alternative explanations that may also account for this surprising finding. One alternative explanation can be derived from the finding that having more close family members is associated with membership in the restricted activities class. It could be that individuals who exhibit patterns of restricted activity engagement have robust family networks that protect against feelings of isolation. Likewise, individuals who engage in diverse activities, though socially integrated in a larger community network, may not perceive it. It should also be noted that respondents in this group reported the highest number of functional limitations. Alternatively, it could be that individuals in the restricted activity engagement group report feeling less isolated because they are receiving higher levels of support and social

interaction from close social network members. Indeed, social support networks are mobilized in times of need (Birditt, Antonucci, & Tighe, 2012). With this interpretation, this finding could have implications for public policy addressing caregiving issues by illuminating social interaction as a function of caregivers. Finally, these findings are based on cross-sectional data. Causal claims can, therefore, not be made about the direction of the effect. It could be that individuals in the diverse activity engagement group seek out opportunities for social integration through activity engagement as a response to feelings of isolation.

Activity engagement was not significantly associated with relational connectedness. Low levels or absence of relational connectedness can be considered emotional loneliness, and stems from a lack of close, intimate ties that offer security and support (Dykstra & Fokkema, 2007). The more peripheral social ties that can be derived from engagement in activities in the wider community are likely not sufficiently emotionally close to protect against emotional loneliness. Instead, it is the close social network that is most influential for relational loneliness.

In contrast, activity engagement was significantly associated with collective connectedness. Social loneliness refers to a lack of wider support network or feelings of belonging, and can occur when perceptions of collective connectedness are low. Findings from this study suggest that patterns of diverse activity engagement result in the wider support network that is needed to combat feelings of social loneliness, and thus, create higher levels of collective connectedness. Conversely, restricted activity engagement patterns were associated with lower levels of collective connectedness. Further, a substitution effect of diverse activity engagement was observed, such that individuals with fewer ties with children still reported relatively high levels of collective connectedness. The same substitution, or buffering, effect was observed among individuals in the diverse activities class for general loneliness.

This suggests that participating in a diverse array of activities, including those in the wider community, compensates for lack of close ties with children with regard to general feelings of loneliness and collective connectedness. Accordingly, activity engagement may be employed as a compensation strategy to cope with limited social ties. This idea is consistent with those put forth by selection, optimization, and compensation models of development (Baltes, 1997; Freund, 2008), and has been applied to leisure activity research (Burnett-Wolle & Godbey, 2007). The present study builds upon this by evaluating activity engagement at large, spanning multiple domains of activity. Given that patterns of activity engagement were not associated with relational connectedness, it is unlikely that promoting activity participation that embeds an individual in the larger community will have any significant effect on relational connectedness, unless this activity also engages their close, social networks (i.e., as opposed to more peripheral networks).

Interestingly, there were no observed moderating effects of restricted activity engagement, suggesting that cumulative disadvantage does not result from a combination of lack of social ties or social contact and restricted activity engagement. Furthermore, the substitution effects of diverse activity engagement for loneliness and collective connectedness were only observed for individuals with few close children. Theories of emotional aging provide insight concerning this finding. Older individuals focus their relationship maintenance efforts on the closest and most meaningful relationships (Carstensen, 2006). This likely includes ties with close children. Similarly, according to the selection and vulnerability integration (SAVI) model, older adults become experienced at avoiding or mitigating negative experiences, including interpersonal experiences, through both cognitive and behavioral mechanisms (Charles & Luong, 2013; Charles & Piazza, 2009). As a result, individuals may be motivated to minimize

relationships that are more negative or conflictual. The parent-child tie, though it is one of the most ambivalent (i.e., both positive and negative; Fingerman, Hay, Birditt, & Hay, 2004), may be difficult to avoid given cultural expectations and social role obligations, especially in comparison to other family relationships or friendships. It is also possible that larger networks of children provide more opportunities for positive interactions and support, thus countering the effects of negativity in other relationships. It should be noted, however, that the present study did not specifically evaluate social support or relationship quality.

Limitations and Future Directions

This study addresses gaps in the literature and makes a novel contribution, but it is not without limitations. Although the identified activity engagement classes seem to vary in terms of social integration, it is not known which of the specific activities were explicitly social versus solitary. For example, volunteering or charity work can be done individually or with a group. The literature on social engagement further delineates different subgroups, including informal engagement, productive engagement, and leisure engagement (Morrow-Howell, 2012). Subsequent findings from this study that link the identified patterns of activity engagement to social network characteristics and to loneliness suggest that the patterns do represent varying degrees of social integration. These findings, however, should be interpreted with caution in the absence of information about the extent to which the individual activities were social. In the present study, we focused on the structural components of social networks, such as number and contact frequency, rather than social support or relationship quality. Network size, or the total number of close, social ties has been shown to have relatively weak effects on loneliness when compared with social support or satisfaction with relationships (de Jong-Gierveld, 1987). Poor quality social relationships and dissatisfaction with relationships are associated with higher

levels of loneliness (Hawkley et al., 2008; Routasalo, Savikko, Tilvis, Strandberg, & Pitkälä, 2006). It may be that activity engagement is used as a compensation strategy among older adults to counter the harmful effects of negative social ties. Thus, we would expect to see a substitution effect of diverse activity engagement in moderating the link between negative relationship quality and loneliness.

Incorporating measures of relationship quality would also address the lack of information about individuals' satisfaction with their social ties. The quality of relationships is evaluated to be negative when individuals are not satisfied with some aspect of that relationship, such as the level or type of social support that is exchanged (Antonucci, Fiori, et al., 2010). In this way, evaluations of negative relationship quality can lead to perceptions of loneliness.

The links to activity engagement were assessed using a subsample of respondents with complete data, therefore, this sample included respondents who reported having close children, other family, and friends, as well as some level of contact with these different groups. Missing data on the frequency of contact measures accounted for a large proportion of missing data, even for respondents who reported having social ties with children, close family, or friends. Ancillary analyses conducted on this larger sample without accounting for contact frequency revealed a similar pattern of results. However, further investigation into the presence or absence of different types of social ties is warranted. For example, results may be different for those without children, for whom other types of social ties or "fictive kin" take on greater significance (Hofferth, 1984; Pang, Jordan-Marsh, Silverstein, & Cody, 2003; Rae, 1992).

Finally, this study used a large sample of older adults who ranged in age from 51 to 93. Although referred to in the literature as "older adults", there is considerable heterogeneity among this age group. This heterogeneity should be taken into account by considering age differences

when disentangling the links between activity engagement, social networks, and loneliness. Further, the results reported in the present study were obtained from analyses of cross-sectional data, so claims about causality cannot be made. Longitudinal analyses must be conducted to determine whether social networks and activity engagement influence loneliness, or vice versa. Longitudinal data can also be leveraged to consider the effect of changes in activity engagement as individuals age, and implications of these changes on social and emotional well-being.

Conclusions and Implications

The well-established links between social networks and emotional well-being in older adulthood have provided insight into the influence of social relations across the lifespan. The present study, guided by theories of successful and active aging, incorporates activity engagement into this discourse by shedding light on a potential avenue for social integration. A pattern-centered approach was used to identify subgroups of older adults with shared activity engagement patterns. By distinguishing different dimensions of loneliness, the present study further specifies what aspects of emotional well-being are associated with activity engagement, providing potential points for intervention. We provide evidence for substitution effects of engaging in a diverse array of activities, suggesting that activity engagement can counter the negative effects of weak social ties on loneliness, particularly with regard to collective connectedness. This study contributes to the literature on social relations and successful aging by demonstrating that activity engagement can serve to foster perceptions of social integration and belonging, even in the face of weak social ties.

Table 4.1.

Descriptive statistics, Health and Retirement Study 2010 ($N = 7,731$)

	$M (SD) / \%$	Range
Personal & Situational Characteristics		
Female	58.4	
Non-White	22.2	
Education		
< high school	18.1	
High school	33.0	
> high school	48.9	
Working for Pay	38.0	
Partnered	61.3	
Age	67.1 (10.7)	50 to 101
Social Network Characteristics ^a		
Size		
Number of Children	2.5 (1.9)	0 to 20
Number of Other Family	3.6 (3.6)	0 to 20
Number of Friends	4.1 (3.7)	0 to 20
Contact Frequency		
Children	4.0 (1.1)	0 to 6
Other Family	3.4 (1.1)	0 to 6
Friends	3.8 (1.1)	0 to 6
Activity Engagement		
Total Number of Activities	12.7 (4.3)	1 to 18
Health and Well-being		
Functional Limitations	4.2 (4.1)	0 to 23
Chronic Conditions	1.6 (1.3)	0 to 7
Self-Rated Health ^b	3.2 (1.1)	1 to 5
Depressive Symptoms ^c	2.7 (1.1)	0 to 8
Loneliness ^d		
Isolation	1.5 (0.44)	1 to 3
Relational Connectedness	1.4 (0.56)	1 to 3
Collective Connectedness	1.4 (0.58)	1 to 3
Collective Connectedness	1.6 (0.54)	1 to 3

a. Not all respondents provided social network data for these measures; missing *ns* ranges

between 523 (contact with other family) to 1,075 (contact with children).

b. 4 respondents missing data

c. 62 respondents missing data

d. 108 respondents missing data

Table 4.2.

Percent Activity Endorsement of HRS 2010 sample ($N = 7,731$)

Watch television	98.4
Read	95.6
Walk for at least 20 minutes	85.7
Home or car maintenance or gardening	84.8
Bake or cook something special	81.8
Pray privately	80.3
Activities with children	74.2
Play sports or exercise	73.4
Work on a hobby or project	69.6
Do word games	67.5
Use a computer	63.4
Play cards or board games	60.9
Write	59.0
Sport, social, or other club	54.3
Other volunteer or charity work	48.9
Meetings of non-religious organizations	41.6
Educational or training course	38.7
Care for a sick or disabled adult	34.0
Volunteer work with children or young people	33.8
Make clothes, knit, ect.	28.2

Table 4.3.

Fit Indices of Latent Class Analysis of Activity Participation ($N = 7,731$)

Classes	-2 LL	G^2	AIC	BIC	Entropy	df
1	-83585.16	46713.00	46749.00	46874.16	1	262125
2	-74163.80	27870.28	27944.28	28201.54	0.83	262106
3	-72487.97	24518.62	24630.62	25019.99	0.79	262087
4	-71993.98	23530.65	23680.65	24202.12	0.75	262068
5	-71658.61	22859.90	23047.90	23701.48	0.73	262049
6	-71344.38	22231.44	22457.44	23243.13	0.70	262030

Notes. -2 LL = -2 log likelihood; AIC = Akaike information criterion; BIC = Bayesian information criterion; df = Degrees of freedom.

Table 4.4.

Latent Class Prevalence and Conditional Class Probabilities Across the Two-Category Latent Class Indicators ($N=7,731$)

	Diverse	Average	Restricted
Latent Class Prevalence (%)	29.6	46.3	24.1
Conditional Class Probabilities			
Pray privately			
Yes	0.93	0.80	0.65
No	0.07	0.20	0.35
Home/yard			
Yes	0.97	0.90	0.62
No	0.03	0.10	0.38
Cook			
Yes	0.94	0.85	0.61
No	0.06	0.15	0.39
Walk >20min			
Yes	0.98	0.90	0.63
No	0.02	0.10	0.37
Activity with (grand)children			
Yes	0.92	0.75	0.51
No	0.08	0.25	0.49
Word games			
Yes	0.91	0.69	0.36
No	0.09	0.31	0.64
Exercise/sports			
Yes	0.97	0.80	0.33
No	0.03	0.20	0.67
Hobby/project			
Yes	0.96	0.76	0.25
No	0.04	0.24	0.75
Computer			
Yes	0.90	0.66	0.26
No	0.10	0.34	0.74
Games/cards			
Yes	0.89	0.62	0.24
No	0.11	0.38	0.76
Writing			
Yes	0.93	0.58	0.20
No	0.07	0.42	0.80

Clubs			
Yes	0.89	0.53	0.13
No	0.11	0.47	0.87
Charity/volunteer			
Yes	0.93	0.41	0.10
No	0.07	0.59	0.90
Education			
Yes	0.85	0.28	0.02
No	0.15	0.72	0.98
Meetings (nonreligious)			
Yes	0.86	0.32	0.06
No	0.14	0.68	0.94
Volunteer with youth			
Yes	0.76	0.22	0.05
No	0.24	0.78	0.95
Caregiving			
Yes	0.55	0.30	0.16
No	0.45	0.70	0.84
Sew/knit			
Yes	0.45	0.27	0.10
No	0.55	0.73	0.90

Table 4.5.

Personal, Situational, and Social Network Characteristics by Class Membership ($N = 5,451$)

	<i>M/%</i>		
	Restricted Activities	Average Activities	Diverse Activities
Female	53.4	58.4	62.3
Non-White	29.6	20.2	19.3
Education			
< high school	40.9	14.4	5.2
High school	35.1	38.4	23.0
> high school	24.1	47.2	71.7
Working for pay	22.2	37.7	51.6
Partnered	51.9	62.2	67.5
Age	70.5	67.1	64.3
Total # of activities	6.9	12.6	17.8
Number of Close Ties			
Children	2.7	2.4	2.4
Other Family	3.7	3.4	3.7
Friends	3.5	4.0	4.7
Contact Frequency			
Children	3.6	4.0	4.3
Other Family	3.2	3.4	3.7
Friends	3.3	3.7	4.3
Functional Limitations	6.2	4.0	2.9
Chronic Conditions	2.0	1.5	1.3
Self-Rated Health	2.7	3.3	3.5
Depressive Symptoms	1.7	1.1	0.7
Loneliness	1.6	1.5	1.4
Isolation	1.5	1.4	1.4
Relational Connectedness	2.5	2.6	2.7
Collective Connectedness	2.2	2.4	2.6

Table 4.6.

Results of Multinomial Logistic Regression ($N = 5,451$)

	Diverse versus Average				Restricted versus Average			
	<i>b</i>	SE	β	OR	<i>b</i>	SE	β	OR
Intercept	-0.74***	0.09			-1.46***	0.10		
Woman	0.03	0.04	0.02	1.04	-0.15***	0.04	-0.08	0.86
White	0.03	0.05	0.01	1.03	-0.20***	0.05	-0.09	0.82
Age	-0.02***	0.00	-0.09	0.98	0.02***	0.00	0.12	1.02
Education								
<HS	-0.52***	0.13	-0.11	0.60	0.93***	0.10	0.19	2.54
>HS	0.88***	0.07	0.24	2.41	-0.39***	0.09	-0.11	0.68
Married/Partnered	0.09*	0.04	0.05	1.09	-0.14***	0.04	-0.07	0.87
Working for pay	0.12**	0.04	0.07	1.13	-0.19***	0.05	-0.10	0.83
Number of close:								
Children	0.04*	0.02	0.04	1.05	-0.02	0.02	-0.02	0.99
Family	0.00	0.01	0.01	1.01	0.04**	0.01	0.07	1.04
Friends	0.03**	0.01	0.05	1.03	-0.04**	0.01	-0.08	0.96
Contact with:								
Children	0.14***	0.04	0.08	1.15	-0.16***	0.04	-0.09	0.85
Family	0.08*	0.04	0.05	1.09	-0.02	0.04	-0.01	0.98
Friends	0.37***	0.04	0.22	1.44	-0.33***	0.04	-0.19	0.72

Note: High school education is reference group for education.

* $p < .05$; ** $p < .01$; *** $p < .001$

Table 4.7.

Correlation Matrix of Continuous Variables

	1	2	3	4	5	6	7	8	9	10	11
1. Age	1										
2. Self-Rated Health	-0.06***	1									
3. Diseases	0.25***	-0.44***	1								
4. Func. Lim.	0.23***	-0.55***	0.43***	1							
5. CESD	-0.03*	-0.39***	0.23***	0.40***	1						
6. # Close Children	0.15***	-0.04***	0.06***	0.05***	0.01	1					
7. # Close Family	0.01	-0.03**	0.01	0.04***	0.01	0.27***	1				
8. # Close Friends	0.09***	0.06***	-0.03**	-0.04***	-0.10***	0.11***	0.31***	1			
9. Contact Children	-0.05***	0.13***	-0.08***	-0.11***	-0.10***	0.13***	0.11***	0.10***	1		
10. Contact Family	-0.07***	0.07***	-0.07***	-0.04***	-0.06***	0.06***	0.26***	0.14***	0.45***	1	
11. Contact Friends	-0.11***	0.16***	-0.10***	-0.14***	-0.11***	-0.06***	0.03*	0.27***	0.38***	0.34***	1

Notes. Func. Lim. = Functional Limitations

* $p < .05$; ** $p < .01$; *** $p < .001$

Table 4.8.

Loneliness as a Function of Activity Engagement Class ($N = 5,451$)

	Model 1			Model 2		
	<i>b</i>	<i>SE</i>	β	<i>b</i>	<i>SE</i>	β
Intercept	1.562	0.011		1.563	0.011	
Diverse	-0.006	0.008	-0.013	-0.009	0.008	-0.019
Restricted	0.003	0.009	0.005	0.004	0.009	0.008
Gender	-0.020	0.005	-0.049***	-0.020	0.005	-0.048***
Race	-0.001	0.006	-0.001	-0.001	0.006	-0.002
Age	-0.003	0.001	-0.064***	-0.003	0.001	-0.064***
Education (>HS)	-0.012	0.007	-0.027	-0.013	0.007	-0.028
Education (< HS)	0.003	0.009	0.004	0.003	0.009	0.006
Marital status	-0.047	0.005	-0.110***	-0.047	0.005	-0.110***
Work status	0.014	0.006	0.032*	0.013	0.006	0.032*
Self-rated health	-0.024	0.006	-0.062***	-0.024	0.006	-0.061***
Chronic disease	0.008	0.004	0.025	0.009	0.004	0.026
Functional limitations	0.005	0.002	0.044**	0.005	0.002	0.044**
Depressive symptoms	0.071	0.003	0.284***	0.071	0.003	0.284***
# Close Children	-0.008	0.003	-0.036**	-0.007	0.003	-0.031*
# Close Family	-0.007	0.002	-0.061***	-0.007	0.002	-0.063***
# Close Friends	-0.018	0.001	-0.162***	-0.017	0.002	-0.153***
Contact- Children	-0.017	0.005	-0.045***	-0.017	0.005	-0.045***
Contact- Family	-0.016	0.005	-0.042**	-0.016	0.005	-0.042**
Contact- Friends	-0.064	0.005	-0.169***	-0.064	0.005	-0.170***
Restricted x # Children				-0.004	0.004	-0.014
Restricted x # Family				0.001	0.002	0.008
Restricted x # Friends				0.004	0.002	0.030
Diverse x # Children				0.012	0.004	0.045**
Diverse x # Family				0.000	0.002	-0.003
Diverse x # Friends				-0.001	0.002	-0.010
Adjusted R^2		.283			.284	

* $p < .05$; ** $p < .01$; *** $p < .001$

Table 4.9.

Isolation as a Function of Activity Engagement Class ($N = 5,451$)

	<i>b</i>	<i>SE</i>	β
Intercept	1.522	0.015	
Diverse	0.027	0.011	0.044*
Restricted	-0.033	0.012	-0.047**
Gender	0.009	0.007	0.016
Race	0.011	0.009	0.017
Age	-0.005	0.001	-0.102***
Education (> HS)	-0.003	0.010	-0.006
Education (< HS)	-0.024	0.013	-0.031
Marital status	-0.051	0.007	-0.091***
Work status	0.015	0.008	0.028
Self rated health	-0.016	0.008	-0.031*
Chronic disease	0.020	0.006	0.047***
Functional limitations	0.011	0.002	0.082***
Depressive symptoms	0.098	0.005	0.298***
# Close Children	-0.010	0.004	-0.034**
# Close Family	-0.008	0.002	-0.053***
# Close Friends	-0.012	0.002	-0.085***
Contact- Children	-0.019	0.007	-0.038**
Contact- Family	-0.014	0.007	-0.029*
Contact- Friends	-0.040	0.007	-0.080***
Adjusted R^2	.200		

* $p < .05$; ** $p < .01$; *** $p < .001$

Table 4.10.

Relational Connectedness as a Function of Activity Engagement Class ($N = 5,451$)

	<i>b</i>	<i>SE</i>	β
Intercept	2.560	0.016	
Diverse	-0.001	0.012	-0.001
Restricted	0.007	0.013	0.010
Gender	0.042	0.008	0.076***
Race	0.000	0.009	0.001
Age	0.001	0.001	0.022
Education (> HS)	0.028	0.011	0.047**
Education (< HS)	-0.029	0.013	-0.037*
Marital status	0.006	0.008	0.010
Work status	-0.002	0.008	-0.004
Self rated health	0.025	0.009	0.049**
Chronic disease	-0.007	0.006	-0.015
Functional limitations	-0.002	0.002	-0.016
Depressive symptoms	-0.049	0.005	-0.147***
# Close Children	0.009	0.004	0.030*
# Close Family	0.008	0.002	0.053***
# Close Friends	0.016	0.002	0.106***
Contact- Children	0.017	0.008	0.034*
Contact- Family	0.018	0.008	0.036*
Contact- Friends	0.076	0.008	0.151***
Adjusted R^2		.126	

* $p < .05$; ** $p < .01$; *** $p < .001$

Table 4.11.

Collective Connectedness as a Function of Activity Engagement Class ($N = 5,451$)

	Model 1			Model 2		
	<i>b</i>	<i>SE</i>	β	<i>b</i>	<i>SE</i>	β
Intercept	2.301	0.014		2.302	0.014	
Diverse	0.045	0.010	0.078***	0.049	0.010	0.083***
Restricted	-0.055	0.012	-0.083***	-0.054	0.012	-0.081***
Gender	0.026	0.007	0.049***	0.025	0.007	0.048***
Race	-0.003	0.008	-0.005	-0.002	0.008	-0.004
Age	0.004	0.001	0.078***	0.004	0.001	0.079***
Education (< HS)	0.026	0.009	0.045**	0.027	0.009	0.047**
Education (> HS)	-0.020	0.012	-0.027	-0.021	0.012	-0.028
Marital status	0.019	0.007	0.036**	0.019	0.007	0.036**
Work status	-0.013	0.007	-0.024	-0.012	0.007	-0.022
Self rated health	0.028	0.008	0.058***	0.027	0.008	0.056***
Chronic disease	-0.002	0.006	-0.004	-0.002	0.006	-0.005
Functional limitations	-0.004	0.002	-0.034*	-0.005	0.002	-0.035*
Depressive symptoms	-0.052	0.004	-0.164***	-0.051	0.004	-0.162***
# Close Children	0.004	0.004	0.014	0.001	0.004	0.004
# Close Family	0.006	0.002	0.040**	0.006	0.002	0.039**
# Close Friends	0.027	0.002	0.192***	0.027	0.002	0.191***
Contact- Children	0.020	0.007	0.040**	0.020	0.007	0.041**
Contact- Family	0.014	0.007	0.030*	0.014	0.007	0.029*
Contact- Friends	0.105	0.007	0.221***	0.106	0.007	0.221*
Restricted x # Children				0.001	0.005	0.002
Restricted x # Family				-0.002	0.003	-0.012
Restricted x # Friends				-0.001	0.003	-0.003
Diverse x # Children				-0.017	0.005	-0.052***
Diverse x # Family				0.000	0.003	0.001
Diverse x # Friends				-0.001	0.003	-0.004
Adjusted R^2		.246			.248	

* $p < .05$; ** $p < .01$; *** $p < .001$

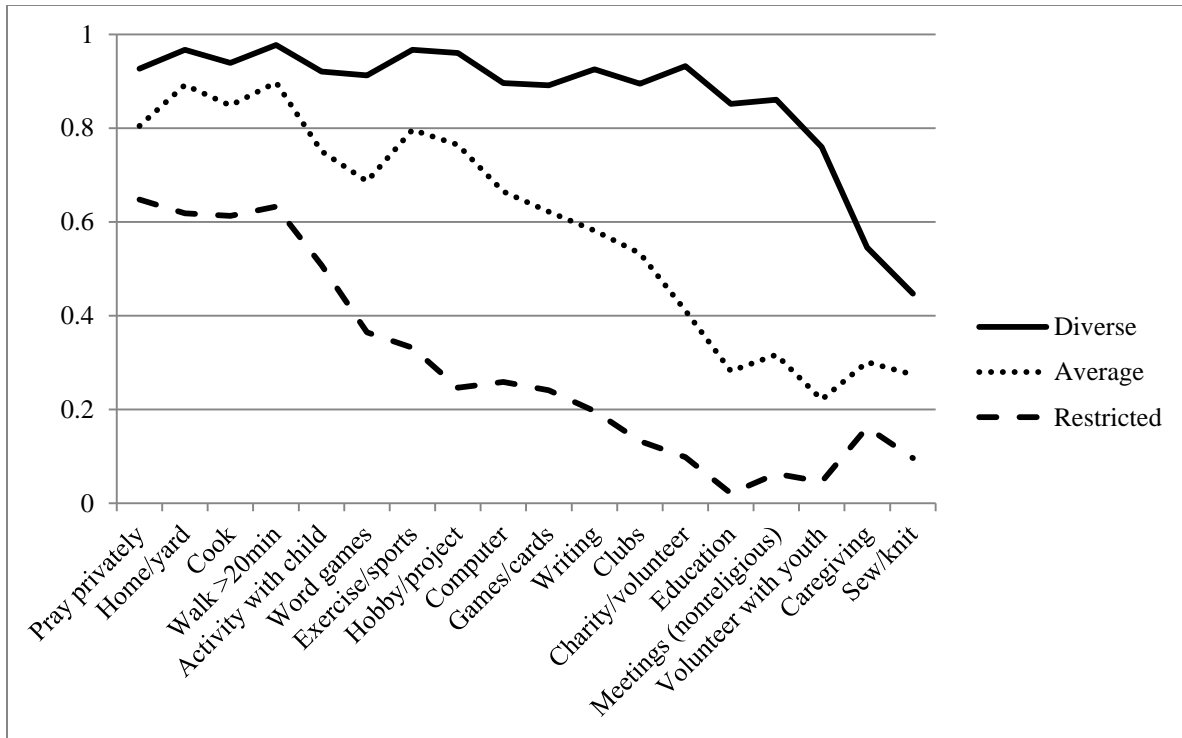


Figure 4.1. Probabilities for the two-category activity participation indicators conditional on latent class membership

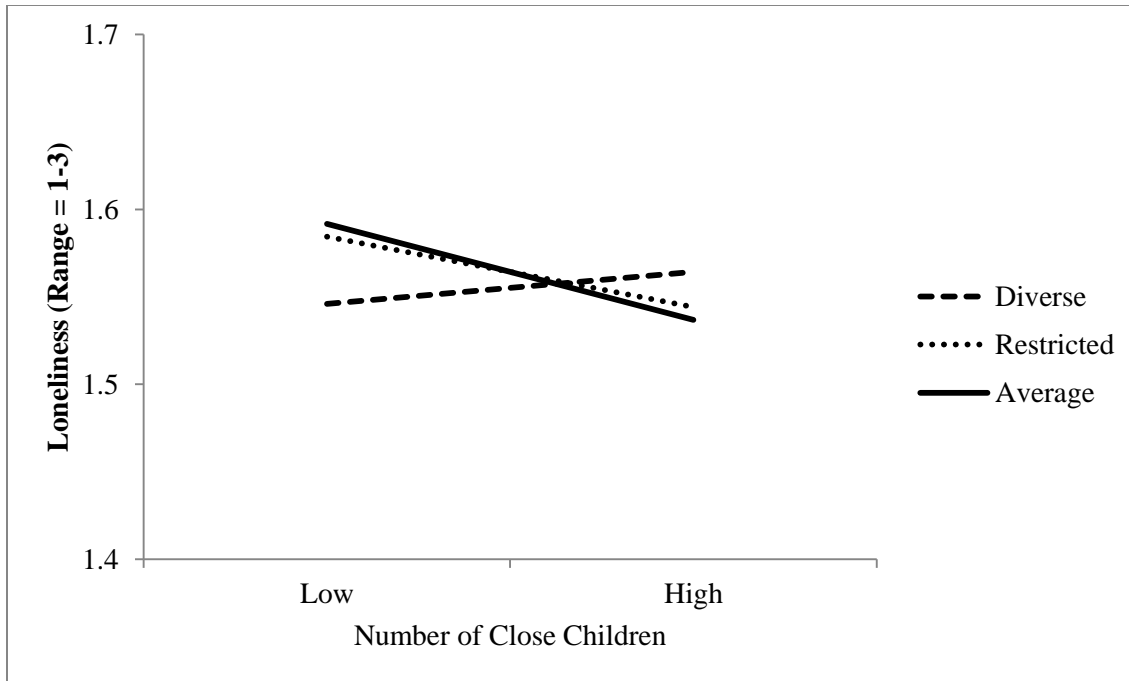


Figure 4.2. Interaction between number of close children and diverse activity engagement on loneliness, plotted at one standard deviation above and below the mean of number of close children; simple slopes: Average: $b = -0.019$, $p < .001$; Diverse: $b = 0.005$, $p = .249$

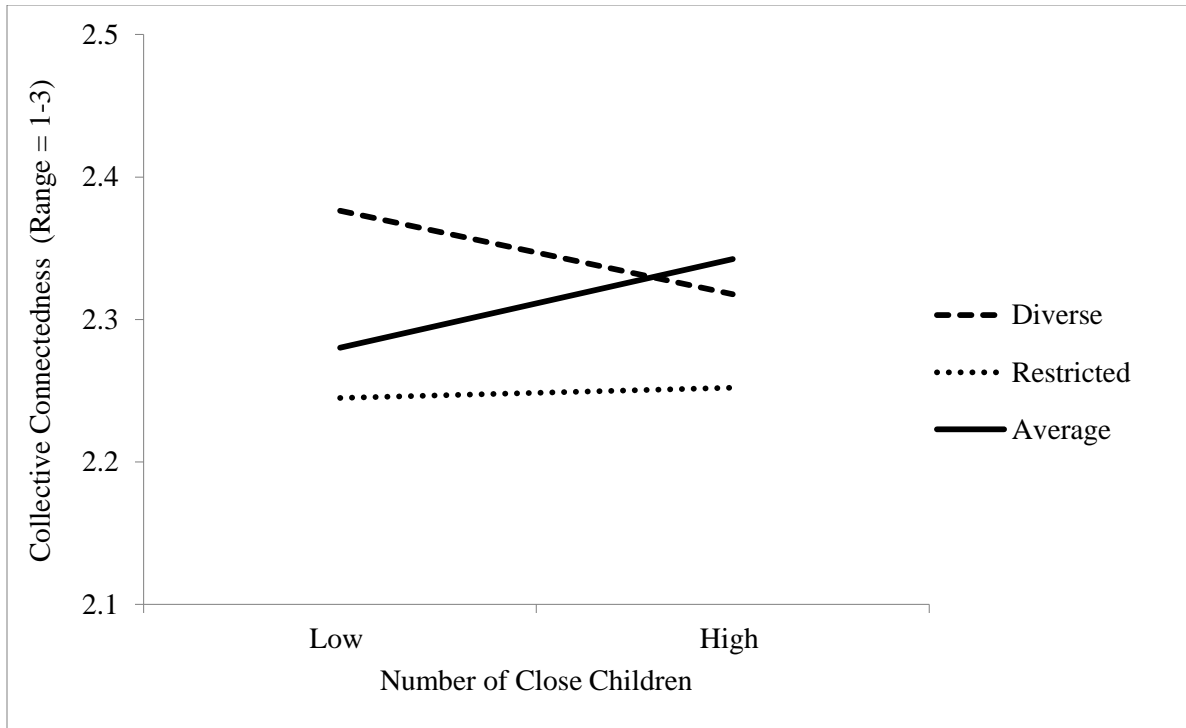


Figure 4.3. Interaction between number of close children and diverse activity engagement on collective connectedness, plotted at one standard deviation above and below the mean of number of close children; simple slopes: Average: $b = 0.018$, $p < .01$; Diverse: $b = -0.016$, $p < .05$

CHAPTER V

GENERAL DISCUSSION

Social networks are an important interpersonal resource that accompany individuals across the lifespan, changing to accommodate shifts in personal and situational characteristics, and influencing health and well-being at all life stages. The overarching aim of this dissertation was to more closely investigate the multidimensionality and continuity of social networks within the context of development and aging. Through three studies, I approached the study of social relations from a lifespan developmental perspective in an attempt to capture the unique challenges and circumstances of the distinct developmental periods examined, including childhood, early adulthood, and older adulthood. In the first chapter of this dissertation, a conceptual model (Figure 1.1) was presented that draws heavily upon the convoy model of social relations, but also incorporates a number of life course perspectives that address the role of social relations in successful development and aging.

Each of the three dissertation studies focused on a different part of the lifespan: 1) social networks in childhood; 2) continuity and change in social networks during the transition to adulthood; and 3) social relations and activity engagement in older adulthood. The key components of this model were addressed across three studies that leveraged rich, survey data with information about social relations by using innovative variable- and pattern-centered approaches. In the first study, I used cross-sectional data from the Social Relations and Health

study to identify typologies of children's social networks based on structural network characteristics. In the second study, I expanded on this with longitudinal data from the Social Relations and Health Study to investigate continuity in individual social network characteristics and in patterns of social networks across the transition to adulthood. Finally, in the third study, I broadened the conceptualization of social networks to encompass social integration through activity engagement and investigated implications of activity engagement for loneliness in older adults using cross-sectional data from the Health and Retirement Study.

In this final chapter, I begin with brief summaries of the findings for each of the three studies. This is followed by a description of the theoretical contributions made by these studies, in which I integrate these findings with the guiding theoretical frameworks that were introduced in Chapter I. Next, I describe the practical implications of this dissertation and discuss how these findings can inform practice and policy. In the following section, I offer suggestions for future research directions. Finally, I conclude with thoughts about how this dissertation contributes to the field and expands our knowledge of social relations across the life course.

Summary of Findings

Social Networks in Childhood

Most studies of children's social relations focus on specific relationships, namely the parent-child tie, or contexts of relationships, such as peer relationships at school. However, there is a robust literature suggesting that children form and maintain social ties with a wide range of people in their lives. To date, comprehensive descriptions of children's broader social networks are limited. The present study investigated three research questions to address this gap in the literature. The first aim was to identify typologies of social networks in childhood using indicators of social network structure (e.g., network size, composition, frequency of contact,

proximity). Using cross-sectional data from the Social Relations and Health Study, three social network typologies were identified among children aged 7 to 14-years through latent profile analysis: Varied Family, Friend and Family, and Close Family. The social networks characteristics that most defined the different typologies were network size and composition, suggesting that size and composition contribute to much of the variability in childhood social networks. The next aim was to determine whether the identified typologies were distinguishable by child and mother sociodemographic characteristics. Results suggested that the typologies were distinguishable only by race, but not any other child or mother characteristics. The final aim of this study was to assess whether the typologies were differentially linked to childhood depressive symptomology, and whether accounting for significant life events influenced this association. Findings showed that children in the Friend and Family typology reported the highest depressive symptomology, significantly higher than children in the Varied Family and Close Family typologies. This pattern of results underscores the importance and developmental significance of family ties in childhood.

Social Networks and the Transition to Adulthood

Continuity and change in social networks, and in the properties of social ties, are central to many theories of social relations across the lifespan. Previous studies have documented aspects of social networks that remain stable and those that change with age across different developmental periods. However, there is limited longitudinal research surrounding intraindividual changes in social networks from childhood to early adulthood. The present study addressed this gap in the literature by investigating change over time in specific social network characteristics using a variable-centered approach, in addition to describing transitions in social network typologies across age using a pattern-centered approach. Three waves of longitudinal

data, spanning from childhood to young adulthood, from the Social Relations and Health Study were analyzed to determine which aspects of social networks were associated with continuity versus change during the transition to adulthood. Results indicate that individual social network characteristics, such as network size and contact frequency, undergo changes rather than remain stable from childhood to adulthood. The direction and magnitude of this change varies, however, across the different childhood social network typologies. In addition, four typologies of social networks were identified in early adulthood (W2, $M_{\text{age}} = 23$): Diverse Distal, Varied Family, Close Family, and Friend. Only two typologies, however, were identified in the third wave (W3, $M_{\text{age}} = 33$): Diverse Distal and Diverse Proximate. Descriptive data on transitions between different social network typologies from childhood to adulthood suggest that most respondents experience change in their social networks over time, although there was also some evidence of stability. Overall, the changes that were observed were consistent with developmentally appropriate trends and transitions expected during the transition to adulthood. This study also demonstrated the long-lasting influences of childhood social relations for shaping future social networks, and the need for larger longitudinal samples.

Activity Engagement and Social Networks in Older Adulthood

Social networks continue to be an important interpersonal resource into advanced age, despite evidence to suggest that older adults have smaller, more distal social networks. Social network characteristics and social support are protective against loneliness across the lifespan, especially in older adulthood. Given the significance of activity engagement for older adults, as suggested by models of successful aging, the broader social connections that can be derived from activity engagement may protect against loneliness. By integrating models of successful aging into theories that guide our knowledge of social relations in older adulthood, this study

investigated associations between social network characteristics and patterns of activity engagement, and examined if activity engagement moderated the link between social network characteristics and emotional well-being. Using cross-sectional data from the 2010 wave of Health and Retirement Study, three patterns of activity engagement were identified through latent class analysis: Restricted Activities, Average Activities, and Diverse Activities classes. Social network characteristics were associated with activity engagement class membership in generally expected ways, with some nuanced findings. For instance, a greater number of close family members was associated with membership in the restricted activities class, compared to the average activities class, possibly a reflection of the social context of the activities that are being reported. Finally, investigating the links between activity engagement, social network characteristics, and different facets of loneliness yielded a number of findings suggesting that diverse activity engagement not only has direct associations with lower levels of loneliness, but also may substitute for weak social ties by fostering perceptions of social integration.

Theoretical Contributions

Convoy Model of Social Relations

Taken together, the results from these three dissertation studies provide evidence in support of many of the life course perspectives that informed this research. Guided primarily by the convoy model of social relations, these studies address all tenets of the theory by clarifying and extending previous research that stemmed from this theory (Antonucci et al., 2010; Kahn & Antonucci, 1980). Typologies of childhood and young adulthood social networks were identified, demonstrating that social relations are multidimensional and consist of multiple social network characteristics that are linked in systematic ways. Broadening the conceptualization of social networks to capture social integration that results from participation in a diverse set of

activities also demonstrates how social networks can encompass peripheral social ties, in addition to close ones. Results of the study on social networks from childhood to early adulthood illuminated the ways in which social relations are dynamic, changing to capture the personal and situational characteristics of discrete developmental periods.

This study also provides evidence for stability in social networks, possibly in reference to a core network of social partners that remain close and important across the lifespan, as suggested by the convoy model. The social network typologies that were identified in the young adult sample, as well as descriptive information on transitions between typologies from childhood to adulthood, are congruent with age-related differences and changes to social networks suggested by socioemotional selectivity theory, including the expansion and diversification of social networks (Carstensen, 1995, 2006).

In addition to describing social networks at different developmental stages, the studies in this dissertation also gave special attention to antecedents and outcomes of social networks. The convoy model posits that social relations have an influence on health and well-being outcomes, and this was clearly demonstrated in this dissertation. Specifically, different aspects of social relations were linked to depressive symptomology in childhood and to loneliness in older adulthood. These findings contribute to a growing body of evidence indicating that at all ages, the availability of supportive social relationships is important for health and well-being. In addition, identifying links between specific components of social relations and specific outcomes will help researchers delineate what aspects of social relations are associated with what outcomes, under which circumstances, and for whom. This information is critical in understanding how to most effectively leverage social relations to optimize health and well-being.

Integrating Life Course Perspectives

Integrating life course perspectives into the study of social relations has illuminated the ways in which they develop and influence health and well-being at different life stages.

According to the convoy model, an optimally functioning social network change in ways to meet the demands of that developmental period and specific circumstances of the individual (Antonucci et al., 2010). Historically, a number of theoretical perspectives have described how social relations change with individual development. In order to showcase the fact that this dissertation is very responsive to developments in the field, we now recognize that each of the theories referenced is in fact lifespan, even if they were not originally conceived as such.

The perspectives that describe social relations in childhood, including attachment theory (Bowlby, 1969), bioecological model (Bronfenbrenner & Morris, 2006), and the social network systems perspective (Cochran & Brassard, 1979), can all be applied to adulthood because they suggest, at their core, that individuals are embedded within larger social systems. Although the salience of each of these subsystems (e.g., family, community, culture) may wax and wane in terms of their influence on individual well-being, they contribute to the social context in which development and aging occur.

There has been less of an effort in the literature to extend the theories of adulthood and aging to childhood. Several theories of social relations and aging consider motivational goals as shaping social networks, including socioemotional selectivity theory (SST; Carstensen, 1993), the strengths and vulnerabilities integration model (SAVI; Charles & Piazza, 2009), and selection, optimization, and compensation (SOC) model (Baltes, 1997). Carstensen (1993) argues that social motivations for forming and maintaining social ties actually begin early in childhood with preferences for certain social partners serving to address motivational goals of

self-concept development, information acquisition, and emotional regulation. Children rely on social partners, first parents and later peers, to provide them with useful information about themselves and the world, to help them regulate feelings, and to develop a sense of self. As individuals develop and age, the salience of these motivations shift (i.e., importance of information acquisition in early adulthood and emotion regulation in older adulthood) and social networks are shaped accordingly.

Similarly, the SOC model emphasizes individuals use these strategies to optimize gains and cope with losses that occur throughout the lifespan. Although this model has traditionally been used to describe changes across adulthood, Baltes (1997) refers to SOC as a metatheory that can be applied to the entire lifespan. Accordingly, these strategies can also be used at young ages to form and maintain social networks in childhood, the period of the lifespan that is typically characterized by more gains than losses. Findings from this dissertation illuminate ways in which children use optimization and compensation strategies in their social networks. For example, selection of the most family-centric networks in childhood appeared to optimize well-being, in terms of lower depressive symptomology among children in the Close Family typology. On the other hand, children in the Friend and Family typology compensated for lack of family ties with a robust network of peers. Consequently, small, family-centric networks in childhood represent a strength, whereas social networks lacking family ties are a vulnerability. In this way, the SAVI model can be applied to childhood, although theoretical or empirical applications of this model to childhood social relations are limited.

Finally, aging is a lifelong process and, as such, the components of successful aging can be applied across the lifespan (Rowe & Kahn, 1997). This dissertation focused specifically on continued engagement with life by considering social integration through activity engagement in

older adulthood. Results from this study suggest that activity engagement does promote social integration in the broader community beyond social networks. Accordingly, activity engagement captures macro-level social systems referenced in the bioecological model (Bronfenbrenner & Morris, 2006) and could serve a similar social integration purpose in childhood. Indeed, structured leisure activities, including involvement in clubs and sports, have been linked to academic and social competence, as well as psychosocial maturity (Fletcher, Nickerson, & Wright, 2003). Activity engagement has not yet been closely studied within a lifespan developmental framework, but doing so could provide insight into how different social systems influence development over the life course.

Overall, the findings from this dissertation underscore the importance of studying social networks with a consideration for the developmental context in which they are formed, evolve, and exert influences on well-being. These studies give attention to heterotypic continuity that is observed in social relations across the lifespan, the notion that change in the manifestation of social networks does not imply change in meaning (Caspi & Roberts, 2001). For instance, a close, intimate network looks fundamentally different in childhood compared to early adulthood. These differences in manifestation and meaning must be taken into account to understand the implications of social ties across development and aging. Given the normative changes in personal and situational characteristics that accompany development, a “one size fits all (ages)” approach to social relations is neither accurate nor appropriate.

Implications for Policy and Practice

This dissertation provides insight into how social networks might translate into useful resources for individual at different life stages. For example, given the importance of available family ties in childhood, children who exhibit social network typologies that lack family ties or

have conflictual family networks could be identified as “at risk” (Repetti, Taylor, & Seeman, 2002). This could allow for more effectively targeted interventions that may reduce the negative effects of poor, unsupportive social networks on developmental outcomes. Indeed, one of the advantages of pattern-centered analysis is the potential for identifying subgroups that are at risk or otherwise in need of special attention (Lanza & Cooper, 2016).

Similarly, findings from this dissertation indicate that variation in activity engagement exists among older adults, and that this variation is differentially linked to emotional well-being. Observed interactions with social network characteristics suggest that community ties or activities can be leveraged for older adults experiencing dissatisfaction with their existing social networks. Activity engagement was found to be associated only with certain dimensions of loneliness, including isolation and feelings of belonging. Other dimensions, such as relational connectedness, are instead more closely linked to individuals’ evaluations of their close, social networks. It is important to consider these different dimensions of loneliness because these findings suggest that some facets of loneliness are easier to address through activity engagement interventions than others.

Indeed, intervention studies informed by the principles put forth by models of successful aging and active aging already leverage activity engagement, often focusing on specific activity domains (e.g., physical, cognitive, social), rather than overall participation in different activities (Bauman, Merom, Bull, Buchner, & Fiatarone Singh, 2016; Dickens, A.; Richards, S.; Greaves, C. & Campbell, 2011; Reijnders, van Heugten, & van Boxtel, 2013). Additionally, activity engagement in childhood could also be leveraged as an avenue for intervention to promote social integration and successful development. For example, given the importance of strong family networks, initiatives that encourage family engagement (e.g., in school activities) could enhance

overall development. Such initiatives that integrate a family-centered approach to early education exist (e.g., Knopf & Swick, 2008), but it is worth considering expanding these programs to encompass other activity domains.

Directions for Future Research

Specific limitations and directions for future research were detailed for each study in the preceding chapters, but some overarching limitations should be addressed in future research. The studies in this dissertation focused exclusively on social network structure, but social relations consist of other dimensions, including social support and relationship quality. Research has long suggested that these more subjective aspects of social relations are in fact more impactful with regard to health and well-being (Antonucci et al., 1997; Blazer, 1982). In fact, the convoy model indicates that social networks do not directly influence well-being, but instead, influence well-being indirectly through social support and relationship quality (Kahn & Antonucci, 1980). The studies in this dissertation provide a basis from which to investigate the quality of and support exchanges that stem from social networks of children and adults of all ages.

In addition, more longitudinal research is needed to better understand the continuity and consequences of social networks and social relations. The cross-sectional findings in this dissertation linking childhood social network typology to depressive symptomology and activity engagement patterns to loneliness in older adults prevent us from making claims about causality or the direction of effects. Though it is becoming increasingly clear that the link between social networks and well-being outcomes is bidirectional (Ramsey & Gentzler, 2015), longitudinal research will serve to clarify directionality of effects, as well as illuminate processes and mechanisms. Contemporary, longitudinal samples would also allow for an investigation into cohort effects in social networks and social relations more broadly. Demographic shifts and

societal changes over the years have influenced the ways in which social ties are formed, developed, and maintained, as well as the links between social relations and well-being. It is important to know not only how social relations change and influence development with age, but also over time, in order to more effectively leverage social networks.

Similarly, another area that deserves attention is the incorporation of communication technology in social relations research. With the advent of social media, “social network” takes on a new meaning, referring not only to a constellation of close and important ties, but rather a complex social web including hundreds of connections. Technological advances in communication have fundamentally changed the formation and maintenance ties, but the influence of these advances on social relations remains largely unknown (Antonucci, Ajrouch, & Manalel, 2017). For example, how do new and emerging modes of contact affect the number and nature of our existing social ties? How does technology change the way in which we form new social connections? What are the implications for our health and well-being? Although researchers have begun to address these issues and outstanding questions, continued investigation is warranted, given the rapid pace of technological advancement.

Recent research has also begun to examine how patterns of social relations influence contact through various modes of contact (Deane, Spitze, Ward, & Zhuo, 2015), and how mode of contact influences relationships (Fingerman, Kim, Birditt, & Zarit, 2016). More research is needed to better understand the implications of texting and social media for close, social networks and for specific social ties. Despite the dehumanizing effects of these new forms of contact, they also offer new ways of exchanging support. Preliminary evidence suggests the importance of distinguishing between different modes of contact and, more broadly, for

incorporating technology into how we conceptualize social relations, social networks, and social integration.

Indeed, technology provides a promising new avenue for promoting social integration among older adults (Schulz et al., 2015), particularly those with limitations or disabilities that hinder other means of community involvement. Czaja (2017) recently outlined how older adults' adoption of information and communication technologies help them maintain social ties with family and friends, form new social ties, and obtain information about social activities within their communities. There is, however, some evidence that technology increases isolation. Incorporating technology into social relations research has far-reaching theoretical and practical implications. More rigorous research is needed to investigate what applications of technology are beneficial for whom, and under what circumstances.

Conclusion

Across the lifespan, social relations are an integral part of human development. Adopting a lifespan developmental perspective allows for a more nuanced understanding of the properties and power of social networks at each life stage. This dissertation builds upon, clarifies, and extends previous research on social networks, providing a more complete understanding of how social networks are multidimensional, change over time, and influence well-being. Social ties are universal and can be leveraged in ways to combat stress and achieve successful development and successful aging. Continued research on the complexities of social relations is needed in order to fully exploit the potential of this often untapped interpersonal resource.

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