

The Pennsylvania State University
The Graduate School
Department of Human Development and Family Studies

**SIBLING DIFFERENTIATION IN ACTIVITY INTERESTS: LONGITUDINAL
LINKAGES TO SIBLING RELATIONSHIP QUALITY AND SELF-WORTH**

A Dissertation in
Human Development and Family Studies

by
Susan E. Doughty

© 2015 Susan E. Doughty

Submitted in Partial Fulfillment
of the Requirements
for the Degree of

Doctor of Philosophy

December 2015

The dissertation of Susan E. Doughty was reviewed and approved* by the following:

Susan M. McHale
Director, Social Science Research Institute
Distinguished Professor of Human Development and Family Studies
Dissertation Advisor
Chair of Committee

Mark E. Feinberg
Research Professor of Health and Human Development

Gregory M. Fosco
Assistant Professor of Human Development and Family Studies
Karl R. and Diane Wendle Fink Early Career Professor for the Study of Families

Wayne Osgood
Professor of Criminology and Sociology

Eva S. Lefkowitz
Professor of Human Development and Family Studies
Chair of the Graduate Program

*Signatures are on file in the Graduate School

ABSTRACT

Although the emergence of sibling differences has long been a subject of interest, little empirical work has examined the development of sibling differentiation over time, or the ways in which sibling differentiation is linked to relational and individual outcomes. This study focused on sibling differences in self-rated activity interests (e.g., the extent to which siblings differ in their level of interest in sports, reading, hobbies, etc.), with the goal of examining associations between sibling differentiation and both sibling relationship quality and youths' self-worth over time. Specifically, this study addressed the following research aims: (1) to describe the trajectory of sibling differentiation from middle childhood through adolescence, (2) to assess linkages between sibling differentiation and sibling intimacy and conflict, and (3) to assess linkages between sibling differentiation and youths' self-worth.

I began by charting the developmental trajectory of differences between siblings' self-reported activity interests from middle childhood through late adolescence. Based on deidentification theory and existing work in behavioral genetics, it was anticipated that siblings would become increasingly different over time. Sibling dyad gender constellation was also examined as a potential moderator of change patterns, given its importance to sibling differences from both the deidentification and behavioral-genetic perspectives.

Multi-level modeling (MLM) was then used to examine the longitudinal linkages between differentiation in siblings' activity interests and their reports of sibling intimacy and conflict. Existing perspectives offer conflicting hypotheses: grounded in Adler's

ideas about the family context of individual development, deidentification theory holds that becoming more different will reduce rivalry and conflict between siblings, allowing for a more harmonious relationship. Principles of homophily suggest the opposite—that the more siblings have in common, the more likely they will be to report close relationships with one another. Sibling dyad gender constellation and birth order were also examined as potential moderators of change patterns, given their relevance to sibling relationship dynamics.

To address the third aim, MLM was used to assess linkages between sibling differences in activity interests and a measure of siblings' individual adjustment—self-worth. Here again, there are competing predictions: deidentification theory predicts that greater differentiation will be linked with positive self-worth. Self-affirmation theory, however, predicts the opposite, as similarity between siblings serves as a source of personal validation and self-worth. Sibling dyad gender constellation was included as a potential moderator of change patterns, given its potential relevance to sibling differentiation.

Results for Aim 1 revealed a negative quadratic effect that was qualified by a significant cubic effect for sibling differentiation over time: Sibling differences increased in early adolescence, leveled off, and then increased again in late adolescence—findings that generally support both deidentification and behavioral genetics perspectives. A significant linear by gender constellation interaction also emerged, with follow ups showing that mixed-sex sibling dyads, but not same sex dyads, showed linear increases in differentiation over time.

For Aim 2, support was found for principles of homophily. At the within-family level, at times when sibling dyads were more different than their average, youths reported lower levels of intimacy. A similar effect was also found at the between-family level, as youths from families with higher than average levels of sibling differences reported lower levels of intimacy. No association was found between sibling differentiation and sibling conflict, although some significant interactions were found between linear age and both birth order and gender constellation.

With respect to Aim 3, support was found for self-affirmation theory: sibling similarity was linked positively to self-worth at the between-family level, such that youths from families with higher than average levels of sibling differences reported lower levels of self-worth. Further, at the within-family level (dyads across time), a significant interaction with gender constellation emerged, indicating that youths from same-sex sibling dyads reported lower levels of self-worth at times when sibling differences were higher their cross-time average—an effect not seen in youths from mixed-sex sibling dyads. Discussion focuses on implications of the findings for theories of sibling influence and directions for future study.

TABLE OF CONTENTS

LIST OF FIGURES	viii
LIST OF TABLES	ix
ACKNOWLEDGEMENTS	x
Chapter 1: Introduction	1
Sibling Differentiation	5
Sibling Differences in Activity Interests	7
Implications of Differentiation	8
Differentiation and Sibling Intimacy	9
Differentiation and Sibling Conflict	10
Differentiation and Self-worth	10
Present Study	12
Chapter 2: Literature Review	13
Sibling Relationship Characteristics	15
Companionship	16
Longevity	17
Dyad Structure	18
Power Dynamics	18
Emotional Tone	19
Sibling Differentiation	20
Definition and Significance	20
Implications for Relationship Quality and Adjustment	21
Perspectives on the Sources of Sibling Differences	22
Social Comparison	22
Deidentification	24
Behavioral Genetics	26
Gene-environment Correlations	27
Environmental Influences	29
Shared Environmental Influences	30
Non-shared Environmental Influences	31
Developmental Course of Sibling Differentiation	34
Implications of Differentiation for Sibling Relationship Dynamics	36
Sibling Intimacy	37
Sibling Conflict	39
Implications of Differentiation for Self-worth	42
Deidentification	44
Affirmation	45

Activity Interests as a Context for Differentiation	45
Present Study	49
Chapter 3: Method	53
Participants.....	53
Procedure	54
Measures	55
Activity Interests.....	55
Sibling Relationship Characteristics	56
Self-worth	56
Moderator and Control Variables	57
Chapter 4: Results	59
Analytic Plan.....	59
Aim 1	60
Aims 2 and 3	61
Preliminary Analyses	62
Aim 1: Trajectory of Sibling Differentiation	64
Aim 2: Differentiation and Sibling Relationship Quality	65
Aim 3: Differentiation and Self-worth.....	67
Chapter 5: Discussion	69
Sibling Differentiation: Empirical Assessment	70
The Significance of Sibling Experiences	74
Implications for Practice	77
Limitations and Future Directions	78
Summary and Conclusion	80
References	82
Appendix A: Tables and Figures	106
Appendix B: Activity List.....	115
Appendix C: Sibling Differentiation Variables	116
Appendix D: Categorization of Interests	129

LIST OF FIGURES

Figure 1: Trajectory for sibling differentiation in reported activity interests 113

Figure 2: Trajectory for sibling differentiation in activity interests for mixed-
and same-sex dyads..... 114

LIST OF TABLES

Table 1: Frequency and Percent of Youths by Age	105
Table 2: Means (<i>SDs</i>) for Sibling Differentiation in Activity Interests	106
Table 3: Means (<i>SDs</i>) for Sibling Relationship Outcomes.	107
Table 4: Means (<i>SDs</i>) for Self-worth.....	108
Table 5: Regression Coefficients (Standard Errors) and Random Effects for the Growth Curve of Sibling Differences	109
Table 6: Regression Coefficients (γ) and Standard Errors (SE) for Multilevel Models Predicting Sibling Intimacy and Conflict from Sibling Differentiation.....	110
Table 7: Regression Coefficients (γ) and Standard Errors (SE) for Multilevel Models Predicting Self-worth from Sibling Differentiation	111

ACKNOWLEDGEMENTS

My sincerest thanks go out to all those without whom this dissertation would not have been possible:

To my Advisor, Susan McHale: My time with you has taught me so much—about siblings, research, and the kind of person I want to be.

To my Committee: Your time, knowledge, guidance, and personal interest throughout my graduate training has been invaluable.

To my Allies in Beecher: Your guidance and support (academic and otherwise) has pulled me through time and time again.

To my wonderful, wonderful Cohort: Words fail me. You've always been my silver lining.

To my Friends and Family, whose love and support made everything possible: Thank you—from the bottom of my heart.

Chapter 1

Introduction

Developmentalists have long drawn attention to the importance of family relationships for individual development and adjustment (Bronfenbrenner, 1986; Minuchin, 1985). Empirical work on the subject has borne these claims out, demonstrating the contributions of family life to areas such as positive adjustment (Hetherington, 1999) and mental health (Sheeber, Hops, & Davis, 2001). Much of this research has focused on the impact of family structure and parent-child relationship quality. Less emphasis has been placed on the importance of siblings and sibling relationship experiences—despite the prevalence of siblings in family life. Yet, close ties with siblings have been linked to a range of positive youth outcomes (Branje, van Lieshout, van Aken, & Haselager, 2004; Kim, McHale, Crouter, & Osgood, 2007; McCoy, Brody, & Stoneman, 1994; Updegraff, McHale, & Crouter, 2002), and so understanding what factors underlie positive sibling relationships and how best to prevent negative sibling relationships are topics worthy of research. One such factor is the degree to which siblings are similar or different in their interests.

Whereas shared genes and family experiences imbue siblings with a degree of similarity (Scarr & Grajek, 1982), it is also the case that siblings can be quite different from one another. In fact, siblings are often as different from each other as they are from unrelated individuals (Plomin & Daniels, 2011). Differences between siblings can arise in a number of ways, including genetic, environmental, and psychological sources. Some differences emanate from family structural factors such as siblings' birth order and the dyad's gender constellation. Other differences develop over time through youths'

individual experiences, both within and outside the family (Daniels, Dunn, Furstenberg, & Plomin, 1985; Daniels & Plomin, 1985; Plomin & Daniels, 1987; Rowe & Plomin, 1981). Sibling differentiation refers to the extent to which siblings differ from one another.

One source of sibling differences that has received empirical attention is sibling deidentification, which refers to a process whereby youths pursue interests, goals, and personal qualities that distinguish them from their siblings (McHale, Crouter, & Tucker, 2001). According to Adler's Individual Psychology, siblings differentiate as a means of creating a unique "niche" in the family--reducing direct comparison, competition, and rivalry between siblings (Adler, in Ansbacher & Ansbacher, 1956). This psycho-dynamic perspective was further developed by Schachter and colleagues, who termed the process of siblings pursuing different characteristics, goals, etc., as "deidentification" (Schachter, Shore, Feldman-Rotman, Marquis, & Campbell, 1976). According to deidentification tenets, differentiation is a normative and adaptive process that will decrease sibling rivalry and enhance sibling relationship quality (Ansbacher & Ansbacher, 1956; Schachter et al., 1976). Deidentification theory runs counter to principles of homophily, however, which posit that individuals who are more similar in characteristics such as attitudes, values, and personality traits are more likely to form and maintain relationships, as each individual will find the other to be agreeable and personally validating (McPherson, Smith-Lovin, & Cook, 2001). Considering principles of homophily, such a relationship should also be positive in nature, as common ground will be plentiful and conflict less likely within dyads of like-minded individuals (McPherson et al., 2001).

Empirical work on sibling differentiation is limited, and work that examines

associations between sibling differentiation and sibling relationship quality is both rare and inconclusive. Some research has found sibling differentiation to be linked with greater sibling intimacy and lower levels of conflict (Feinberg, Neiderhiser, Simmens, Reiss, & Hetherington, 2003). Other work, however, has found a negative association between differentiation and relationship quality (Whiteman, McHale, & Crouter, 2007). Given the lifespan significance of sibling relationship quality for individual well-being (Cicirelli, 1995), further work is necessary to better understand both the emergence of sibling differences and the implications of sibling differentiation for the development of sibling relationships.

Though alluded to above, potential linkages between sibling differentiation and individual adjustment outcomes are also unexplored. Ecological theory, family systems theory, and Adlerian ideas about differentiation are all congruent with the idea that sibling relationship dynamics have the ability to influence individual development and well-being. Theoretical linkages between sibling differentiation and identity development lead to the prediction that establishing a unique identity is beneficial for individual adjustment. Given the established link between sibling relationship quality and individual adjustment, however, it may also be the case that the negative impact of differentiation on sibling relationship quality (Whiteman et al., 2007) would also have negative ramifications for individual adjustment. The latter process is congruent with self-affirmation theory, which suggests that similarity between siblings may serve as a source of personal validation and self-worth. In the face of competing theory-based predictions, empirical research is necessary to better understand whether and how sibling differentiation and individual adjustment are linked.

Accordingly, building on existing theory and research, the current study focused on sibling differences in self-described activity interests (e.g., sports, reading, hobbies), with the goal of examining the extent of sibling differentiation and the associations between sibling differentiation and both sibling relationship quality and youth adjustment over time. In testing competing predictions about the nature of sibling differentiation, the current study had three aims.

The first was to chart the trajectory of sibling differentiation from middle childhood through adolescence, testing for potential moderation by sibling dyad gender constellation. Based on deidentification theory, as well as existing work on sibling differences, I expect sibling differentiation to increase over time. In examining for moderation by gender constellation, competing hypotheses arise. Deidentification theory suggests that siblings who are more similar will feel a greater need to deidentify, leading me to expect greater sibling differentiation in same-sex sibling dyads. Existing work on gender socialization, however, describes gender differences in interests that may be exaggerated in adolescence via gender intensification (Galambos, Almeida, & Peterson, 1990; Lever, 1976). This would suggest that mixed-sex sibling dyads may, in fact, exhibit more differentiation than their same-sex peers.

The study's second aim was to examine linkages between sibling differentiation and sibling relationship quality. Using multi-level modeling (MLM), I examined the longitudinal linkages between differences in siblings' activity interests and their reports of sibling intimacy and conflict. For this aim, I tested the conflicting predictions of deidentification theory—which suggests that differentiation is beneficial for sibling relationship quality—and principles of homophily, which predict that sibling similarity

will be linked with positive sibling relationship dynamics. Considering their relevance for sibling relationship dynamics, I also tested for potential moderation by gender constellation and birth order.

The third research aim was to investigate potential linkages between sibling differences in activity interests and a measure of siblings' individual adjustment—self-worth. This aim also tested conflicting hypotheses: although deidentification theory suggests that differentiation will enhance self-worth, self-affirmation theory suggests the opposite. As in Aim 2, gender constellation was tested as a potential moderator. In the remainder of the chapter, I introduce sibling differentiation—discussing its relevance to development and activity interests, as well as its potential implications for sibling relationship quality (intimacy and conflict) and youth adjustment (self-worth).

Sibling Differentiation

Dunn and Plomin (1991) argued that differences between siblings are largely due to the fact that, although siblings are born into the same family, their experiences are frequently quite different from one another. These variations in experience—non-shared environmental influences—are defined as factors that serve to make siblings different from one another. For example, having different friends, joining different activities, or being members of different age cohorts can all result in siblings having different developmental outcomes such that sibling differentiation increases over time. In addition, as family members who are similar in age and upbringing, siblings serve as salient benchmarks for social comparison (Feinberg, McHale, Crouter, & Cumsille, 2003; Wills, 1991). These social comparisons can be sources of positive and negative feedback about both youths' personal characteristics, as well as their places in their families. According

to deidentification theory, the inevitability of within-family comparisons may lead youths to seek to define themselves as different from their siblings. By limiting direct comparisons, youths may feel less threatened by their siblings, and competition and rivalry are reduced (Feinberg et al., 2003; Schachter et al., 1976). This process, in turn, may allow more positive sibling relationship dynamics to flourish.

Sibling deidentification is considered to be an important component of identity development for both older and younger siblings, and qualitative research has found evidence of sibling deidentification across birth order and gender constellation (Whiteman & Christiansen, 2008). There is also evidence that sibling deidentification is evident across development. Its impact on shaping self-identity suggests that sibling deidentification will be particularly significant during adolescence, when identity formation is a crucial developmental task (Erikson, 1968; McHale et al., 2001). Another factor theorized to influence sibling differentiation is the degree to which siblings resemble one another, though specific predictions vary. Deidentification theory suggests that siblings who are objectively different from one another--by virtue of factors such as gender or stage of development--feel less pressure to differentiate, as direct comparisons with siblings are less frequent. Siblings who are more objectively similar, in contrast, may feel a greater need to distinguish themselves from their sibling (Schachter et al., 1976). Thus, from a deidentification perspective, differentiation should be more common and intense between siblings who are the same sex and close in age, as youths strive to establish unique niches within their families (Schachter et al., 1976). In contrast, from a behavioral genetics perspective, genetically-based similarity in sex would likely make same-sex siblings more similar, including because genetic differences between youths

from mixed-sex dyads help to create different environments in which the siblings develop. In sum, while both deidentification theory and behavioral genetics suggest an increase in sibling differences over time, predictions differ with respect to gender constellation.

Sibling Differences in Activity Interests

In this study, I focused on one domain of potential sibling differences—their self-rated activity interests, or, how interested they reported being in a range of different free time activities. Youths' activity interests may be a particularly appropriate topic for analyses of sibling differentiation because they reflect individual identity (Barber, Eccles, & Stone, 2001), as well as youths' emerging priorities and orientation to time use. Adolescence has been described as a time of personal reflection and growth, with adolescents exploring many different possible identities—a process which may include testing out a wide variety of different activities and interests (Marcia, 1966). This process is described as crucial into the successful formation of a personal identity. As adolescents explore various activity interests, they may decide to maintain some interests and discard others over time, in a process that shapes and is shaped by their developing identities. School-aged youths in the United States and other Western nations average 40%–50% of their waking hours in discretionary activities outside of school (Larson & Verma, 1999). Further, youths are often involved in several different out-of-school activities during the course of a week or even a single day (Capizzano, Tout, & Adams, 2000; Mahoney, Lord, & Carryl, 2005; Vandell & Posner, 1999). Indeed, approximately 70% of youths participate in multiple activities during a given week or month (Larson, Hansen, & Moneta, 2006). Activity interests also have a prominent role in developmental theory, as

engaging in and mastering a variety of activities is considered a crucial task for youths' positive development (Erikson, 1968).

With the plethora of extracurricular options currently available to many U.S. adolescents, youths must decide which interests to pursue. This may be especially true for adolescents, who increasingly find that their time and energy are limited resources such that their interests reflect their values and priorities (Erikson, 1963; Youniss & Yates, 1997). These increasing time demands force adolescents to prioritize some interests over others, further refining their interests over time. For example, an adolescent who finds that student council conflicts with soccer practice must decide which activity is more interesting and enjoyable. That adolescents are often forced to be more selective in their interests is reflected in research findings showing that adolescents exhibit overall declines in activity interests across development, as their interests become more focused and less diffuse (Garton & Pratt, 1987; 1991). This selectivity may force adolescents to abandon interests that are deemed less important or fulfilling, further shaping their identity --and possibly resulting in siblings growing increasingly different from one another.

Implications of Differentiation

One theoretical implication of sibling differentiation is its impact on sibling relationship quality. According to deidentification theory, high levels of similarity between siblings are likely to cause feelings of inferiority, leading to competition, resentment, and rivalry. Homophily principles, on the other hand, suggest that the more siblings have in common, the closer they are likely to be—bonding and growing closer over shared interests. To examine this issue, my second research aim was to examine linkages between sibling differentiation and sibling relationship quality. Below I outline

the ways in which differentiation is thought to impact sibling intimacy and sibling conflict.

Differentiation and Sibling Intimacy. Sibling intimacy refers to the degree to which siblings feel close to, loved by, and supported in their relationship with one another. Sibling intimacy often takes the form of protective behaviors, shared time, physical affection, and positive thoughts and feelings toward one another (Brody, 1998; Buhrmester & Furman, 1990). A range of evidence suggests that sibling intimacy is beneficial for youth outcomes—researchers have linked high levels of sibling intimacy to positive youth adjustment and a reduced likelihood of internalizing symptoms (Branje et al., 2004; Kim et al., 2007). Sibling relationships characterized by intimacy also are linked to positive peer and romantic relationships, possibly because such relationships serve to enhance youths’ social skills and capacity for intimacy (Doughty, McHale, & Feinberg, 2015; Lockwood et al., 2001). Previous work on sibling intimacy has found both fluctuations in average sibling intimacy over time and interactions with dyad gender constellation (Kim et al., 2006). The current study aims to elaborate on these findings by testing two competing theories about the role that differences in siblings’ activity interests play in cross-time changes in sibling intimacy. As noted, deidentification theory holds that as siblings become more different from one another, sources of sibling rivalry and hostility will diminish, allowing for more positive relationship dynamics. Different interests may also lead to a natural decline in sibling shared time—making their limited time together seem more enjoyable due to relative infrequency. Homophily principles (McPherson et al., 2001), however, focus on the importance of shared interests for

promoting and maintaining positive relationships. From this perspective, if siblings share fewer interests, their relationship quality will suffer.

Differentiation and Sibling Conflict. High rates of teasing, arguments, and physical aggression between siblings are common and considered normative in Western society (Dunn, 1983; Kahn & Monks, 1997; Kramer, 2010). Sibling conflict, however, has been associated with negative individual outcomes such as depression and poor peer relationships (Bank, Patterson, & Reid, 1996; Bullock & Dishion, 2002; Stocker et al., 2002). Although frequent in childhood, sibling conflict has been found to decline from middle childhood to late adolescence (Kim et al., 2006). This pattern is congruent with deidentification theory, which postulates that, as siblings select their own distinct niches in the family, sibling comparison and rivalry decline—resulting in fewer sources of conflict. It may also be the case that as siblings become more different, they spend less time together and thus have fewer opportunities to argue and fight with one another—further reducing sibling conflict. Homophily principles, being focused on affiliation and intimacy, do not directly offer insight into potential linkages between differentiation and conflict. By expanding on a homophily perspective, however, tentative predictions can be made. According to this perspective, as siblings grow more different, they will have less common ground over which to connect, which should result in decreased intimacy-- and potentially create or exacerbate sources of conflict.

Differentiation and Self-Worth. Self-worth refers to the degree to which an individual feels worthy and valued. Rather than being based in one's external accomplishments and perceptions of success, like self-esteem, self-worth is typically conceptualized as referring to the belief that one is intrinsically valuable and worthwhile

as an individual—based on who an individual *is*, rather than what an individual has accomplished (Pelham & Swann, 1989). It is a fundamental element of self-concept and self-esteem, and has been used as an indicator of overall positive adjustment and psychological well-being (Harter, 1990). Self-worth has been found to thrive in warm, nurturing, supportive environments, with the family environment described as a particularly important context for the development of self-worth (McGuire, Manke, Saudino, Reiss, Hetherington, & Plomin, 1999). Previous work in this area has highlighted the importance of analyzing the development of self-worth from a family systems perspective, which takes into account multiple family members, subsystems, and bidirectional effects (Bulanda & Majumdar, 2009). Previous work has demonstrated the importance of parental involvement and support to adolescent self-esteem (Heinonen, Raikkonen, & Keltikangas-Jarvinen, 2003) and psychological well-being (Parker & Benson, 2004), lending credence to the notion that warm family relationships play a crucial role in the development of self-worth. Sibling relationships, specifically, have been found to be influential in youth development (Whiteman, Becerra Bernard, & Jensen, 2011). Their unique relationship dynamics may make them particularly salient to the development of self-worth in adolescence.

A deidentification perspective would predict that the process of differentiation from one's sibling leads to the development of a unique self—a “niche” in the family wherein one can be appreciated without having to compete with a sibling. This individual development is expected to serve as a source of positive identity, increasing one's sense of self-worth. The exploration and discernment of a unique self is particularly relevant to adolescence, which is theorized to be a time when issues of identity development are

paramount (Erikson, 1968). Self-affirmation theory, however, points out the importance of familial approval and support to the development of self-worth (Aronson, Cohen, & Nail, 1999). Particularly given the importance of activity interests to youths' developing sense of identity, the approval--or dismissal of a valued interest by a close family member could be perceived as affirmation-- or rejection. The validation inherent in sharing common interests with a sibling would therefore be expected to enhance adolescents' self-worth, whereas having little in common with a sibling could be experienced as a lack of familial support, damaging adolescents' self-worth.

Present Study

To summarize, although siblings are often thought to be similar, recent work suggests that they are often no more similar than they are to unrelated individuals. The extent to which siblings are similar or different, however, may have implications for both sibling dynamics and individual development. As noted, in this research, I addressed three aims: (1) to chart the trajectory of sibling differentiation from middle childhood through adolescence, examining gender constellation as a potential moderator, (2) to examine linkages between sibling differentiation and sibling relationship quality (intimacy and conflict), testing gender constellation and birth order as potential moderators, and (3) to examine linkages between sibling differentiation and youths' adjustment (self-worth), testing for potential moderation by gender constellation. In doing so, my goal was to shed light on sibling differentiation in relation to predictions informed by deidentification theory, behavioral genetics research and principles of homophily and self-affirmation theories—as elaborated in Chapter 2. In this research, youths' reported activity interests are used as the focus for studying sibling differentiation.

Chapter 2

Literature Review

The significance of siblings is evidenced, in part, by the regular appearance of brothers and sisters in personal, cultural, and religious narratives from around the world. Siblings are a fixture in the lives of most children and adolescents, and research continues to document the roles they play in one another's lives, including as friends, foes, and the focus of social comparison. Sibling research emphasizes the importance of siblings in one another's lives, providing evidence that sibling relationship experiences can advance youths' social, emotional, and cognitive development (e.g. Bank & Kahn, 1997; Brody, 2004; Dunn, 2007; Schachter & Stone, 1987). The ubiquity of sibling relationships, coupled with their unique dynamics, makes them a worthy subject for further research.

Growing up with a sibling is an experience shared by the majority of children around the world. Even in the face of declines in family size, recent U.S. census data indicate that 82.22% of youth age 18 and under lived with at least one sibling (McHale, Updegraff, & Whiteman, 2012) and about 80% of U.S. adults report having at least one living sister or brother (Dunn, 2007; White, 2001). Indeed, more children in the U.S. today share a home with a sibling than with a father or father figure (78.19%) (McHale et al., 2012). Data from the Integrated Public Use Microdata Series' harmonization of the 2010 Current Population Survey (King, Ruggles, Alexander, Flood, Genadek, Schroeder, Trampe, & Vick, 2010) show that approximately 40% of U.S. youth (18 years and under) lived with one sibling, approximately 25% lived with two siblings, and more than 15% reported living with three or more siblings (McHale et al., 2012). The prominence of siblings in the contemporary family landscape underscores the importance of better

understanding the ways in which sibling experiences are linked to development and adjustment in childhood and adolescence—and beyond.

Given their ubiquity in family life, it is surprising to note that, in the world of family research, sibling relationships receive far less empirical attention than marital or parent-child relationships. The field of sibling research continues to grow, however, reflecting the importance of siblings for family life and individual development. Sibling relationship experiences have been examined using a variety of conceptual models, including behavior genetics, socialization and social learning theory, individual psychology, ecological theory, and family and developmental systems models (McHale et al., 2012). The current study utilizes elements of these perspectives as the foundation for an exploration of the trajectory and correlates of sibling differentiation.

In this chapter, I review the literature that underlies the current research. First, I describe some of the key characteristics of sibling relationships, specifically their companionship, longevity, dyad structure, power dynamics, and emotional tone. Next, I discuss sources of similarity and differentiation between siblings—specifically genes, environment (shared and non-shared), and social comparison processes. The practical relevance of sibling differentiation is then explored, with a focus on youths' activity interests. The importance of siblings' activity interests, as both a context for sibling differentiation and a vehicle for identity development, is then discussed. Paralleling the aims of this research, I conclude the chapter by discussing the potential impact of sibling differentiation on sibling relationship quality (intimacy and conflict) and individual development, based on principles of homophily, deidentification theory, and self-affirmation theory.

Sibling Relationship Characteristics

The duration of sibling relationships, coupled with the large role that siblings tend to occupy in one another's lives, set the stage for siblings to influence one another in a variety of ways. A growing body of research documents the implications of sibling relationships in areas ranging from friendship to academic engagement and risky behavior (Brody, 1998; 2004; Slomkowski, Conger, Rende, Heylen, Little, & Shebloski, 2009). Given the intensity that often characterizes sibling relationships, it is not surprising that a relationship with a sibling has the potential for meaningful impact—just as has been found of parent-child or peer relationships (Dunn, 2007). In fact, sibling influences have been found to play a significant role in development even when controlling for parent-child relationship quality (Doughty et al., 2015).

The ability of siblings to influence one another is consistent with an ecological perspective of development: as members of the microsystem, siblings are expected to impact individual development in a variety of ways (Bronfenbrenner, 1979). Indeed, Sibling relationships play a role in the development of social skills and abilities in childhood, serving as a forum for learning and practicing a range of social skills including perspective taking and conflict resolution (Lewis, 2005). Sibling relationships are often the first peer-like relationship children experience, and for this reason siblings may be influential in establishing the capacity to form secure attachments (Collins & Sroufe, 1999; Scharf & Mayseless, 2001). Although adolescence is often a time of withdrawal from the family, siblings remain a significant and meaningful influence on individuals through the teenage years, influencing social skills, identity development, and risk behaviors (Raffioli, 1992; Rende, Slomkowski, Lloyd-Richardson, & Niaura, 2005;

Updegraff et al., 2002). Whether such sibling influences are positive or negative lies within the nuances of each dyad's relationship dynamics. Research on sibling relationships has identified several factors that contribute to the importance of siblings to development, including their companionship, longevity, dyad structure, power dynamics, and emotional tone.

Companionship

Demographic data demonstrate the ubiquity of sibling relationships on a population level. Family research, in turn, finds that siblings are also ubiquitous in one another's daily lives—providing high levels of companionship to one another. Siblings spend large amounts of time in one another's company, occurring both as the result of actively deciding to spend time together, and as the result of passive acceptance of situations that place them together (e.g. family meals, car rides). Research has found that—outside of school hours—in middle childhood and early adolescence, youth spend more time in the company of a sibling than they do in other social contexts such as with parents and peers, allowing for ample interaction and influence (McHale & Crouter, 1996). The amount of time spent with a sibling fluctuates over development, as youths gain the ability and independence needed to enter into relationships and activities beyond the family and home (Larson & Verma, 1999). Although siblings spend more time together during childhood, adolescents continue to describe siblings as important people in their lives (Blyth, Hill, & Thiel, 1982). These relationships sustain their importance across the lifespan through an accumulation of shared experiences and understanding (Cicirelli, 2013).

Longevity

Another facet of the ubiquity of sibling relationships is their potential to extend across the lifespan, as they are frequently the longest-lasting relationship an individual will have (Bank & Kahn, 1982). Sibling relationships are typically formed in early childhood and are often a child's first non-parental relationship. Unlike relationships with one's spouse or children, siblings typically enter into one another's lives very early—average age spacing between siblings is about 3 years in the U.S. (Eggebeen, 1992). Siblings are also likely to have similar life spans, rather than outliving one another by decades, as with a parent. In addition to having significantly overlapping lifespans, the longevity of sibling relationships is further enhanced by the relative permanence of their social bond: Few social relationships have the level of permanence of a sibling relationship. Barring extreme circumstances, siblings are unable to escape or end relationships with their siblings--particularly during the early decades of life. The inability to terminate a relationship despite interpersonal difficulties or personal preferences means that siblings may spend considerable time with someone they may not otherwise have exposure to, and forces them to learn the social skills necessary to navigate a potentially difficult relationship.

The unusual longevity of sibling relationships also affords siblings an opportunity to play a significant role in one another's lives across the lifespan—for good or for ill. Although siblings' potential for life-long influence has been noted, much of the existing sibling literature remains focused on childhood. What work has been done on sibling relationships beyond childhood focuses primarily on risky behaviors, and has found evidence of sibling influence well into adulthood, demonstrating the continued

importance of sibling relationships for individual outcomes across the lifespan (Cicirelli, 1995; Waldinger, Vaillant, & Orav, 2007).

Dyad Structure

Living with a sibling provides unique opportunities for interaction between individuals who may differ in age and gender. Dyad structure is one way in which sibling dyads differ from one another. These structural variables include gender constellation, relative ages, and age spacing—and have been found to play a role in how siblings interact with one another. For example, in a longitudinal study of sibling relationships, the trajectory of sibling intimacy from middle childhood to late adolescence varied as a function of sibling dyad gender constellation—same-gender dyads exhibited no change in intimacy over time (with sister-sister pairs reporting the highest levels of intimacy), whereas mixed-gender dyads showed a decline in intimacy in early adolescence, followed by a significant increase through adolescence (Kim, McHale, Osgood, & Crouter, 2006). Further, mixed-sex sibling dyads tend to experience more conflict than same-sex sibling dyads, in both early and middle childhood (Dunn & Kendrick, 1982; Epkins & Dedmon, 1999). Other work has found that the presence of an opposite-gender sibling can benefit youths' social skills--providing natural opportunities to observe and interact with an opposite-gender peer (Doughty, Lam, Stanik, & McHale, 2014).

Power Dynamics

Sibling relationships also differ in their power dynamics, with each dyad negotiating the degree to which they exhibit egalitarian versus hierarchical patterns in their interactions. Sibling dyads may exhibit hierarchical dynamics, with one sibling

(typically the older) taking on a leadership role--dictating activities and behavior. In other cases, however, siblings will demonstrate more egalitarian dynamics—sharing power equally as in peer relationships and friendships. Even in the same relationship, power dynamics may change across situations and over time. This variability stands in contrast to relationships with parents, teachers, and friends—which tend to be either hierarchical or egalitarian, but not both. This unique combination of power dynamics can cause difficulty between siblings, as, at least in Western culture, there are fewer clearly defined roles or responsibilities for siblings, such as caregiving or economic obligations. In fact, U.S. siblings bear few legal rights and responsibilities for one another (Dwyer, 2006). This lack of societal guidance leaves siblings to determine their own dyadic power structure, which can leave siblings jockeying for dominance in the relationship (McHale et al., 2012). Determining the balance of power in sibling relationships may involve an ongoing process of negotiation, with each sibling attempting to gain greater control. And, as siblings develop, the power balance between them is likely to shift periodically. Evidence of these developmental changes can be seen in adolescence and beyond, when increasingly egalitarian dynamics emerge, reflecting the progressively smaller developmental differences between siblings in the face of a constant difference in their chronological ages (Buhrmester & Furman, 1990).

Emotional Tone

In Western society, few relationships are imbued with the emotional intensity and ambivalence that characterizes sibling relationships. Sibling relationships vary in the degree to which they exhibit positive or negative emotions: although some sibling dyads are highly intimate or predominantly positive, others are characterized by negative,

hostile, or conflictual interactions—and some by both (Stocker, Lanthier, & Furman, 1997). Early work on sibling relationship quality was focused narrowly on the relative presence or absence of “sibling rivalry” (Levy, 1934, 1937). Later models of sibling relationship quality took a broader view, examining as many as 12 characteristic features, including intimacy, competition, ambivalence, relative status/power, and emotional understanding (Dunn, 1984, 1988; Furman & Buhrmester, 1985). More recent work tends to focus on three factors: sibling rivalry/jealousy/competition, affection/warmth/intimacy, and hostility/antagonism/conflict (Sanders, 2010). Two of these factors, intimacy and conflict, are sometimes thought of as existing on opposite ends of a spectrum, such that a dyad cannot be high in intimacy without also being low in conflict. However, sibling intimacy and conflict are actually more accurately described as orthogonal: each existing on its own continuum and able to fluctuate independently (Sanders, 2011). Such a model allows for dyads to be, for example, high in both conflict and intimacy—a combination termed “affect intense,” or low in both factors (“distant”) (McGuire, McHale, & Updegraff, 1996).

Sibling Differentiation

Definition and Significance

Another dynamic in sibling relationships pertains to the extent to which siblings compare themselves to one another and the salience that these comparisons have for both dyad dynamics and individual development (Feinberg et al., 2000). The prominence of social comparison in sibling dyads can be seen in the extent to which sibling theory and research has focused on issues of sibling appraisal, rivalry, and competition. Better

understanding the ways in which siblings engage in comparisons with one another may give insight to the forces that motivate individual behavior and sibling dyad dynamics.

Early work on siblings emphasized their similarities, based on the premise that socialization processes operate similarly for children with the same family, a perspective which is echoed in the methodology and assumptions of sibling and family research (Dunn & Plomin, 1990; Maccoby & Martin, 1983). An alternative perspective emerged in the 1980s which called assumptions of sibling similarity into question. Work by Plomin and Daniels (1987; 2011) demonstrates that siblings are often as different from one another as they are different from children from a different family. The extent to which siblings are similar and different is a topic that has sparked considerable conceptual and empirical attention across several disciplines, including social learning, individual psychology, and behavioral genetics. Here, I discuss the importance of sibling differentiation, its sources, and relevant theory, which provide a foundation for this study's aims.

Implications for Relationship Quality and Adjustment

Although the terms deidentification and differentiation have occasionally been used interchangeably (Caspi, 2010), preserving a distinction between the two is useful for researchers. Rather than being synonymous with differentiation, for the purposes of the study and consistent with deidentification theory and prior research (Schachter et al., 1976), deidentification is defined as a psychological process that functions to make siblings more different. Deidentification is theorized to be motivated (consciously or unconsciously) by the desire to lessen similarities and comparisons to ones' siblings (Schachter, Gilutz, Shore, & Adler, 1978). In contrast, for the purposes of this study,

differentiation is defined in terms of measured differences between siblings—which are possibly the outcome of de-identification. More generally, in the context of this study, differentiation can be understood as the result of two opposing forces—those that make siblings more similar (common genes, shared environmental influences, etc.) and those that make siblings more different (deidentification and non-shared environmental influences), as elaborated in the following pages.

Perspectives on the Sources of Sibling Differences

The processes through which differences between siblings emerge have been conceptualized within a number of disciplinary perspectives, which focus on different aspects of the differentiation process. Discussed below are social comparison perspectives, which encompass Social Comparison and De-Identification Theories, and the behavioral genetic perspective, which targets the interactive influences of genes and environments.

Social Comparison

Grounded in a social learning framework, a social comparison perspective emphasizes the ways in which individuals compare themselves to others and the ways in which such comparisons impact relationships and development. Of particular relevance to the current research are sibling comparisons, which can be understood via the tenets of Social Comparison Theory (SCT) (Festinger, 1954; Suls & Wills, 1991). SCT holds that individuals have an innate motivation to compare themselves to others in a variety of domains—including abilities, material possessions, and perception by others. As relates to siblings, SCT can explain the dynamic whereby siblings reference each other in order to evaluate themselves and their standing in the family—as well as the larger world. As a

member of the same family who is similar in age and upbringing, a sibling can be a salient and omnipresent benchmark against which to judge aspects of self-development and social acceptance (Feinberg et al., 2003; Wills, 1991). SCT suggests that comparisons are ubiquitous in everyday life and are particularly likely to be made with those who are similar in personal characteristics and with whom interactions are frequent (Tesser, Millar, & Moore, 1988; Wills, 1991; Wood, 1989). Siblings tend to fulfill these criteria, making siblings particularly likely to engage in frequent and mutual social comparison due to their physical proximity and shared personal attributes as a means of evaluating their own skills and relationships (Tesser et al., 1988). When individuals are more objectively similar, comparisons are particularly relevant, as there are fewer reasons to account for any observed or perceived differences (Tesser et al., 1988; Wills, 1991; Wood, 1989). Stemming from these theoretical principles (McHale & Crouter, 1996; Updegraff, McHale, Whiteman, Thayer, & Delgado, 2005), siblings provide ubiquitous frames of reference in many domains. For the purposes of this study, of particular concern are the ways in which siblings inform youths' decisions about their developing activity interests.

Sibling comparisons can be both conscious and unconscious (Stapel & Suls, 2004; Suls et al., 2002), but regardless of the degree to which individuals are aware of them, sibling comparisons appear to play a powerful role in informing self-concept. Importantly, comparisons are not always accurate--but inaccurate comparisons can affect self-concept just as readily as more accurate comparisons (Festinger, 1954; Wood, 1989). Individuals, however, strive to make comparisons as accurate as possible (Wills, 1991; Wood, 1989), and thus it is possible that individuals' perceptions of discrepancies

between themselves and social comparison targets are at least somewhat based on an accurate sense of differences. This may be particularly true of siblings, who are privy to so many details about one another's lives. In sum, SCT, by delineating the ways in which siblings use one another as frames of reference for self-assessment and individual development, adds an important theoretical dimension to the study of sibling differentiation. By making comparisons with a sibling, youths may evaluate or modify their identity as in the process of sibling deidentification.

Deidentification

Relying heavily on social comparison principles is the process of sibling deidentification—a source of sibling differences that has attracted much interest and theoretical speculation. Deidentification has been described as the process wherein youths develop interests, goals, and personal qualities that distinguish them from their siblings (Whiteman, Bernard, & Jensen, 2011). Deidentification describes the tendency of siblings to consciously or unconsciously cultivate different personal qualities and seek out different niches or roles in order to better define themselves as a unique individual—distinct from their sibling (Whiteman et al., 2009). Through deidentification processes, youths are thought to reduce the number of interests, goals, and activities that they share with siblings in order to protect themselves from the effects of direct comparison, rivalry, envy, and potential resentment of their sibling (Feinberg & Hetherington, 2000). From the perspective of deidentification theory, this process is healthy and normative, and a way to promote positive sibling relationships by decreasing conflict and increasing warmth (Adler, in Ansbacher & Ansbacher, 1956).

Deidentification is thought to be more common and intense between siblings who are the same sex and close in age, as siblings who are already similar may feel a greater need to distinguish themselves (Schacter et al., 1976). Areas in which youth have been found to differentiate from siblings include vocational interests, gender role orientations, and indicators of adjustment (Feinberg & Hetherington, 2000; Grotevant, 1978; Leventhal, 1970). As deidentification is posited to occur as a series of behaviors and preferences carried out by both siblings over time, the effect would be a gradual accumulation of interests, ideas, and personal qualities that are unique to the individual (Whiteman et al., 2007). Deidentification, then, would be expected to result in adolescents becoming increasingly differentiated from their siblings over time. This hypothesis, although mentioned frequently in sibling literature, has received relatively little empirical attention. Limited work on twin and adoptive samples found evidence that dizygotic twins became less similar from infancy through to adolescence (Matheny, Wilson, Dolan, & Krantz, 1981; Scarr & Weinberg, 1978). More work on single-birth sibling dyads is needed in order to better test this assumption of deidentification theory.

Although it would logically seem that deidentification may be more necessary for later-borns than firstborns, research into sibling deidentification suggests that it is a part of identity development for both for older and younger siblings, though some work found deidentification to occur at the higher levels between proximal sibling dyads (e.g. firstborn and second-born) as opposed to jump pairs (e.g. firstborn and third-born) (Schachter, 1976; Whiteman & Christiansen, 2008). Deidentification may become particularly prominent during adolescence, as defining one's self as a unique individual is a crucial developmental task for this stage of development (Erikson, 1968; McHale et al.,

2001). Being particularly motivated to develop and establish their unique identity, youths may find distinguishing themselves from their sibling particularly satisfying during adolescence, resulting in an abundance of differentiation during this stage of development. The potential importance of deidentification as a means to further identity development speaks to the potential of this process to have ramifications for individual adjustment as well as relational dynamics.

Deidentification theory itself offers little insight as to what dimensions of self might be particularly likely targets for deidentifying. Other relevant theories, however, provide some insight into this matter. Self-esteem maintenance theory posits that youth are more likely to deidentify from their siblings in areas that are of particular relevance and importance to their identity in order to reduce the risk of unfavorable comparison in important domains (Tesser, 1980). This distinction allows for similarities between siblings to remain in areas that are of less importance to either sibling's sense of self. In theory, by giving youth a way to distinguish themselves from their siblings, deidentification would allow youths to establish an identity that provides them with the greatest chance of positive comparison in the areas that are important to them—which would foster a positive sense of self-worth and promote positive adjustment. For example, an individual being overshadowed academically by a sibling could pursue music or dance, allowing them to reduce direct sibling comparison while cultivating a unique identity.

Behavioral Genetics

A second perspective on the emergence of sibling differences comes from the field of behavioral genetics. Rather than focusing on social psychological processes,

early work speculating on the sources of siblings' similarities and differences categorized influences more generally, as genetic or environmental, reflecting the question of the roles of nature vs. nurture in behavior and development (Plomin & Bergeman, 1991). Emphasis within this perspective is also on the ways in which nature and nurture interact, and toward this end scholars have worked to conceptualize the sources and nature of environmental influences as described below.

Applied to the study of sibling differentiation, behavior geneticists note that, due to their shared parentage, biological (non-monozygotic) siblings share 50% of their genetic material, on average. This genetic similarity has been credited as the source of a variety of similarities between siblings. For example, their common genetic background has been found to predict siblings' similarity in areas including cognitive ability, personality, athletic abilities, and physical appearance (Boomsma et al., 1989; Chipuer, Rovine, & Plomin, 1990; Plomin & Neiderhiser, 1992; Susanne, 1975). Although full siblings (who are not monozygotic twins) share approximately 50% of their genetic material, this still leaves roughly 50% of their genetic material free to differ. These differences in genotype can manifest in individual physical, cognitive, and psychological differences between siblings. Further, the ability of genes to influence environments means that genetic differences between siblings can lead to the experience of non-shared environments—which in turn, increase sibling differences. The ability of genes to create environments has been described in terms of gene-environment correlations, discussed below.

Gene-environment Correlations. One difficulty in parsing the distinct contributions of genes and environments to behavior and development is the degree to which genetic

similarity is correlated with shared environment (Scarr & McCartney, 1983). Correlations between genes and environment arise in a variety of ways, and are described in the literature as being passive, evocative, or active in nature. Passive gene-environment (g-e) correlations are those that arise due to the fact that when individuals are raised by their biological parents, their early environments and genes are naturally correlated—both having been provided by the parents. Thus, a child whose parents are gifted musicians is likely to be raised in an environment (created by musical parents) that encourages musical talents, while also being likely to inherit his or her parents' genetically-influenced talent for music. This correlation between genetic potential and parent-cultivated environments is theorized to amplify or exaggerate genetic predispositions by providing environments that foster their development. Passive g-e correlations are thought to be particularly evident in early life, as they require no action on the part of the individual, and early environments tend to be predominantly created by parents (Scarr & McCartney, 1983). As siblings who are raised together share much of their early environment, as well as similar genes, passive g-e correlations are likely to operate in both siblings' early lives, potentially promoting sibling similarities.

Evocative g-e correlations describe the bidirectional interplay between genetically influenced behaviors and the environmental responses they evoke. A child's genes predispose him or her to engage in certain behaviors. These behaviors, in turn, evoke a certain kind of response from the environment. This environmental response may serve to reinforce or punish the child's behavior—creating a correlation between genes and environments. For example, a child who is skilled at painting is likely to be highly engaged and successful in art class. In turn, his or her art teacher is likely to respond to

such skill and enthusiasm with positive attention and artistic encouragement, which may prompt the child to further develop his or her interest and skill at painting. Although evocative g-e correlation is likely to operate across the lifespan, its reliance on individual behaviors and dispositions makes this effect of genes on environments more likely as individuals grow more capable of autonomous interaction with their environment. This would result in an increase in sibling differences, as youths' genes are able to evoke increasingly disparate reactions from the surrounding environment.

Active g-e correlations occur when individuals seek out environments that fit their genetic dispositions. For example, athletic children may be more likely to seek out opportunities to participate in sports--a context in which their genes predispose them to excel--resulting in a correlation between their genetic traits and their self-selected environments. The level of autonomy required to make decisions about one's environments makes active g-e correlations increasingly likely to operate later in development—as individuals' characteristics become more defined with development and autonomy to seek out environmental niches increases. As relates to sibling differentiation across development, as siblings become increasingly able to make choices about how they spend their time, active g-e correlations may make differentiation increasingly pronounced, as siblings' genetic differences become accentuated through their choices of free time activities.

Environmental influences. In efforts to understand the role of the environment, behavior geneticists also have classified and defined differing forms of environmental influences. Variance between siblings that is non-genetic in nature is attributed to environmental sources (Dunn & Plomin, 1987; 2011). This broad definition of

environmental influences encompasses prenatal, social/relational, physical/environmental, and incidental experiences (among others). In turn, the broad category of environmental influences has been subdivided into shared and non-shared environmental influences, each of which may play a role in shaping sibling similarities and differences.

Shared environmental influences. Determining the extent to which genetic similarity accounts for resemblances between siblings is made difficult by the fact that siblings typically experience a shared home environment in addition to their common genes. Shared environments--also referred to as shared environmental influence, between-family variance, E_2 , and common environmental variance—refer to factors that cause resemblance among family members (Plomin & Daniels, 2011). Shared environmental influences are those environmental factors that are experienced by all siblings in a family and are measured in terms of similarities that are not attributed to genetics.

The importance of shared environmental influences can be explained through principles of ecological theory, which emphasizes the importance of individuals' contexts for their development (Bronfenbrenner, 1979). Siblings raised in the same family are likely to experience a great deal of similarity in their ecological systems, with nuclear family members populating the microsystem, and other common contexts appearing in other levels of their ecological system as well (e.g. their parents' work-life balance within the mesosystem, community norms in their exosystems, cultural belief systems in their macrosystems, and birth cohort and historical events in their chronosystems (Bronfenbrenner, 1994). Factors operating at each of these levels have been found to play

a role in youth development, and thus it follows that by sharing their developmental contexts, siblings are likely to be similar. Indeed, much of the existing research of family socialization is designed around the seeming assumption that family socialization processes operate in the same way for all children and thus that it is sufficient to study one child per family to understand family influences (McHale, et al., 2012). Although shared environments work to make siblings more similar, it is important to remember that siblings are no more similar to one another than they are to unrelated individuals (Dunn & Plomin, 1990). With this latter pattern in mind, behavior genetics researchers have focused on the role of the non-shared environment in promoting sibling differences, as described below.

Non-shared environmental influences. Despite the degree to which siblings share their early environments, research suggests that to a large extent, environmental influences are not shared by siblings. These non-shared environmental influences (also termed E1, within-family, individual, unique, and specific environmental variance) are those non-genetic factors that do not promote the resemblance between siblings. Although non-shared environmental influences are present throughout the lifespan, there has been some speculation that they become more plentiful with development. Given that the shared family context is the primary source of siblings' shared experiences, as individuals continue to expand their social contexts beyond the family, the degree to which siblings experience shared environmental influences will continue to diminish (Plomin & Daniels, 2011). Non-shared environmental influences have been categorized as being either non-systematic or systematic, with the latter category yielding the greatest research potential.

Non-systematic, non-shared, environmental influences are unpredictable or capricious experiences that do not serve to promote resemblance between siblings. Common examples include accidents, illnesses, or traumas that are experienced by one sibling but not the other. As one sibling experiences and is influenced by a non-shared event, it is theorized to influence him or her in ways that may not be replicated in his or her sibling, possibly leading to a heightened degree of difference between them. For example, if one sibling is seriously injured in a bicycle accident, he or she may be more cautious about bike-riding in the future, and avoid this form of activity altogether. A sibling, not having experienced such injury, may feel no such need for caution when biking. In this way, non-systematic non-shared influences have the potential to impact only one member of a sibling dyad, making siblings more different. The random nature of these influences, however, makes them difficult topics for research. Consequently, the majority of research on non-shared environmental influences has focused, instead, on *systematic* non-shared environmental influences, discussed below.

Systematic non-shared environmental influences are those aspects of an environment that reduce the degree of similarity between family members. Most often, investigating such influences involves a process of identifying experiences that are not shared by family members. These experiences are then assessed for relations to behavioral differences, and attempts are made to determine the causality of any associations (Plomin & Daniels, 2011). Previous work on this subject classifies dimensions of systematic non-shared environmental influences as: family composition, sibling interaction, parental differential treatment, and extra-familial networks.

Family composition variables are those such as birth order or gender constellation that describe a family's structure. Family composition has received substantial research attention, particularly in comparison to the other three categories of systematic NSE. Birth order, as a factor that by definition must differ between siblings and is not determined by genes, is an example of systematic NSE—and has been the subject of much study. Much of this work has examined birth order effects using between-family designs, rather than within-family designs—one possible reason for inconsistent findings (Sulloway, 1996). Other research on family composition variables such as sibling dyad gender composition has found evidence that they may play a role in shaping sibling differences, including because of their implications for siblings' differential experiences within their shared relationship.

That is, sibling interactions are another source of systematic non-shared environmental influences. Although sibling relationships are experienced by both members of the dyad, there are still ways in which these relationship experiences serve to increase sibling differences. One way is based on individual differences in siblings' individual characteristics including gender and age, as well as characteristics such as personality, skills and interests. For example, one sibling may be kind and supportive, while the other is less sociable. Even though they are part of the same relationship, they have different experiences within that relationship. A second avenue for differential impact arises through the potential of siblings to perceive the same events in different ways. Even if no objective difference exists between the siblings' treatment of one another, they may interpret their relationship experiences differently and respond to them in very different ways—increasing differences between them (Jessor, 1981).

The importance of individual perception has also been found to be salient with regards to parents' differential treatment of siblings—the third category of systemic NSE described by Plomin and Daniels (2011). A substantial body of research has found that children who experience unfavorable differential treatment (such as greater parental control and/or less parent-child warmth/intimacy) had sibling relationships characterized by low sibling positivity and high levels of negativity and resentment—both concurrently and in later years (Brody et al., 1992; Teti, 2002). As well as being a prime example of non-shared environmental influences, PDT also demonstrates the importance of social comparisons to sibling relationship dynamics and youth adjustment outcomes.

A final source of systemic NSE influences is extra familial networks—those relationships and experiences outside the family that siblings do not have in common. These experiences arise in a variety of contexts, including school, extra-curricular activities, and peer groups. Little work has been done on the ways in which siblings' extra familial network experiences may operate to make them more different, but it is not difficult to imagine scenarios in which having different experiences leads to different outcomes.

Developmental Course of Sibling Differentiation

Although the causes of sibling differentiation have been explored, little is known about the trajectory of sibling differentiation over time—the focus of this study's first research aim. What work does exist in this area provides evidence for increased differences between siblings over time in intelligence (Scarr & Weinberg, 1978) and parent-child relationship quality (Feinberg et al., 2003). As alluded to above, behavioral genetics' scholarly work gives reason to expect that sibling differences will increase over

time, as evocative and active gene→environment processes operate. For similar reasons, the effects of non-shared environmental influences are also likely to grow stronger over time, further increasing differences between siblings. Deidentification theory also suggests that siblings will grow more different over time, as youths define their niches in the family. Although there is theoretical reason to expect siblings to grow more different over time, however, few longitudinal empirical data are available. Thus, to further understanding of sibling differentiation processes, Aim 1 of this research was to chart the trajectory of sibling differentiation over time. Existing research, combined with the theoretical work discussed above, led me to expect an increase in differentiation over time.

In addition to charting the trajectory of differentiation, I examined possible moderation of this trajectory by gender constellation. As noted, according to Adler's theory of Individual Psychology, sibling differentiation emerges as a means of reducing reduce direct comparison, competition, and rivalry between siblings, thereby enhancing sibling relationship quality (Ansbacher & Ansbacher, 1956). Siblings who are objectively different from one another--by virtue of factors such as gender or stage of development--may feel less pressure to differentiate, as direct comparisons with siblings are less frequent. Siblings who are more objectively similar, in contrast, may feel a greater need to distinguish themselves from their sibling (Schachter et al., 1976). Thus, differentiation may be more common and intense between siblings who are the same sex and close in age, as youths strive to establish unique niches within their families (Schachter et al., 1976).

Implications of Differentiation for Sibling Relationship Dynamics

Having explored the course of sibling differentiation over time, my second research aim was to examine linkages between sibling differentiation and sibling relationship quality. According to the Theory of Individual Psychology, high levels of similarity between siblings are likely to cause feelings of inferiority, leading to competition, resentment, and rivalry. Principles of homophily, on the other hand, suggest that the more siblings are able to bond over shared interests, the closer they are likely to be. To examine this issue, my second research aim was to examine linkages between sibling differentiation and two aspects of sibling relationship quality: intimacy and conflict.

Although deidentification theories suggest that sibling similarity can lead to conflict, the principles of homophily posit the reverse: that increased similarity is beneficial for relationships. Homophily operates on two complementary principles: that similarity breeds connection and that ties between dissimilar individuals are more likely to dissolve (McPherson et al., 2001). Homophily has been found to operate in a wide variety of social networks and relationship types (e.g. romantic, friendship, professional) (McPherson et al., 2001). Typically studied in the context of populations, large social networks, and peer groups, principles of homophily have only been applied to family dynamics in the context of spousal/mate selection (homogamy) (McPherson et al., 2001). Given the peer-like elements of sibling relationships, however, it is not far-fetched to speculate that similar dynamics may be found in among siblings.

Research distinguishes between two types of homophily: status homophily and value homophily. Status homophily occurs when individuals' affiliation is based on one

or more status markers. These status markers can be ascribed--such as race, ethnicity, birth cohort, and gender--or attained over time--like religion, education, occupation, age, and behaviors (Lazarsfeld & Merton, 1954). One principle of homophily is that the more traits are shared by two individuals, the more likely it is that they will form a positive affiliation. The majority of status markers are genetically determined (McPherson et al., 2001), making it likely that biological siblings will share at least some of these traits—and making siblings likely to form and maintain positive relationship dynamics.

Applied to sibling differentiation and relationship quality, the principles of homophily suggest that, as siblings have fewer shared interests, their relationship quality is likely to decline, with siblings exhibiting lower levels of sibling intimacy. Should siblings develop more common interests over time, their relationship quality would be predicted to grow more positive: by providing common ground over which siblings can bond, having more shared activity interests would be expected to increase sibling intimacy. Although homophily principles focus on affiliation rather than conflict, siblings who have more in common may find that they have fewer disagreements and reasons for conflict.

Sibling Intimacy

As the emphasis in sibling differentiation research has focused primarily on its antecedents, little empirical work has examined the impact of differentiation on sibling relationship characteristics. For my second research aim, I examined the ways in which sibling differentiation may be linked to sibling relationship quality—namely, sibling intimacy and conflict. Siblings are often close, developing a common history through their years of shared family experiences and environments (Stocker, Burwell, & Briggs,

2002). Sibling intimacy refers to the degree to which siblings are close to, loved by, and supported in their relationship with one another. Sibling intimacy often takes the form of protective behaviors, shared time, physical affection, and positive thoughts and feelings toward one another (Bank & Kahn, 1975; Brody, 1998; Buhrmester & Furman, 1990). Siblings are often close in age, and may be able to interact with and understand each other in cohort-specific ways as they mature and face developmental challenges and milestones in similar micro-environments and as members of the same age cohort in their families.

A range of evidence suggests that sibling intimacy is beneficial for youth—close ties with siblings have been linked to outcomes including peer competence, emotional understanding, and a reduced likelihood of depressive symptoms (Howe, Aquan-Assee, Bukowski, Lehoux, & Rinaldi, 2001; Kim et al., 2007; McCoy et al., 1994; Updegraff et al., 2002). Sibling relationships characterized by healthful and mutual intimacy also have positive implications for subsequent relationships, which benefit from individuals' enhanced social skills and capacity for intimacy (Lockwood et al., 2001). Sibling relationships characterized by intimacy also are linked to positive peer competence and romantic relationship outcomes—again, because such relationships may serve to enhance youths' social skills and capacity for intimacy (Doughty et al., 2015; Lockwood et al., 2001). In addition to fostering social skill development, intimate sibling relationships can also serve as a source of support, advice, and companionship, which appears to have protective effects: higher levels of sibling support have been related to lower levels of internalizing behaviors, even after controlling for other sources of support, such as parents or friends (Branje et al., 2004). Supportive sibling relationships have also been

found to be influential in the development of positive self-worth (Stocker, 1994).

The current study aims to elaborate on these findings by testing two competing hypotheses about the role that differences in activity interests may play in sibling intimacy over time. As noted, deidentification theory suggests that as siblings become more different from one another, sources of sibling rivalry and hostility should diminish, allowing for more positive relationship dynamics. Different interests may also lead to a decline in sibling shared time—making their limited time together seem more enjoyable due to relative infrequency. Homophily principles, however, focus on the importance of shared interests for promoting and maintaining positive relationships. From this perspective, when siblings share fewer common interests, their relationship quality will suffer.

Sibling Conflict

Siblings' frequent contact and companionship can produce relationships characterized as much by their hostility as by their intimacy (Dunn, 1983; Raffaelli, 1992; Stocker et al., 2002). Sibling hostility has been theorized to stem from jealousy, rivalry, and competition for family resources among other sources of provocation (Felson, 1983). High rates of teasing, arguments, and physical aggression between siblings are common and considered normative in Western society (e.g., Dunn, 1983; Kahn & Monks, 1997; Kramer, 2010; Shantz & Hobart, 1989). As well as being more frequent, conflict between siblings has also been found to be more volatile than conflict between other family members (Straus, Gelles, & Steinmetz, 1980). Sibling conflict appears to play a role in youths' socio-emotional development. The emotional intensity and physiological arousal that accompanies conflict between brothers and sisters, coupled

with siblings' sensitivity to one another's behaviors and emotions, are thought to make sibling conflict a prime opportunity for learning about relationship dynamics (Bedford, Volling, & Avioli, 2000). The importance of sibling conflict as a tool for social development has been demonstrated by a growing body of work exploring the ways in which sibling conflict is linked with social development—both negatively and positively (explored below).

Although most research on sibling conflict has focused on its associations with negative individual and interpersonal outcomes, some work suggests that engaging in conflict with siblings may actually have positive implications including enhanced social and communication skills (Bedford et al., 2000). Navigating conflict successfully involves negotiation, compromise, perspective taking, turn-taking, and self-expression, all of which are necessary skills for social interaction (Howe, 1991; Shantz & Hobart, 1989). Although the value of conflict for social skill development is intriguing, it is important to remember that much of the work on the potential benefits of sibling conflict has been conducted on young children. Though it is possible that repeated experience with sibling conflict and conflict resolution may hone youths' social competencies, the majority of work in this area demonstrates the negative impact of sibling conflict.

Sibling hostility and conflict, as well as being aversive while occurring, also can have negative implications for adjustment and development. Sibling relationships characterized by high levels of conflict have been linked to heightened levels of depressive symptoms, lower self-esteem, poor peer relationships, and more externalizing behaviors (Bank et al., 1996; Branje et al., 2004; Bullock & Dishion, 2002; Hansen et al., 1992; Kim et al., 2007; Stocker et al., 2002). Sibling conflict that is particularly frequent

and pervasive also puts children at risk for experiencing and developing coercive styles of interaction, establishing escalating negativity and/or negative reinforcement as a template for social interactions (Patterson, 1982). High levels of sibling conflict have also been found to predict negative social outcomes such as aggression, delinquency, poor peer relationships, psychopathology, and arrests (Bank et al., 1996; Bullock & Dishion, 2002; Patterson, Dishion, & Bank, 1984; Rinaldi & Howe, 1998; Stocker et al., 2002). The negative implications of sibling conflict, coupled with its frequency and aversive nature, have made sibling conflict a source of concern for families and professionals alike. Indeed, parents have named sibling conflict as their greatest parenting concern, the most frequent source of parent-child conflict in the family, and a source of parental stress (Perlman & Ross, 1997).

Although frequent in childhood, sibling conflict has been found to decline from middle childhood to late adolescence (Kim et al., 2006). This is congruent with deidentification theory, which postulates that as siblings select their own niches in the family, sibling comparisons and rivalry should decline—resulting in fewer sources of conflict. It may also be the case that as siblings become more different, they spend less time together. Siblings would thus have fewer opportunities to irritate or be irritated by each other, which could further reduce sibling conflict. Homophily perspectives focus primarily on affiliation rather than conflict, providing little explicit direction for predictions about how differentiation and conflict may be linked. An expansion of homophily principles, however, leads to the expectation that as siblings grow more different, they will have less common ground over which to connect, lessening intimacy and possibly creating sources of conflict (McPherson et al., 2001). This prediction

remains tentative, given the focus of homophily on positive relationship dimensions and the dearth of prior empirical findings of connections between homophily and conflict. In the case of sibling relationships, this is of particular importance given that intimacy and conflict tend to be uncorrelated, and thus that the absence of one does not imply the presence of the other.

Implications of Differentiation for Self-worth

In addition to impacting sibling relationship dynamics, sibling differentiation may also have the capacity to impact individual development. SCT demonstrates that comparison to others has an influence on self-concept, which suggests that sibling comparison may also impact individual's adjustment. To better understand this potential linkage, my third research aim was to examine connections between sibling differentiation and youths' self-worth. This aim was informed by work on deidentification processes as well as the self-affirmation literature. Discussed above, deidentification suggests that as siblings become more distinct from one another, they enhance their sense of identity, leading to increased self-worth. The self-affirmation literature, however, suggests that youths' self-worth would benefit instead from having common interests with a sibling, as sharing activity interests should affirm youths' developing sense of self. These hypotheses are discussed below, as is the overall importance of self-worth to youths' development.

Self-worth refers to the degree to which one feels worthy and valued as an individual. It is a fundamental aspect of self-image and self-esteem, and has been used as an indicator of overall positive adjustment and psychological well-being (Harter, 1990; Pelham & Swann, 1989; Smedema, Catalano, & Ebener, 2010). Self-worth thrives in

warm, nurturing, supportive environments, with the family environment described as a particularly important context for the development of self-worth (McGuire et al., 1999). Previous work in this area has highlighted the importance of analyzing the development of self-worth from a family systems perspective, which takes into account influences of multiple family members, subsystems, and bidirectional effects (Bulanda & Majumdar, 2009). The importance of parental involvement and support to adolescent self-esteem (Heinonen et al., 2003) and psychological well-being (Parker & Benson, 2004) has been documented, lending credence to the notion that warm family relationships play a crucial role in the development of self-worth. Supportive sibling relationships, specifically, have been found to be influential in the development of positive self-worth (Stocker, 1994). The importance of sibling relationship quality in the development of self-worth lends support to theories suggesting that comparisons with one's sibling may also have implications for the development of self-worth in adolescence.

Importantly, sibling comparisons carry implications for individual well-being, but the consequences depend on the direction and valence of the comparison. Downward comparisons, or those evaluations made with those who are perceived as less well off (e.g., a sibling who performs poorly) have been linked with a better self-concept, higher well-being, and improved adjustment. In contrast, upward comparisons, or evaluations made with those who are perceived as better off (e.g., a sibling who excels) have been associated with a diminished self-concept and poorer well-being and adjustment (e.g., Mendes, Blascovich, Major, & Seery, 2011; Wheeler & Miyake, 1992). The hypothesized effects of downward and upward evaluations, however, are only evident when the domain of comparison is deemed important to the individual. For example, if a

sibling is uninterested in sports, self-comparison of athletic ability to a brother or sister who is a star athlete may have fewer consequences, even if the differences in athletic ability are significant and rewarded. Some evidence has even been found for “basking”—finding personal satisfaction in the success and accomplishments of someone who is similar or close to you—provided that their success is not perceived as a threat to one’s own sense of accomplishment and worth. Yet, if athletic ability is an important domain to the individual, the same differences in skill would likely have greater implications for offspring outcomes.

Deidentification

Social comparison between siblings may be particularly powerful, as research suggests that evaluations will be more salient when the individuals are more objectively similar, as there will be fewer reasons to account for any observed or perceived differences (Tesser et al., 1988; Wills, 1991; Wood, 1989). When based on a valued domain, sibling comparisons appear to be highly salient, difficult to dismiss, and influential to self-understanding. When applied to deidentification theory, this suggests that siblings may be mutually motivated to cultivate differentiated niches wherein they can both succeed in a valued area. As niches become further developed over time, they can serve as a source of positive identity and self-worth. In sum, a deidentification perspective suggests that increasing the differences between the self and a sibling is an essential part of creating a unique niche in the family—and establishing an identity. As identity development is a critical task of adolescence (Erikson, 1968), progress in this area would be expected to contribute to positive adjustment and heightened self-worth.

Affirmation

In contrast, self-affirmation theory, which emphasizes the importance of external validation for maintaining positive self-concept (Steele et al., 1993), suggests that sibling similarity, rather than differentiation, may be a source of affirmation that leads to positive self-worth. Self-affirmation theory points to the importance of familial approval and support in the development of self-worth (Harter, Waters, & Whitesell, 1998; Steele, 1988). Particularly given the importance of activity interests to youths' developing sense of identity, the approval (or dismissal) of a valued interest by a close family member could be perceived as affirmation (or rejection). Having a sibling with similar interests is then tantamount to affirmation of individuals' own valued interests and emerging identity. From a self-affirmation perspective then, the validation inherent in sharing activity interests with a sibling would be expected to enhance adolescents' self-worth, whereas having little in common with a sibling could be felt as a rejection of youths' developing values and identity as well as a lack of familial support, damaging adolescents' sense of self-worth. Those who have little in common with their sibling would be expected to react to this lack of validation with lower levels of self-worth.

Activity Interests as a Context for Differentiation

In moving the study of sibling differentiation from the abstract and into real-world experiences, it is helpful to examine siblings' differentiation in a specific domain, rather than as a somewhat nebulous whole. Youths' activity interests may be a valuable focus for research on sibling differentiation, due to their prominence in the lives of youths as well as their salience to development. Activity interests have long been noted for their developmental significance. The ability to sustain interest in and complete chosen

activities is central to Erikson's stage of Industry vs. Inferiority, as youths are thought to be particularly focused on skill development during this stage (Erikson, 1968). Although the stage of Industry vs Inferiority is described as occurring from middle childhood until the onset of adolescence, activity interests continue to play an important role in youths' development and adjustment well into adolescence, however, as discussed below.

Adolescents typically feel they have a degree of freedom in determining a great deal of how their time and energy is invested (Kleiber, Larson, & Csikszentmihalyi, 2014). A key factor in making decisions about time use and personal investment lies in adolescents' opinions about the relative merits of their options. Motivation theories suggest that the strongest predictors of activity participation are adolescents' beliefs about their abilities and interest in an activity (Eccles, 1993; Ryan & Deci, 2000; Simpkins et al., 2006a; Simpkins, Fredricks, Davis-Keane, & Eccles, 2006). These theories have been supported by research demonstrating that one of the main reasons adolescents enroll in organized activities is due to their interest in the topic—a factor that also influences their continued participation (e.g., Loder & Hirsch, 2003; Luthar, Shoum, & Brown, 2006; Mahoney, Harris, & Eccles, 2006). By understanding adolescents' activity interests, insight is gained into their developing senses of self—including the extent to which the self is distinct from that of a sibling.

Knowing about adolescents' activity interests is also meaningful because of the impact of activity engagement on development. For example, free time activities have been found to impact psychological and behavioral adjustment in both middle childhood and adolescence (Barber et al., 2001; Carnegie Council on Adolescent Development, 1992; Darling, 2005; Fredericks & Eccles, 2006; Mahoney, Cairns, & Farmer, 2003;

Osgood, Wilson, O'Malley, Bachman, & Johnston, 1996). Participation in extra-curricular activities serves as an opportunity for youths to acquire information, connect with peers, and learn new skills—including ones they may need later in life. Indeed, youths' free-time activities are associated with individual differences in abilities, behaviors, and characteristics that develop across childhood and adolescence, and may have implications across the lifespan (e.g., Huston, 1985; Maccoby, 1998; Ruble, Martin, & Berenbaum, 1998). Involvement in extracurricular activities has been found to promote youth development in a number of areas, including school adjustment, initiative, and emotion regulation (Holland & Andre, 1987; Larson et al., 2006). The belief that participation in extra-curricular activities enhances youths' chances of later success in life has proliferated in modern U.S. culture, as parents encourage youths' extracurricular interests—a process known as concerted cultivation (Lareau, 2011).

Middle childhood and adolescence are times of increased exposure to a wide variety of activity interests, and the proliferation of free-time activities for children in contemporary U.S. society allows youths to develop a range of abilities and interests (Fredericks & Eccles, 2006). School-aged youths in the United States and other Western nations average 40%–50% of their waking hours in discretionary activities outside of school (Larson & Verma, 1999). Youths are often involved in several different out-of-school activities during the course of a week or even a single day, with approximately 70% of adolescents involved in more than one activity during a given time frame (Capizzano et al., 2000; Larson et al., 2006; Mahoney et al., 2005; Vandell & Posner, 1999). The abundance of available activities, coupled with youths' increasing autonomy, allow youths to pursue their interests and activities during these developmental periods.

This may be especially true for adolescents, who—when faced with an abundance of activity options--increasingly find that their time is a limited resource (Erikson, 1963; Youniss & Yates, 1997). First, in comparison to childhood, adolescents have new demands on their time, such as formal employment, which lessen the time they have to spend pursuing their interests (e.g., Borden, Perkins, Vallaruel, & Stone, 2005; Halpern, Barker, & Mollard, 2000). Second, adolescents may also need to spend a substantial amount of time on homework or contributing to the family through chores (e.g., Borden et al., 2005; Halpern et al., 2000). Additionally, the standards for activity involvement increase from childhood to adolescence (e.g., McNeal, 1998), such that greater time commitments are required to stay competitive in a chosen activity. Adolescents' limited time for activity engagement may require that they make decisions about which activities to prioritize. For example, an adolescent who finds that student council conflicts with soccer practice must decide which activity is more enjoyable and meaningful for him or her. In this way, the choices that youths make in terms of developing their interests are thought to reflect aspects of their identity—revealing meaningful information about their preferences, skills, priorities, and beliefs (Barber et al., 2001).

Not only do youths' activity interests have the potential to *reflect* identity—activity interests are also thought to play an influential role in *shaping* youths' ongoing identity development (Bronfenbrenner, 1979; Kleiber, 1999; Larson & Verma, 1999). Everyday activities are important in middle childhood when the development of skills—such as in reading, writing, arithmetic, recreation and relationships-- and a sense of “industry” (versus inferiority) is a key developmental task (Erikson, 1968). The next developmental task, according to Erikson, is for adolescents to form a sense of their own

identity (1968). During this stage, adolescents take the opportunity to explore possible adult roles. This process often involves engaging in activities and behaviors associated with a number of different “possible selves” that appeal to the adolescent. Over the course of these experiences, adolescents can gain valuable information about the kind of adult they hope to become. Longitudinal research conducted by Barber and colleagues (Barber et al., 2001, 2005; Eccles et al., 2003) demonstrates the importance of activity choices in this process, as adolescent identity is often associated with types of activities in which youths participate. The ideal outcome of this identity exploration is “a reintegrated sense of self, of what one wants to do or be, and of one’s appropriate sex role” (Bee, 1992).

According to deidentification theory, not only are adolescents’ forays into various identities informed by *their own* skills, beliefs, and preferences, but also by *their siblings’* choices. In order to ensure that their emerging identity sufficiently distinguishes them from their sibling, youths may forge their own identities, at least in part, by making efforts to cultivate interests that set them apart from their siblings and allow them to occupy their own ‘niche’ in the family (Whiteman et al., 2009). Although the aforementioned characteristics make youths’ activity interests a theoretically ideal context for sibling differentiation, this has not yet been tested empirically—allowing the present study to expand on existing work in sibling differentiation.

Present Study

To advance understanding of the role of sibling differentiation in sibling relationship quality and youths’ self-worth, the current study addressed three aims. First, the developmental trajectory of differences between siblings’ activity interests from

middle childhood through late adolescence was modeled. Sibling differentiation has been described as a process of siblings' accumulating behaviors, traits, and characteristics that make them more different from one another over time (McHale et al., 2001). Based on existing work from deidentification theory and behavioral-genetics, I predicted that there would be an overall increase over time in the differences between siblings' activity interests. Less certain was how gender constellation might moderate the trajectory of sibling differentiation. One prediction was that siblings in mixed-sex sibling dyads would develop greater differences as compared to those in same-sex sibling dyads, as their genders provide both a clear cut difference from one another and may present an array of differing socialization experiences, for instance, due to evocative g-e correlations. A competing prediction from deidentification theory holds that siblings from same-sex dyads experience a greater compulsion to distinguish themselves from one another, as there are fewer objective factors that set them apart from their siblings. In this case, larger differences in same sex compared to mixed sex dyads' activity interests would be expected over time.

Having examined the trajectory of sibling differences in activity interests, a multi-level modeling (MLM) approach was then used to examine the longitudinal associations between differences in siblings' activity interests and their reports of intimacy and conflict. This approach allowed for comparisons to be made both between individuals ("Do siblings from dyads that exhibit greater differences in their interests also report more positive relationship qualities?") and within individuals over time ("At times when youth are more different from their siblings than usual, do they also report more positive relationship qualities than usual?"). Theory and research suggest competing hypotheses

about these associations. As noted, the prediction from deidentification theory (Adler, in Ansbacher & Ansbacher, 1956; Schachter et al., 1976) is that siblings who are more different from one another will report less conflict and higher intimacy. From homophily principles (McPherson et al., 2001), however, come the prediction that positive relationship dynamics (high intimacy and low conflict) will be more likely to occur when siblings exhibit greater similarity in their interests. To assess the extent to which linkages varied by dyad gender constellation and/or youths' birth order, these terms were included as potential moderators.

A final set of analyses examined the linkage between sibling differences in activity interests and youths' self-worth. As with the previous research goal, multi-level modeling (MLM) was used to explore both between-individual variation ("Do youths from sibling dyads with higher average differences in their activity interests also report higher self-worth *on average*?") and within-individual variation ("At times when youth exhibit greater than usual differences from their siblings, do they also report higher than usual levels of self-worth?"). Deidentification theory and affirmation theory suggest competing hypotheses about these associations. As noted, deidentification theory suggests that increasing differences between the self and the sibling is an essential part of creating a unique identity and niche in the family. As identity development is thought to be a critical task of adolescence (Erikson, 1968), this process should contribute to positive adjustment and heightened self-worth. In contrast, self-affirmation theory, which emphasizes the importance of external validation in maintaining positive self-concept (Steele et al., 1993), suggests that sibling *similarity*, rather than differentiation, should be a source of affirmation that leads to positive self-worth. From a self-affirmation

perspective, then, youths who are more similar to their sibling should experience validation of their interests, thereby enhancing their self-worth. Those who have little in common with their sibling, in contrast, fail to experience this affirmation—with possible negative implications for their self-worth. Dyad gender constellation was included as a potential moderator, due to its relevance to overall sibling similarity and sibling relationship dynamics. Parent-child warmth, sibling relationship quality (intimacy and conflict), and youths' gender were also included as controls, due to their potential influence on youths' self-worth.

Chapter 3

Method

The data were drawn from a sample of 203 families (including mother, father, and first- and second-born children) that participated in a longitudinal study exploring family relationships and youth development. Data collection began in 1995-1996, when participating siblings were in middle childhood, and follow-up data collection occurred on up to 10 occasions across 10 years. The final wave of data collection occurred in the year following the firstborn siblings' completion of high school. The data for the current study were drawn from the 1st, 2nd, 3rd, 6th, 7th, 8th, 9th, and 10th years of data collection, when the measures of interest were collected (referred to hereafter as Time 1 through Time 8).

Participants

Participating families were recruited from rural areas, towns, and small cities in a northeastern state. Recruitment letters were sent home to all families with 4th and 5th graders from schools within 16 school districts. These letters described the study and criteria for participation, and interested families were asked to return a self-addressed postcard. Families were eligible for participation if parents were married and employed, the firstborn sibling was in 4th or 5th grade, and the second-born sibling was 1-4 years younger in age. It is unknown how many eligible families failed to return a postcard, but over 90% of families that returned postcards met the participation criterion and eventually participated. Attrition in the sample was notably low, and due to study design and the variation in siblings' ages, not all families completed the study at the same time. However, at Time 6 (the final year in which all families were scheduled to participate),

95% of the sample was still participating. Two families that only participated at Time 1 were removed from the sample.

Although the sample is not representative of all U.S. families, it is representative of the ethnic/racial background of families from the region where data were collected (McHale, Updegraff, Helms-Erikson, & Crouter, 2001; U.S. Census Bureau, 2000). The sample included almost exclusively European American families (97% European American; 3% Asian American or Latino) living in small cities, towns, and rural communities. Moreover, reflecting the educational (> 80% of adults completed high school) and financial (median income = \$55,714 for married-couple families) backgrounds of the region (U.S. Census Bureau, 2000), at Time 1, average education level was 14.57 years ($SD = 2.15$; range = 12-20) for mothers and 14.67 years ($SD = 2.43$; range = 10-20) for fathers (where a score of 12 signified a high school graduate and a score of 16 signified the completion of a bachelor's degree), and the median family income was \$55,000 ($SD = 28,613$; range = 21,000-207,000). The wide ranges of parental education and family income levels, however, indicated that the sample was diverse in socioeconomic status and primarily included working- and middle-class families. Given the relatively small size of the sample, homogeneity of family structure reduced confounds and preserved statistical power (Hansen & Collins, 1994).

Sibling dyads were divided almost equally among the four possible gender constellations, with 50 sibling pairs consisting of two sisters, 53 pairs consisting of an older sister and younger brother, 50 pairs with an older brother and younger sister, and 48 pairs of two brothers. On average, firstborns were 10.87 ($SD = 0.54$; range = 9.45 - 12.59) and second-borns were 8.26 ($SD = 0.93$; range = 6.05 - 10.30) years old at Time 1.

The average age spacing between siblings was 2.47 years ($SD = .93$). Because of the age difference between siblings and multiple waves of data collection, between 32 and 270 youths provided data at each chronological age from 7 (i.e., ages 6.5–7.5) to 20 (i.e., ages 19.5–20.5) years (Table 1).

Procedure

Data were collected from mothers, fathers, and the two siblings via two methods: annual home interviews and nightly phone interviews. First, trained interviewers visited families to conduct home interviews, during which parents reported on family background characteristics, including sibling dyad gender constellation as well as their relationships with the target children, and youth reported on their personal qualities, including activity interests and self-worth, as well as their sibling relationship experiences (conflict and intimacy). All families gave informed consent and received an honorarium at the beginning of the home interviews, and family members were interviewed independently. Interviews consisted of a variety of standardized questionnaires—read aloud to children—as well as card sort tasks.

Second, at Times 1, 2, 3, 4, and 5, families were contacted in the 2 to 3 weeks following the home interviews to conduct seven (5 weekdays, 2 weekend days) nightly phone interviews. In each of these calls, trained interviewers guided each sibling through a list of approximately 80-90 activities ranging from hobbies, athletic activities, entertainment, and outdoor activities, and probed for the duration and social contexts (i.e., with whom the siblings engaged in the activities) of any activities completed outside of regular school hours.

Measures

Activity Interests. At each time point, youths were asked to complete a card sort task to indicate their level of interest in each of 25 activities (e.g., sports, music, handicrafts) on a four-point Likert scale (1 = *not very interested*; 4 = *very interested*). Activities were based on descriptions of children's time use (Medrich, Roizen, Rubin, & Buckley, 1982; Newson & Newson, 1976) as well as pilot work with youths from the same communities as the participating families (see Appendix B for activity measure). Activity interest was defined broadly and encompassed "liking to do an activity, read about an activity, or watch others engaging in the activity" (i.e., it was possible for youths to report interest in an activity in which they did not actively participate).

Sibling differentiation can be conceptualized and measured in a variety of ways. Because self-reports can suffer from self-concept biases and in order to avoid mono-method bias in assessing links between sibling differentiation and youth outcomes, differentiation was measured based on the two siblings' reports of their activity interests. The way in which sibling differences are assessed has methodological and conceptual implications, the nuances of which impact interpretation of research findings. Thus, in preliminary analyses, I explored four approaches to constructing the sibling differentiation measure, as described in Appendix C. Based on these preliminary analyses, the version of the differentiation variable chosen for use included all the activity interests that were collected at each time point.

Specifically, sibling differences in activity interests were calculated by taking the absolute value of the difference between the two siblings' ratings of each of the 25 activity interests rated at each occasion of measurement and summing those scores across

all interest items to create a single score. Scores indicated the extent to which siblings were different from one another in their activity interests, with higher scores indicating a greater degree of difference between siblings.

Sibling Relationship Characteristics. Sibling relationship quality was measured at each time point, using subscales that varied slightly depending on when the data were collected. *Sibling intimacy* was measured at Time 1 using the 8-item positivity subscale of the Sibling Relationship Inventory (Stocker & McHale, 1992), on which youths used a five-point Likert scale (1 = *hardly ever*; 5 = *always*) to rate items such as, “Some children share secrets with their brothers and sisters, and other children don't. How often do you share secrets with _____?” For the remaining time points, sibling intimacy was assessed using an 8-item measure developed by Blyth, Hill, and Thiel (1982) on which youths used a five-point Likert scale (1 = *not at all*; 5 = *very much*) to rate items such as, “How much do you share your inner feelings or secrets with your brother/sister?” At Time 2, when both measures were collected, scores were highly correlated ($r = .79$ for older siblings and $r = .77$ for younger siblings), demonstrating acceptable measurement equivalence.

Sibling conflict was measured using the 5-item hostility subscale of the Sibling Relationship Inventory (Stocker & McHale, 1992), on which youths used a five-point Likert scale (1 = *hardly ever*; 5 = *always*) to rate items such as, “Children sometimes hurt their brother or sister on purpose, like by pushing, punching, or hitting them. How often do you do these kinds of things to _____?”

Self-Worth. Youths reported on their self-worth using the global self-worth subscale of The Perceived Competence Scales for Children (PCSC) and (Harter, 1982;

1988). For Times 1, 2, and 3, the subscale consisted of six items; for each item youths chose from two statements (e.g. “Some kids like the kind of person they are BUT other kids wish that they were different.”). For Times 4, 5, 6, 7, and 8, phrasing was changed to reflect youths’ developmental stage (e.g. “Some teenagers like the kind of person they are...”), and one fewer item was included. At all Times, youths were asked to select which statement better described them, and then rate whether that statement was “really true” or “sort of true” about them. Each item was scored from 1 to 4 and summed across the measure, with higher scores reflecting higher perceived self-worth.

Moderator and Control Variables. To isolate the effects of siblings’ shared interest in an activity from potential effects of joint participation in activities or overall time spent together, *youths’ shared time with their sibling* was included as a control. This was measured via data collected in phone interviews at Time 1 and calculated by summing the minutes youths reported spending with their sibling across all activities and across the seven calls. Siblings’ independent reports were highly correlated ($r = .70 - .99$) and so were averaged across siblings and across time to create a single score for each dyad. *Sibling dyad gender constellation* and *birth order* were included as potential moderators, given their importance in social comparison processes as well as sibling relationship qualities. Youths’ gender was also included as a control for Aim 3, to account for gender differences in the development of self-worth.

Parent-adolescent warmth was also included as a control variable to account for the established positive impact of warm parent-child relationships on youths’ sibling relationship quality and individual adjustment—allowing for a clearer understanding of the impact of sibling differentiation on these outcomes (Conger et al., 2000; Seiffge-

Krenke, 2003). This construct was measured at each time point, using either a measure of parent-child responsiveness or parent-child acceptance, depending on which was collected at a given time point. For the first time point, parents rated the degree to which they were responsive to their child's needs, using a five-item subscale adapted from the Parenting Style Inventory (Darling, 1993). Mothers and fathers rated such items as "I praise my child for doing well" on a four-point Likert scale (1 = *strongly disagree*; 4 = *strongly agree*). For the remaining six time points, parent-child relationship quality was measured using the 24-item scale from the parents' version of the Child's Report of Parental Behavior Inventory (CRPBI) (Schludermann & Schludermann, 1970; Schwarz, Barton-Henry, & Pruzinsky, 1985). Mothers and fathers rated such items as "I am a person who likes to talk with my child and be with him/her much of the time" on a five-point Likert scale (1 = *not at all*; 5 = *very much*). As they were correlated ($r = .20 - .30$) and to reduce the number of variables in the analyses, maternal and paternal ratings were combined to create a mean parent-child warmth score for each phase. To control for the established role of sibling relationship quality in youths' adjustment, sibling intimacy and sibling conflict (measures described above) were included in models predicting self-worth (Aim 3).

Chapter 4

Results

This chapter begins with an overview of the analytic plan and, after presentation of descriptive data, is organized according to the study aims: (1) to chart the trajectory of sibling differentiation from middle childhood through adolescence, test for possible moderation by gender constellation, (2) to assess linkages between sibling differentiation and sibling relationship quality--specifically intimacy and conflict--testing for moderation by gender constellation and birth order, and (3) to assess linkages between sibling differentiation and youth self-worth, testing for moderation by gender constellation.

Analytic Plan

Given the clustered (i.e., youths from the same family were assessed at multiple time points) and unbalanced (i.e., variable measurement spacing) nature of the data, a multilevel modeling (MLM) approach was chosen as the analytic strategy (Raudenbush & Bryk, 2002; Singer & Willet, 2003). This approach extends multiple regression to account for dependencies in the data. Another advantage of MLM is that it allows for the use of unbalanced data, meaning that it is not necessary for every individual to be assessed at the same points in time. This feature of MLM allows for the use of age as the index of time, despite differences in youths' ages at each time of measurement.

The data used for the analyses encompassed variance at three levels. At Level 1, the *within-person* effect represented the extent to which individuals' scores differed from their own cross-time mean. Variables at this level include individuals' reports of sibling intimacy, conflict, and self-worth, as well as variables that differ between siblings—such as birth order. Although individual ratings of activity interests were collected at Level 1,

these scores were then used to create a dyad-level difference score. As both members of a sibling dyad have the same sibling difference score, no variance exists for the sibling differentiation variable at the within-person level. Thus, sibling differentiation was analyzed at the second level of analysis and will be referred to as a *within-family/dyad* effect. At Level 2, the *within-family* effect represented the extent to which sibling dyads' scores differ from their cross-time mean). At Level 3, the *between-family* effect will represent the extent to which sibling dyads' mean score varied from the overall sample mean. The three level structure of the data was used to examine the extent to which within- and between-family factors (Level 2 and Level 3 predictors) predicted the within-person (Level 1) scores of perceived sibling relationship quality and self-worth. For all analyses, variation in the independent variable (sibling differentiation) is found at Levels 2 and 3 (within- and between-family, respectively), and variation for the dependent variables (sibling intimacy, sibling conflict, and self-worth) is found at Level 1 (within-person).

Aim 1. The first research aim was to chart the trajectory of sibling differentiation across middle childhood and into adolescence. For Aim 1 growth curve analyses, it was determined that using one siblings' age as the metric of time (rather than the dyadic average) would aid interpretability of the dependent variable—sibling differentiation. I selected firstborns' age (rather than second-borns') as the metric of time because there was greater homogeneity in age among firstborns than for second-borns. Linear, quadratic, and cubic age terms were included in growth curve models to estimate patterns of change over time. Sibling dyad gender constellation (0 = mixed-sex; 1 = same-sex) was entered at Level 3 and tested as a moderator of these effects.

Aims 2 and 3. To address Aims 2 and 3, a series of three-level models (Level 1 = within-person; Level 2 = within-family; Level 3 = between-family) were estimated using the MIXED procedure in SAS version 9.2. In a preliminary step, growth curves of the dependent variables, intimacy, conflict and self-worth, were first estimated. Given that these variables were measured in each sibling, for these models, youths' age (rather than firstborns' age) was used as the metric of time for these analyses. Aims 2 and 3 were to test the links between sibling differentiation and youths' reports of sibling relationship qualities (intimacy and conflict—Aim 2) and self-worth (Aim 3), including both between- and within-family effects. To do this, sibling differentiation was indicated by two variables: at Level 2, sibling differentiation was indicated by a time-varying, group-mean centered (i.e., centered at each family's cross-time average) variable; at Level 3, sibling differentiation was indicated by the grand-mean centered (i.e., centered at the sample mean), cross-time average. The Level 2 variable captured within-family variation, or how a sibling dyad deviated from its own cross-time average at each time point; the Level 3 variable captured between-family variation, or how the family's cross-time average differed from the overall sample average. In this way, the Level 3 sibling differentiation term controlled for stable family-level differences in sibling differentiation, leaving the Level 2 sibling differentiation term to represent the within-family sibling differentiation effect.

For Aim 2 analyses, a time-varying control for parent-child warmth was created by averaging scores for mother-child and father-child warmth from parents' reports at each time point. Parent-child warmth was centered at the sample mean and entered into models at Level 1 (specific to each sibling). Additionally, a control for siblings' shared

time was created by averaging first- and second-born siblings' reports of shared time at Time 1. Thus, it was entered into models at Level 3 (reflecting between-family differences). To account for gender constellation (0 = mixed-sex; 1 = same-sex; Level 3) and birth order (0 = first; 1 = second; Level 2) effects on the trajectory of sibling intimacy and conflict, interactions with linear and quadratic age were also tested in the models. When significant, interaction effects were further probed by running models separately by gender constellation/birth order to parse the interaction effect.

For Aim 3 analyses, a control for parent-child warmth was again entered into models at Level 1 (specific to each sibling), as described above. Sibling intimacy and conflict (time-varying individual reports, centered at the sample mean) were also included in the models at Level 1 to account for their influence on youths' self-worth. Additionally, youths' gender (0 = female; 1 = male) was entered into models at Level 2 to account for its influence on youths' self-worth. To account for potential moderation by gender constellation (Level 2, 0 = mixed-sex; 1 = same-sex), gender constellation by sibling differentiation variables were also tested.

Analyses were conducted in three stages, as detailed below.

Preliminary Analyses

Prior to the Aim 1 analyses, four versions of the sibling differentiation variable were created, each intended to reflect different conceptualizations of the construct. Version A included all activity interests from all time points, thereby maximizing data use. Version B included only those activities that were assessed at all eight time points, thereby minimizing concerns about developmental equivalence between activities reported on in childhood (play with toys) versus adolescence (work out). To minimize

possible over-estimation of sibling similarity due to a common *lack* of interest, Version C included only those activities that at least one member of the dyad reported an interest in. To distinguish between passive and active activity interests, Version D included only those activity interests in which at least one sibling reported participating during nightly phone interviews. Given the high correlations between Versions A-C and the data loss involved in calculating Version D, only one version was used in the final analysis—Version B. More information on the creation and analysis of sibling differentiation variables is provided in Appendix C.

Descriptive statistics for sibling differentiation, sibling relationship quality, and self-worth can be found in Tables 2-4. As seen in Table 2, sibling differentiation scores ranged from 7 to 54 (out of a possible range from 0 (minimum possible differentiation) to 100 (maximum possible differentiation)), demonstrating substantial variation in sibling differentiation between dyads. Across time, average sibling differentiation scores ranged from approximately 22 ($SD = 6.62$) to 25 ($SD = 6.19$), representing a moderate level of difference between siblings. Sibling relationships also demonstrated a range of emotional tone, with mean intimacy scores ranging from approximately 23 ($SD = 5.00$) to 27 ($SD = 6.76$) (out of a possible range of 8 – 40; Table 3), with an overall average of 24.93, and item averages at about the midpoint of the scale. Mean conflict scores ranged from 10 ($SD = 2.84$) – 14 ($SD = 4.33$) (out of a possible range from 5 – 25; Table 3), with an overall average of 12.39, representing low-to-moderate levels of conflict. Youths' self-worth was generally positive, ranging from 3.00 ($SD = 0.66$) to 3.40 ($SD = 0.52$) and averaging 3.21 overall (possible range was 1 – 4; Table 4).

Aim 1: Trajectory of Sibling Differentiation

To address Aim 1--charting the trajectory of sibling differentiation--a general change model was first estimated to illustrate the overall change in siblings' differential interests from middle childhood through adolescence. To aid interpretability, firstborns' age (centered at 15, the mean age for firstborns) was used as the metric of time, and polynomial age terms (e.g., linear, quadratic, cubic) were included to describe the developmental trajectory of sibling differences in interests. To identify the best error structure, a number of nested models that differed only in the random effect of interest were compared, using deviance tests to determine the statistical significance of the random effects (Raudenbush & Bryk, 2002). Because the difference between two nested models in their deviances (i.e., $-2 \log$ likelihood) was chi-squared distributed, it indicated whether adding a particular set of random variance components constituted a significantly better error structure. Non-nested models with different random variance components, however, were compared based on Information Criteria, including AIC and BIC. Additional analyses were conducted to determine whether gender constellation moderated the trajectory of sibling differences.

Results for Aim 1 revealed a significant quadratic (negative) effect, which was qualified by a significant cubic (positive) pattern of change in siblings' differences in activity interests (Table 5). Sibling differentiation increased from age 9 to age 13, stabilized and even declined from ages 13 to 18, and then increased once again after about age 18 (Figure 2). A significant linear by gender constellation effect also emerged, and simple slopes tests were used to probe the interaction. These showed that mixed-sex sibling pairs exhibited a significant linear increase over time in differentiation, but the

linear change for same-sex sibling pairs did not reach significance. Consistent with the study hypothesis, the significance of the positive cubic effect supports both deidentification and behavior genetics perspectives (Table 5). The gender constellation moderation effect, however, is consistent with a behavior genetics but not a deidentification perspective.

Aim 2: Differentiation and Sibling Relationship Quality

To address the second research aim, two three-level models were tested—one examining the links between differentiation in siblings' activity interests and individual reports of sibling intimacy and one using individual reports of sibling conflict as the dependent variable. Youths' age (averaged between siblings) was used as the metric of time. To control for youths' reports of sibling relationship quality over time at Level 1, the time-varying variable (intimacy or conflict) was centered at the individual's cross-time mean (to reflect within-person effect). To test for between- and within-family effects of sibling differentiation, models included both a Level 2 (dyad variation from its own cross-time mean) and Level 3 (dyad variation from the overall group mean) sibling differentiation term. This approach essentially treats each sibling dyad as its own control—capturing how dyads vary from their own average at each time point, as well as how dyads' cross-time averages differ from the overall sample average. Gender constellation (same vs. mixed gender) was examined as a potential moderator, entered at Level 3, and birth order (Level 2), time-varying parent reports of parent-child relationship quality with each child (Level 1), and Time 1 sibling shared time (Level 3) were included in the models as controls. For all analyses, non-significant interactions were removed

from the models, as retaining non-significant interactions has been found to increase standard errors (Aiken & West, 1991).

Preliminary growth curve analyses showed a significant quadratic growth in sibling intimacy, such that intimacy declined into middle adolescence and then increased through late adolescence. A significant quadratic decline in was found for sibling conflict over time, such that conflict declined after early adolescence. Consistent with previous work on this sample, evidence of interactions with dyad gender constellation and birth order were also found (see Kim et al., 2006 for details).

Results of analyses examining the links between sibling differentiation and sibling intimacy and conflict are shown in Table 6. Controlling for dyad characteristics, parent-child intimacy, and siblings' shared time, significant effects for sibling differentiation emerged at both the within- and between-family levels. The within-family effect indicated that at times when the sibling dyad exhibited higher levels of differentiation, siblings reported lower levels of intimacy. Similarly, the between-family effect showed that youths from families with higher levels of sibling differentiation reported lower levels of intimacy, on average. Gender constellation did not significantly moderate the link between differentiation and intimacy. Significant interactions between linear age and gender constellation, linear age and birth order, and quadratic age and birth order demonstrated that gender constellation and birth order impact the trajectory of sibling intimacy over time (see Kim et al., 2006 for a description of the development of sibling intimacy). A significant positive relation was also found between sibling shared time and sibling intimacy. That significant findings emerged for sibling differentiation even when controlling for the effects of sibling shared time and parent-child intimacy speaks to the

unique influence of sibling differentiation--beyond more general family and sibling dynamics.

Although the linear and quadratic effects of age remained significant for the model predicting sibling conflict, no significant links emerged between sibling differences and sibling conflict at the within- or between-family levels. Nor did gender constellation emerge as a significant moderator of sibling differentiation effects. In terms of controls, significant interactions emerged between linear age and birth order, and a trend-level effect was found between linear age and sibling dyad gender constellation in predicting sibling conflict (see Kim et al., 2006).

Aim 3: Differentiation and Self-worth

An approach similar to that used for Aim 2 analyses was used to address the third aim. A three-level model (Level 1 = within person over time, Level 2 = within family and within family over time, and Level 3 = between families) was tested to examine links between sibling differentiation at the within- and between-family levels (Levels 2 and 3) and time-varying self-worth as reported by individual siblings (Level 1). As in Aim 2, siblings' average age, centered at 14 (sample average) was used as the metric of time. The time-varying Level 1 variable (self-worth) was centered at the individual's cross-time mean. Again, dyad gender constellation (same vs. mixed gender) was included as a potential moderator at Level 3. Control variables included parent reports of parent-child intimacy (Level 1) as well as individual siblings' reports of sibling intimacy and conflict (Level 1), and youths' gender (Level 2). Non-significant interactions were removed from the models.

Preliminary growth curve analyses for Aim 3 revealed a significant cubic pattern of change, such that self-worth increased from middle childhood through early adolescence, declined in middle adolescence, and began to rise again in late adolescence. With respect to the links between differentiation and self worth, significant between-family effects indicated that youths from families in which siblings were more different reported lower levels of self-worth, on average. A significant interaction was found between within-family sibling differentiation and sibling gender constellation. For youths with a same-sex sibling, but not those from mixed-sex dyads, a significant negative relation emerged between within-family sibling differentiation and dyad gender constellation such that, at times when dyads exhibited greater-than-average differences in their activity interests, youths' reports of self-worth were lower than usual. Consistent with deidentification theory, this suggests that youths with a same-gender sibling may be particularly sensitive to changes in sibling differences over time. In terms of controls, all were linked to self-worth outcomes: parent-child intimacy, positively at trend-level, sibling intimacy and conflict (positively and negatively, respectively), and youths' gender (males higher).

Chapter 5

Discussion

The overall goal of this study was to shed light on an aspect of sibling relationship dynamics that remains relatively unexplored: sibling differentiation, including its development and linkages to relational and adjustment outcomes. Examining self-rated activity interests as a context of sibling differentiation, the current study aimed to: (1) chart the trajectory of sibling differentiation across time, assessing potential moderation by dyad gender constellation, (2) examine links between sibling differentiation and sibling relationship quality—specifically, intimacy and conflict—testing for potential moderation by gender constellation and birth order, and (3) assess links between sibling differentiation and youths' self-worth, testing for moderation by gender constellation. These aims were grounded in several perspectives, some of which suggested competing hypotheses. For Aim 1, both deidentification and behavioral-genetics perspectives led to the prediction that sibling differentiation would increase over time, while perspectives differed on the anticipated role of gender constellation. For the second aim, deidentification theory suggested that the more different siblings were, the less rivalry and conflict they would experience. In contrast, homophily principles focus on intimacy and suggested that the more similar siblings were, the more intimate their relationship would be—with more common ground to bond over and fewer differences to result in conflict. Similarly for Aim 3, whereas deidentification theory suggested that differentiation may benefit identity development and self-worth, self-affirmation theory predicted the opposite: that sibling *similarity* should be linked to higher self-worth.

Support was found for deidentification theory and behavioral-genetic principles in the form of a significant cubic increase in sibling differentiation over time, as well as a linear interaction with dyad gender constellation. With respect to the implications of differentiation, however, results primarily supported principles of homophily and self-affirmation theory, with sibling differentiation being linked to lower sibling intimacy and self-worth, respectively. Taken together, the findings provide novel insights about the nature and implications of sibling differentiation as well as emphasizing the importance of sibling relationship experiences to youths' well-being and development.

Sibling Differentiation: Empirical Assessment

By assessing sibling differentiation--a phenomenon that remains largely understudied—the current research provides a meaningful contribution to the literatures on siblings and on family and youth development. Much of the existing work on sibling differentiation has been theoretical in nature, with few empirical studies of whether or how such processes unfold. What empirical work has been done has examined adoptive or twin samples (Matheny et al., 1981; Scarr & Weinberg, 1978), utilized a qualitative approach (Whiteman & Christiansen, 2008), and focused on relational rather than identity-oriented differences between siblings (Feinberg et al., 2003). In its examination of sibling differentiation, the current research extended the literature by using a longitudinal approach, assessing the potential implications of sibling differentiation, and incorporating perspectives from a range of theoretical/conceptual perspectives, including some that had not yet been applied to sibling relationships.

A primary contribution of the current research was its examination of sibling differentiation utilizing a longitudinal, multi-informant design. Given the potential of

sibling differentiation to extend across development, it is important for future work to continue to examine its trajectory over extended periods of time. This study documented sibling differentiation and its correlates over about 10 years. Reports from sibling dyads from middle childhood through adolescence provided data to plot differentiation across time, allowing for a meaningful examination of what is thought to be a gradual process that extends across the lifespan. The findings for Aim 1 documented an overall cubic increase in differentiation over time--a pattern that may not have been evident had a shorter span of time been examined. As the quadratic and cubic effects are more complicated than the linear increases suggested by deidentification theory and behavioral genetics, this suggests the presence of additional moderating effects such as family dynamics and youths' adjustment—which should be explored in future research.

The ability to distinguish between levels of variance allowed for a greater degree of specificity in the conclusions, because tests at each level address different kinds of questions. Controlling for dyads' average levels of differentiation allowed each dyad to essentially act as its own control—permitting a focus on the implications of the dyads' deviations from their cross-time means. The within-family link between sibling dyad differentiation and youths' reports of intimacy demonstrate that—whether conscious of differentiation or not—youths' reports of sibling relationship dynamics were sensitive to fluctuations in differentiation over time. This sensitivity can also be seen in the finding that youths from same-sex sibling dyads reported higher than average levels of self-worth at times when the dyad was more similar. That youths from sibling dyads with lower levels of differentiation typically reported higher levels of intimacy and self-worth speaks to between-family differences and the potential impacts of family context variables that

deserve future study—such as familial values, family size, or other factors that promote sibling similarities. Further, by collecting data from multiple family members, the current research minimized the risk of mono-reporter bias: By assessing sibling differentiation by comparing both siblings' self-reports of activity interests the measurement approach avoided use of potentially biased individual perceptions of sibling differences.

Given the dearth of existing work on the impacts of sibling differentiation, the current research demonstrates the potential benefits of seeking insights from theoretical perspectives beyond those typically applied to sibling dynamics. Researchers have long emphasized the uniqueness of sibling relationships—perhaps at the expense of exploring the ways in which research on other close relationships might inform the sibling literature. This study drew on concepts from the peer literature--specifically homophily and self-affirmation, suggesting that a direction for further work lies in the integration of peer and sibling research. Siblings, as well as being family members, can also be thought of as children's first peer relationships. Work on social development in early childhood has described the ways in which sibling interactions serve as a training ground on which children can learn the skills they will need in future relationships with peers (Stocker & Dunn, 1990; Stocker et al., 2002). Indeed, the relevance of sibling relationship quality for siblings' interactions with peers has been demonstrated from early childhood through adolescence, and in both platonic and romantic peer contexts (Conger, Cui, Bryant, & Elder, 2000; Doughty et al., 2015). Further, sibling and peer relationship dynamics have been found to be congruent in nature (Updegraff et al., 2002). Given these parallels, the application of peer frameworks--such as homophily principles--to sibling relationship

research is a logical extension of existing work.

Just as the application of peer theory proved useful in explaining sibling dynamics, so too might sibling differentiation research benefit from the application of theory and research on another form of within-family differences—parental differential treatment (PDT). The conceptual parallels between PDT and sibling differentiation are fairly straightforward, as an underlying mechanism for their implications is social comparison. Although long recognized as a problematic family dynamic, a growing literature has provided a more nuanced understanding of PDT, the ramifications of which depend on a number of factors, notably siblings' perception of fairness. Given the centrality of sibling comparison to both PDT and deidentification, it may be productive to explore the degree to which the importance of 'perception' is significant for sibling differentiation. For example, the negative effects of PDT are reduced if parents' behaviors can be justified (Kowal & Kramer, 1997). A parallel in sibling activity interests may occur in situations wherein sibling comparisons occur, but discrepancies—such as in skills—are easily accounted for by differences in age, playing on different teams, or pursuing different sports. These kinds of differences may provide a logical explanation for occasions when youths are compared unfavorably to a sibling (upward comparisons)—for example, a child whose older sibling is a far faster swimmer can console him or herself by thinking that when (s)he is older (s)he will swim just as fast, or alternately, that even if his or her sibling is the faster swimmer, he or she is better at tennis.

By providing reasonable explanations for their shortcomings, differences in the specifics of siblings' activities may allow for similarity even in competitive contexts. As

elaborated below, parents and practitioners may be able to mitigate negative implications of sibling comparisons by helping youths reframe sibling differences—especially those that highlight shortcomings. This could be done by generating plausible explanations for sibling differences, re-assessing the importance of a given skill, or highlighting ways in which each sibling excels.

The Significance of Sibling Experiences

Whereas much of the existing work on the importance of siblings for development focuses on links between more overt sibling experiences and outcomes, the current research demonstrated the potential for more subtle sibling relationship experiences to exert influence as well. Research has long established the importance of siblings' treatment of one another for relationship quality and individual adjustment (Bank & Kahn, 1997; Brody, 2004; Dunn, 1997; Whiteman et al., 2011). Sibling influences, however, may also be far subtler and outside of conscious awareness. The current research focused not on overt, sibling-directed behaviors, but instead on the power of siblings to influence one another based on phenomena as ephemeral as their changing interests and identities. That sibling influence occurs on such a level aligns with expectations from a range of perspectives--from Adlerian theory and social psychological ideas about homophily and self-affirmation--but also from ecological and family systems perspectives, which highlight the pervasive and ongoing influence of family members on one another. At the most general level, by demonstrating the effects of sibling differentiation, the current research exemplifies the power of sibling influences.

The current research offers evidence of increases in sibling differentiation over time—although not simply linear--as well as demonstrating differentiation's linkages to

sibling relationship quality and individual adjustment. That no linkages were found between differentiation and conflict is also noteworthy—particularly given the centrality of sibling rivalry and conflict to deidentification theory. If, however—as the current findings suggest—homophily (rather than deidentification) best reflects the relational dynamics of sibling differentiation, this finding is not completely unexpected. Homophily principles focus on affiliation rather than discord—making no strong or explicit predictions about how differentiation should be linked to sibling conflict. Further, given the orthogonal nature of intimacy and conflict, it does not necessarily follow that in the case of greater sibling differences a reduction in intimacy is necessarily accompanied by an increase in conflict. In sum, the findings of the current research support homophily principles: similarity between siblings is linked to more positive sibling relationships. There remain important directions for research, however, to illuminate the role of deidentification in sibling relationships, as discussed below.

One seeming assumption within deidentification theory is that all sources of sibling similarity are equally likely to breed competition, rivalry, and dissent between siblings. Thus, sharing an activity interest should lead to conflict, regardless of the nature of the activity. This assumption, however, does not allow for the possibility that activities may differ in the extent to which they inspire competitive feelings, and that some activities may not lend themselves to rivalry. Thus, some interests, such as gardening, cooking, or watching TV, may be less prone to sibling rivalry as they do not involve competitive dynamics. In contrast, activities that focus on skills measured by scores, wins, and rankings may be more likely to inspire sibling rivalry than shared interests that involve a more collaborative or neutral focus. Another element of competition to consider

is the degree to which an activity encourages or requires participants to publically demonstrate their skills (or lack thereof). One such activity is sports, which frequently involves the demonstration and scoring of performance in front of others. Although siblings may already compare themselves to one another, the potential for additional judgements and comparisons from others may exacerbate siblings' feelings of competition and rivalry. This contrasts with activity interests such as reading or computer games, which may be undertaken in solitude.

Another seeming assumption of deidentification theory is that all domains of similarity or difference are equally salient to individuals' self-concepts. Work in the field of self-esteem maintenance, however, suggests that the value placed on the domain in which siblings are compared may be an important moderator. If siblings are similar in a highly valued domain, any comparisons made between them are likely to be highly salient, setting the stage for rivalry and/or deidentification. If, however, siblings are similar in a domain that neither sibling particularly values, the comparisons that result may have little impact on the individuals' self-perception, reducing the likelihood of rivalry. Taking into account the value of the activity to the individual allows siblings to maintain a degree of similarity in their activity interests without risking their relationship, so long as the shared interests are not particularly important to either sibling's sense of self.

Future work can be done to address the assumptions discussed above, exploring the extent to which sibling comparison dynamics vary within—as well as across—activity interest domains (explored further in Appendices B and C). Data on sibling interests could be collected with special attention being paid to the extent to which

activity interests are pursued competitively, examining potential moderation of rivalry and other outcomes by the nature of an activity. Work could also pursue the extent to which individual activity interests are valued or integrated into youths' sense of identity. This would allow for a better understanding of the ways in which deidentification, identity, and self-affirmation are linked.

Implications for Practice

In addition to informing the sibling differentiation literature, the current research also has the potential to inform sibling- and family-focused prevention/intervention efforts. Sibling research is frequently carried out with the implicit aim of improving sibling relationship quality--increasing sibling intimacy and reducing sibling conflict. Given the sizeable impact of sibling conflict on family systems and its prominence as a parental concern (Perlman & Ross, 1997), this focus is not unwarranted. On the topic of sibling differentiation, existing theoretical work on deidentification suggested that parents should encourage their children to pursue different interests. By ensuring that each child was able to carve out their own "niche" in which to excel free from sibling comparison, rivalry and conflict between siblings were thought to be reduced. The current research, however, found no linkages between differentiation and sibling conflict, and in contrast to deidentification theory, found a negative association between differentiation and sibling intimacy. Although further research on the links between differentiation and sibling relationship outcomes is needed, the ramifications of this finding for prevention/intervention work bear consideration.

That sibling conflict was unaffected by sibling differentiation presents an opportunity to see sibling interventions in a new light. If parents' or practitioners' aim is

to promote positive sibling relationship dynamics, the current findings suggest that attempting to promote sibling differences may be counter-productive. Instead, results indicate the potential merit in encouraging siblings to embrace common interests—a tactic that runs counter to deidentification-based approaches. Alternately, it may be that—as with PDT—altering siblings’ *perceptions* of differentiation, rather than the extent of differentiation itself, may be an effective avenue for change. For example, rather than pushing siblings to pursue different after-school activities, parents could instead focus their energy on influencing the way in which similarities between siblings’ activity interests are perceived. Parents could encourage siblings to bask in one another’s accomplishments rather than being resentful, or to differentiate in competitive domains while retaining common non-competitive interests. The centrality of parent-child interactions in these processes indicates that parents’ treatment of sibling similarities and differences is a topic worthy of further inquiry—particularly given the importance of PDT to sibling outcomes. More work must be done in this area before true recommendations can be given, however, particularly given the limitations of this study, discussed below.

Limitations and Future Directions

As noted, this study is not without limitations. Although the sample reflected a number of population characteristics of married-couple families in the geographic area in which the data were collected (US Census Bureau, 2000), it was ethnically homogenous and not representative of the diversity of youths in the United States. Given the established cultural differences in family socialization, social norms, and other characteristics (Chen & French, 2008), the present findings should be replicated with

more diverse samples. Additionally, despite the methodological and statistical strengths of the research design, definitive conclusions about causal relations cannot be made based on correlational data (Cook & Campbell, 1979). Experimental designs are necessary to disentangle causal paths that may underlie the associations observed in this research. In the face of these limitations, the use of longitudinal data, time-varying predictors, and efforts to minimize alternative explanations lend credence to the findings, which shed light on the developmental course and relational and adjustment correlates of sibling differentiation.

Another limitation stems from the fact that the data for this research were collected as part of a larger research study on family relationships. As the data were not collected with the current study in mind, information on youths' activity interests is not sufficiently detailed. Future work in this area would benefit from more nuanced information about the kinds of activities youths are interested in—for example, the current research collected information on how interested youths were in “music,” but not whether this interest was in listening to music, playing a trombone vs. piano, learning about musicians, or singing in a choir. The ability to specify youths' activity interests would allow for a better understanding of the extent of similarity between siblings. That significant findings emerged despite this limitation, however, speaks to the robustness of the linkages between sibling differentiation and relational and individual outcomes.

Whereas the current research benefitted from the objectivity and clarity gained through difference score measures, future research could benefit from exploring more open-ended approaches to assessing sibling differences. The combination of objective measurements, along with assessment of youths' perceptions of their similarities,

differences, and differentiation processes could prove to be a fruitful avenue for further inquiry. Given the significant role played by individual perception in social comparison processes, more insight into youths' cognitions about sibling comparison processes could potentially illuminate thought processes or motivations that underlie differentiation and mediate its effects on relationship and adjustment outcomes. For example, although researchers might measure siblings as having similar interests, the siblings themselves may consider themselves quite different, due to variations in how they each pursue their interests (e.g. watching hockey vs. playing hockey). By including measures of youths' perceptions to inform objective measurements, a much richer understanding of sibling differentiation could be gained.

Not only could assessing siblings' cognitions about and perceptions of differentiation clarify the extent to which siblings feel similar or different, they could also provide insight about the degree of rivalry, comparison, or competition each sibling experiences in their relationship. Although some individuals may be particularly sensitive to sibling comparisons, others may be more oblivious to such comparisons, lessening their potential impact. To date, little work has been done to directly measure siblings' perceptions of differentiation and sibling social comparisons. What work has pursued this topic, however, indicates that youth often report the occurrence deidentification dynamics, making this a potentially productive vein of research (Whiteman & Christiansen, 2008).

Summary and Conclusion

The current research advanced understanding of sibling dynamics and their implications by examining the trajectory, moderators, and correlates of sibling

differentiation in activity interests. Charting sibling differentiation from middle childhood through late adolescence revealed a significant cubic growth pattern, supporting deidentification theory and behavioral-genetic predictions, as well as helping to move the sibling differentiation literature from the theoretical to the empirical level. The findings further paved the way for future work by demonstrating linkages at the within- and between-family levels between sibling differentiation and both sibling intimacy and self-worth. Although results for Aims 2 and 3 supported principles of homophily and self-affirmation theory with respect to the implications of differentiation, deidentification processes cannot be entirely discounted in relationship and adjustment outcomes, as much remains to be addressed by future work on sibling differentiation. Above all, the current study demonstrated the pervasive and far-reaching importance of sibling relationship experiences, and the potential of sibling differences, in particular, to impact relational experiences and individual adjustment.

References

- Ackard, D. M., Neumark-Sztainer, D., Story, M., & Perry, C. (2006). Parent–child connectedness and behavioral and emotional health among adolescents. *American Journal of Preventive Medicine, 30*(1), 59-66.
- Adams, J. S. (1965). Inequity in social exchange. *Advances in Experimental Social Psychology, 2*, 267-299.
- Adler, A. (1927). Individual psychology. *The Journal of Abnormal and Social Psychology, 22*(2), 116 - 122.
- Ansbacher, H. L., & Ansbacher, R. R. (1956). The individual psychology of Alfred Adler. Oxford, England: Basic Books, Inc.
- Aronson, J., Cohen, G., & Nail, P. R. (1999). Self-affirmation theory: An update and appraisal. In E. Harmon-Jones & J. Mills (Eds.), *Cognitive dissonance: Progress on a pivotal theory in social psychology* (pp. 127-147). Washington, DC, US: American Psychological Association.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Bulletin, 84*, 191-215.
- Bank, S., & Kahn, M. D. (1975). Sisterhood-brotherhood is powerful: Sibling sub-systems and family therapy. *Family Process, 14*(3), 311-337.
- Bank, S. P., & Kahn, M. D. (1997). *The sibling bond*. Basic Books.
- Bank, L., Patterson, G. R., & Reid, J. B. (1996). Negative sibling interaction patterns as predictors of later adjustment problems in adolescent and young adult males. In G. H. Brody (Ed.), *Sibling relationships: Their causes and consequences*.

Advances in applied developmental psychology, 10, (197-229). Westport, CT, US:
Ablex Publishing.

- Barber, B. L., Eccles, J. S., & Stone, M. R. (2001). Whatever happened to the jock, the brain, and the princess? Young adult pathways linked to adolescent activity involvement and social identity. *Journal of Adolescent Research*, 16(5), 429-455.
- Bedford, V. H., Volling, B. L., & Avioli, P. S. (2000). Positive consequences of sibling conflict in childhood and adulthood. *The International Journal of Aging and Human Development*, 51(1), 53-69.
- Bee, H. L. (1992). *The developing child*. London: HarperCollins
- Blyth, D. A., Hill, J. P., & Thiel, K. S. (1982). Early adolescents' significant others: Grade and gender differences in perceived relationships with familial and nonfamilial adults and young people. *Journal of Youth and Adolescence*, 11(6), 425-450.
- Boer, F., & Dunn, J. (Eds.). (1992). *Children's sibling relationships: Developmental and clinical issues*. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
- Boomsma, D. I., Martin, N. G., & Molenaar, P. C. M. (1989). Factor and simplex models for repeated measures: Application to two psychomotor measures of alcohol sensitivity in twins. *Behavior Genetics*, 19(1), 79-96.
- Borden, L. M., Perkins, D. F., Villarruel, F. A., & Stone, M. R. (2005). To participate or not to participate: That is the question. *New Directions for Youth Development*, 2005(105), 33-49.

- Branje, S. J., Van Lieshout, C. F., Van Aken, M. A., & Haselager, G. J. (2004). Perceived support in sibling relationships and adolescent adjustment. *Journal of Child Psychology and Psychiatry, 45*(8), 1385-1396.
- Brody, G. H. (1998). Sibling relationship quality: Its causes and consequences. *Annual Review of Psychology, 49*(1), 1-24.
- Brody, G. H. (2004). Siblings' direct and indirect contributions to child development. *Current Directions in Psychological Science, 13*(3), 124-126.
- Bronfenbrenner, U. (1979). Contexts of child rearing: Problems and prospects. *American Psychologist, 34*(10), 844-850.
- Bronfenbrenner, U. (1994). Ecological models of human development. *Readings on the Development of Children, 2*, 37-43.
- Bronfenbrenner, U. (1986). Ecology of the family as a context for human development: Research perspectives. *Developmental Psychology, 22*(6), 723-742.
- Bryant, B. K. (1992). Sibling caretaking: Providing emotional support during middle childhood. In F. Boer & J. Dunn (Eds.), *Children's sibling relationships: Developmental and clinical issues*, (pp. 55-69). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
- Buhrmester, D., & Furman, W. (1990). Perceptions of sibling relationships during middle childhood and adolescence. *Child Development, 61*(5), 1387-1398.
- Bulanda, R. E., & Majumdar, D. (2009). Perceived parent-child relations and adolescent self-esteem. *Journal of Child and Family Studies, 18*(2), 203-212.

- Bullock, B. M., & Dishion, T. J. (2002). Sibling collusion and problem behavior in early adolescence: Toward a process model for family mutuality. *Journal of Abnormal Child Psychology, 30*(2), 143-153.
- Cairns, R. B., Leung, M. C., Buchanan, L., & Cairns, B. D. (1995). Friendships and social networks in childhood and adolescence: Fluidity, reliability, and interrelations. *Child Development, 66*(5), 1330-1345.
- Cairns, E., McWhirter, L., Duffy, U., & Barry, R. (1990). The stability of self-concept in late adolescence: Gender and situational effects. *Personality and Individual Differences, 11*(9), 937-944.
- Capizzano, J., Tout, K., & Adams, G. (2000). Child care patterns of school-age children with employed mothers. Occasional Paper. Assessing the New Federalism: An Urban Institute Program to Assess Changing Social Policies.
- Card, N. A., & Hodges, E. V. (2006). Shared targets for aggression by early adolescent friends. *Developmental Psychology, 42*(6), 1327-1338.
- Carnegie Council on Adolescent Development. (1992). *A matter of time: Risk and opportunity in the nonschool hours*. New York, NY: Carnegie Corporation.
- Chipuer, H. M., Rovine, M. J., & Plomin, R. (1990). LISREL modeling: Genetic and environmental influences on IQ revisited. *Intelligence, 14*(1), 11-29.
- Cicirelli, V. G. (1995). Sibling relationships in cross-cultural perspective. In V. G. Cicirelli (Ed.), *Sibling relationships across the life span* (pp. 69-85). New York, NY: Springer US.
- Cicirelli, V. G. (2013). *Sibling relationships across the life span*. New York, NY: Springer US.

- Chen, X., & French, D. C. (2008). Children's social competence in cultural context. *Annual Review of Psychology, 59*, 591-616.
- Collins, W. A., & Sroufe, L. A. (1999). Capacity for intimate relationships. In W. Furman, B. B. Brown, & C. Feiring, (Eds.). *The development of romantic relationships in adolescence* (p. 125-147). New York, NY: Cambridge University Press, USA.
- Conger, R. D., Cui, M., Bryant, C. M., & Elder Jr, G. H. (2000). Competence in early adult romantic relationships: a developmental perspective on family influences. *Journal of Personality and Social Psychology, 79*(2), 224 - 237.
- Connidis, I. A., & Campbell, L. D. (1995). Closeness, confiding, and contact among siblings in middle and late adulthood. *Journal of Family Issues, 16*(6), 722-745.
- Daniels, D., Dunn, J., Furstenberg Jr, F. F., & Plomin, R. (1985). Environmental differences within the family and adjustment differences within pairs of adolescent siblings. *Child Development, 764-774*.
- Daniels, D., & Plomin, R. (1985). Differential experience of siblings in the same family. *Developmental Psychology, 21*(5), 747-760.
- Darling, N. (2005). Participation in extracurricular activities and adolescent adjustment: Cross-sectional and longitudinal findings. *Journal of Youth and Adolescence, 34*(5), 493-505.
- Doughty, S. E., Lam, C. B., Stanik, C. E., & McHale, S. M. (2014). Links between sibling experiences and romantic competence from adolescence through young adulthood. *Journal of Youth and Adolescence*, online, 1-13.

- Doughty, S. E., McHale, S. M., & Feinberg, M. E. (2015). Sibling experiences as predictors of romantic relationship qualities in adolescence. *Journal of Family Issues, 36*(5), 589-608.
- Dunn, J. (1983). Sibling relationships in early childhood. *Child Development, 54*(4), 787-811.
- Dunn, J. (1988). Sibling influences on childhood development. *Journal of Child Psychology and Psychiatry, 29*(2), 119-127.
- Dunn, J. (2007). Siblings and socialization. In J. E. Grusec & P. D. Hastings (Eds.), *Handbook of socialization: Theory and research*. (p. 309-327). New York, NY, US: Guilford Press.
- Dunn, J., & Kendrick, C. (1982). *Siblings: Love, envy, and understanding*. Cambridge, MA: Harvard University Press.
- Dunn, J., & Plomin, R. (1990). *Separate lives: Why siblings are so different*. New York, NY, US: Basic Books.
- Dunn, J., & Plomin, R. (1991). Why are siblings so different? The significance of differences in sibling experiences within the family. *Family Process, 30*(3), 271-283.
- Dunn, J., Slomkowski, C., (1992). Conflict and the development of social understanding. In C. U. Shantz & W. W. Hartup, (Eds.), *Conflict in child and adolescent development* (p. 70-92). New York, NY: Cambridge University Press.
- Dwyer, J. G. (2006). *The relationship rights of children*. New York, NY: Cambridge University Press.

- Eccles, J. S. (1993). School and family effects on the ontogeny of children's interests, self-perceptions, and activity choices. In *Nebraska symposium on motivation* (Vol. 40, pp. 145-208). Lincoln, NE: U. Nebraska Press.
- Eccles, J. S., & Barber, B. L. (1999). Student council, volunteering, basketball, or marching band: What kind of extracurricular involvement matters?. *Journal of Adolescent Research, 14*(1), 10-43.
- Eccles, J. S., Barber, B. L., Stone, M., & Hunt, J. (2003). Extracurricular activities and adolescent development. *Journal of Social Issues, 59*(4), 865-889.
- Eggebeen, D. J. (1992). Changes in sibling configurations for American preschool children. *Social Biology, 39*(1-2), 27-44.
- Epkins, C. C., & Dedmon, A. M. (1999). An initial look at sibling reports on children's behavior: Comparisons with children's self-reports and relations with siblings' self-reports and sibling relationships. *Journal of Abnormal Child Psychology, 27*(5), 371-381.
- Erikson, E. H. (1968). *Identity: Youth and crisis*. New York: Norton.
- Feinberg, M. E., & Hetherington, E. M. (2000). Sibling differentiation in adolescence: Implications for behavioral genetic theory. *Child Development, 71*(6), 1512-1524.
- Feinberg, M. E., McHale, S. M., Crouter, A. C., & Cumsille, P. (2003). Sibling differentiation: Sibling and parent relationship trajectories in adolescence. *Child Development, 1261-1274*.
- Feinberg, M. E., Neiderhiser, J. M., Simmens, S., Reiss, D., & Hetherington, E. M. (2000). Sibling comparison of differential parental treatment in adolescence:

- Gender, self-esteem, and emotionality as mediators of the parenting-adjustment association. *Child Development*, 1611-1628.
- Feinberg, M. E., Reiss, D., Neiderhiser, J. M., & Hetherington, E. M. (2005). Differential association of family subsystem negativity on siblings' maladjustment: using behavior genetic methods to test process theory. *Journal of Family Psychology*, 19(4), 601- 610.
- Felson, R. B. (1983). Aggression and violence between siblings. *Social Psychology Quarterly*, 271-285.
- Felson, R. B. (1993). The (somewhat) social self: How others affect self-appraisals. *Psychological Perspectives on the Self*, 4, 1-26.
- Festinger, L. (1954). A theory of social comparison processes. *Human Relations*, 7(2), 117-140.
- Foster, E. M. (2002). How economists think about family resources and child development. *Child Development*, 1904-1914.
- Fredricks, J. A., & Eccles, J. S. (2006). Extracurricular involvement and adolescent adjustment: Impact of duration, number of activities, and breadth of participation. *Applied Developmental Science*, 10(3), 132-146.
- Friedman, S. L., & Haywood, H. C. (Eds.). (2013). *Developmental follow-up: Concepts, domains, and methods*. Waltham, MA: Academic Press.
- Furman, W., & Buhrmester, D. (1985). Children's perceptions of the personal relationships in their social networks. *Developmental Psychology*, 21(6), 1016-1024.

- Galambos, N. L., Almeida, D. M., & Petersen, A. C. (1990). Masculinity, femininity, and sex role attitudes in early adolescence: Exploring gender intensification. *Child Development, 61*(6), 1905-1914.
- Gamble, W. C., Card, N. A., & Yu, J. J. (2010). Self-representations in Early Adolescence: Variations in Sibling Similarity by Sex Composition and Sibling Relationship Qualities. *Social Development, 19*(1), 148-169.
- Garton, A. F., & Pratt, C. (1987). Participation and interest in leisure activities by adolescent schoolchildren. *Journal of Adolescence, 10*(4), 341-351.
- Garton, A. F., & Pratt, C. (1991). Leisure activities of adolescent school students: Predictors of participation and interest. *Journal of Adolescence, 14*(3), 305-321.
- Grotevant, H. D. (1978). Sibling constellations and sex typing of interests in adolescence. *Child Development, 54*(4), 540-542.
- Halpern, R., Barker, G., & Mollard, W. (2000). Youth programs as alternative spaces to be a study of neighborhood youth programs in Chicago's West Town. *Youth & Society, 31*(4), 469-506.
- Harter, S. (1990). Causes, correlates, and the functional role of global self-worth: A life-span perspective. In R.J. Sternberg & J. Kolligian, Jr. (Eds.), *Competence considered* (pp. 67-97). New Haven, CT: Yale University Press.
- Harter, S. (1999). *The construction of the self: A developmental perspective*. New York, NY: Guilford Press.
- Harter, S., Waters, P., & Whitesell, N. R. (1998). Relational self-worth: Differences in perceived worth as a person across interpersonal contexts among adolescents. *Child Development, 69*(3), 756-766.

- Harter, S., & Whitesell, N. R. (2003). Beyond the debate: Why some adolescents report stable self-worth over time and situation, whereas others report changes in self-worth. *Journal of Personality, 71*(6), 1027-1058.
- Heinonen, K., Raikkonen, K., & Keltikangas-Jarvinen, L. (2003). Maternal perceptions and adolescent self-esteem: A six-year longitudinal study. *Adolescence, 38*(152), 669 - 687.
- Hetherington, E. M. (1994). Siblings, family relationships, and child development: Introduction. *Journal of Family Psychology, 8*(3), 251 - 253.
- Hetherington, E. M. (1999). Chapter I. Family functioning and the adjustment of adolescent siblings in diverse types of families. *Monographs of the Society for Research in Child Development, 64*(4), 1-25.
- Hetherington, E. M., Parke, R. D., & Locke, V. O. (1999). *Child psychology: A contemporary viewpoint*. (5th ed.). New York, NY, US: McGraw-Hill.
- Holland, A., & Andre, T. (1987). Participation in extracurricular activities in secondary school: What is known, what needs to be known?. *Review of Educational Research, 57*(4), 437-466.
- Howe, N. (1991). Sibling-directed internal state language, perspective taking, and affective behavior. *Child Development, 62*(6), 1503-1512.
- Howe, N., Aquan-Assee, J., Bukowski, W. M., Lehoux, P. M., & Rinaldi, C. M. (2001). Siblings as confidants: Emotional understanding, relationship warmth, and sibling self-disclosure. *Social Development, 10*(4), 439-454.
- Huston, A. C. (1985). The development of sex typing: Themes from recent research. *Developmental Review, 5*(1), 1-17.

- Jacobs, J. E., Lanza, S., Osgood, D. W., Eccles, J. S., & Wigfield, A. (2002). Changes in children's self-competence and values: Gender and domain differences across grades one through twelve. *Child Development, 73*(2), 509-527.
- Jessor, R. (1981). The perceived environment in psychological theory and research. In D. Magnusson (Ed.), *Toward a psychology of situations: An interactional perspective*, 297-317. New York, NY: Psychology Press.
- Kahn, M. D., & Monks, G. (1997). Sibling relational problems. *DSM-IV Sourcebook, 3*, 693-712.
- Katz, L. F., Kramer, L., & Gottman, J. M. (1992). Conflict and emotions in marital, sibling, and peer relationships. In C. U. Shantz & W. W. Hartup, (Eds.), *Conflict in child and adolescent development*, (p. 122-149). New York, NY: Cambridge University Press.
- Kerr, D. C., Capaldi, D. M., Pears, K. C., & Owen, L. D. (2009). A prospective three generational study of fathers' constructive parenting: Influences from family of origin, adolescent adjustment, and offspring temperament. *Developmental Psychology, 45*(5), 1257-1275.
- Kim, J. Y., McHale, S. M., Wayne Osgood, D., & Crouter, A. C. (2006). Longitudinal course and family correlates of sibling relationships from childhood through adolescence. *Child Development, 77*(6), 1746-1761.
- Kim, J. Y., McHale, S. M., Crouter, A. C., & Osgood, D. W. (2007). Longitudinal linkages between sibling relationships and adjustment from middle childhood through adolescence. *Developmental Psychology, 43*(4), 960-973.

- King, M., Ruggles, S., Alexander, J.T., Flood, S., Genadek, K., Schroeder, M.B.,
Trampe, B., Vick, R. (2010). Integrated Public Use Micro-data Series, Current
Population Survey: Version 3.0. Minneapolis: University of Minnesota.
- Kleiber, D. A. (1999). *Leisure experience and human development: A dialectical
interpretation*. New York, NY: Basic Books, Inc.
- Kleiber, D., Larson, R., & Csikszentmihalyi, M. (2014). The experience of leisure in
adolescence. In M. Csikszentmihalyi (Ed.), *Applications of flow in human
development and education* (pp. 467-474). Utrecht, Netherlands: Springer
Netherlands.
- Kowal, A., & Kramer, L. (1997). Children's understanding of parental differential
treatment. *Child Development*, 68(1), 113-126.
- Kramer, L. (2010). The essential ingredients of successful sibling relationships: An
emerging framework for advancing theory and practice. *Child Development
Perspectives*, 4(2), 80-86.
- Lareau, A. (2011). *Unequal childhoods: Class, race, and family life*. Berkeley, CA:
University of California Press.
- Larson, R. W., Hansen, D. M., & Moneta, G. (2006). Differing profiles of developmental
experiences across types of organized youth activities. *Developmental
Psychology*, 42(5), 849-863.
- Larson, R. W., & Verma, S. (1999). How children and adolescents spend time across the
world: work, play, and developmental opportunities. *Psychological Bulletin*,
125(6), 701-736.

- Lazarsfeld, P. F., & Merton, R. K. (1954). Friendship as a social process: A substantive and methodological analysis. *Freedom and Control in Modern Society*, 18(1), 18-66.
- Leventhal, G. S. (1970). Influence of brothers and sisters on sex-role behavior. *Journal of Personality and Social Psychology*, 16(3), 452-265.
- Leventhal, G. S., & Anderson, D. (1970). Self-interest and the maintenance of equity. *Journal of Personality and Social Psychology*, 15(1), 57-62.
- Lever, J. (1976). Sex differences in the games children play. *Social Problems*, 23, 478-487
- Levy, D. M. (1934). Rivalry between children in the same family. *Child Study*, 11, 233-261.
- Levy, D. M. (1937). Studies in sibling rivalry. *Research Monographs, American Orthopsychiatric Association*, 2, 96.
- Lewis, M. (2005). The child and its family: The social network model. *Human Development*, 48(1-2), 8-27.
- Loder, T. L., & Hirsch, B. J. (2003). Inner-city youth development organizations: The salience of peer ties among early adolescent girls. *Applied Developmental Science*, 7(1), 2-12.
- Luthar, S. S., Shoum, K. A., & Brown, P. J. (2006). Extracurricular involvement among affluent youth: a scapegoat for "ubiquitous achievement pressures"?. *Developmental Psychology*, 42(3), 583- 597.
- Maccoby, E. E. (1998). *The two sexes: Growing up apart, coming together*. Cambridge, MA: Harvard University Press.

- Maccoby, E. E. (1990). Gender and relationships: A developmental account. *American Psychologist*, 45(4), 513 - 520.
- Maccoby, E. E., & Martin, J. A. (1983). Socialization in the context of the family: Parent-child interaction. In P.H. Mussen (Ed.) *Handbook of child psychology: formerly Carmichael's manual of child psychology*. New York, NY: John Wiley & Sons.
- Mahoney, J. L., Cairns, B. D., & Farmer, T. W. (2003). Promoting interpersonal competence and educational success through extracurricular activity participation. *Journal of Educational Psychology*, 95(2), 409-418.
- Mahoney, J. L., Harris, A. L., & Eccles, J. S. (2006). Organized Activity Participation, Positive Youth Development, and the Over-Scheduling Hypothesis. Social Policy Report. Volume 20, Number 4. *Society for Research in Child Development*.
- Mahoney, J. L., Lord, H., & Carryl, E. (2005). An ecological analysis of after-school program participation and the development of academic performance and motivational attributes for disadvantaged children. *Child Development*, 76(4), 811-825.
- Marcia, J. E. (1966). Development and validation of ego-identity status. *Journal of Personality and Social Psychology*, 3(5), 551 - 558.
- Matheny Jr, A. P., Wilson, R. S., Dolan, A. B., & Krantz, J. Z. (1981). Behavioral contrasts in twinships: Stability and patterns of differences in childhood. *Child Development*, 579-588.
- McCoy, J. K., Brody, G. H., & Stoneman, Z. (1994). A longitudinal analysis of sibling relationships as mediators of the link between family processes and youths' best friendships. *Family Relations*, 400-408.

- McGuire, S., Manke, B., Eftekhari, A., & Dunn, J. (2000). Children's perceptions of sibling conflict during middle childhood: Issues and sibling (dis)similarity. *Social Development, 9*(2), 173-190.
- McGuire, S., Manke, B., Saudino, K. J., Reiss, D., Hetherington, E. M., & Plomin, R. (1999). Perceived competence and self-worth during adolescence: A longitudinal behavioral genetic study. *Child Development, 70*(6), 1283-1296.
- McGuire, S., McHale, S. M., & Updegraff, K. (1996). Children's perceptions of the sibling relationship in middle childhood: Connections within and between family relationships. *Personal Relationships, 3*(3), 229-239.
- McHale, S. M., & Crouter, A. C. (1996). *The family contexts of children's sibling relationships*. New York, NY: Ablex Publishing.
- McHale, S. M., Crouter, A. C., & Tucker, C. J. (2001). Free-time activities in middle childhood: Links with adjustment in early adolescence. *Child Development, 72*(6), 1764-1778.
- McHale, S. M., Kim, J. Y., Whiteman, S., & Crouter, A. C. (2004). Links between sex-typed time use in middle childhood and gender development in early adolescence. *Developmental Psychology, 40*(5), 868-881.
- McHale, S. M., Updegraff, K. A., & Whiteman, S. D. (2012). Sibling relationships and influences in childhood and adolescence. *Journal of Marriage and Family, 74*(5), 913-930.
- McNeal Jr, R. B. (1998). High school extracurricular activities: Closed structures and stratifying patterns of participation. *The Journal of Educational Research, 91*(3), 183-191.

- McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual Review of Sociology*, 415-444.
- Mendes, W. B., Blascovich, J., Major, B. & Seery, M. D. (2001). Challenge and threat responses during downward and upward social comparisons, *European Journal of Social Psychology*, 31, 477-497.
- Minuchin, P. (1985). Families and individual development: Provocations from the field of family therapy. *Child Development*, 56(2), 289-302.
- Osgood, D. W., Wilson, J. K., O'malley, P. M., Bachman, J. G., & Johnston, L. D. (1996). Routine activities and individual deviant behavior. *American Sociological Review*, 635-655.
- Parker, J. S., & Benson, M. J. (2004). Parent-adolescent relations and adolescent functioning: Self-esteem, substance abuse, and delinquency. *Adolescence*, 39(155), 519-530.
- Patterson, G. R. (1982). *Coercive family process* (Vol. 3). Eugene, OR: Castalia Publishing Company.
- Patterson, G. R., Dishion, T. J., & Bank, L. (1984). Family interaction: A process model of deviancy training. *Aggressive Behavior*, 10(3), 253-267.
- Pelham, B. W., & Swann, W. B. (1989). From self-conceptions to self-worth: on the sources and structure of global self-esteem. *Journal of Personality and Social Psychology*, 57(4), 672-680.
- Perlman, M., & Ross, H. S. (1997). Who's the boss? Parents' failed attempts to influence the outcomes of conflicts between their children. *Journal of Social and Personal Relationships*, 14(4), 463-480.

- Plomin, R. (2011). Commentary: Why are children in the same family so different? Non-shared environment three decades later. *International Journal of Epidemiology*, 40(3), 582-592.
- Plomin, R., & Bergeman, C. S. (1991). Nature and nurture. *Behavioral and Brain Sciences*, 14(03), 414-427.
- Plomin, R., & Daniels, D. (1987). Why are children in the same family so different from one another?. *Behavioral and Brain Sciences*, 10(01), 1-60.
- Plomin, R., & Daniels, D. (2011). Why are children in the same family so different from one another?. *International Journal of Epidemiology*, 40(3), 563-582.
- Plomin, R., & Neiderhiser, J. M. (1992). Genetics and experience. *Current Directions in Psychological Science*, 1(5), 160-163.
- Posner, J. K., & Vandell, D. L. (1999). After-school activities and the development of low-income urban children: a longitudinal study. *Developmental Psychology*, 35(3), 868-879.
- Raffaelli, M. (1997). Young adolescents' conflicts with siblings and friends. *Journal of Youth and Adolescence*, 26(5), 539-558.
- Raffaelli, M. (1992). Sibling conflict in early adolescence. *Journal of Marriage and the Family*, 54(7), 652-663.
- Rende, R., Slomkowski, C., Lloyd-Richardson, E., & Niaura, R. (2005). Sibling effects on substance use in adolescence: social contagion and genetic relatedness. *Journal of Family Psychology*, 19(4), 611-618.

- Repetti, R. L., Taylor, S. E., & Seeman, T. E. (2002). Risky families: family social environments and the mental and physical health of offspring. *Psychological Bulletin*, 128(2), 330-366.
- Rinaldi, C., & Howe, N. (1998). Siblings' reports of conflict and the quality of their relationships. *Merrill-Palmer Quarterly*, 44(3), 404-422.
- Rodgers, K. B., & Rose, H. A. (2001). Personal, family, and school factors related to adolescent academic performance: A comparison by family structure. *Marriage & Family Review*, 33(4), 47-61.
- Rowe, D. C., & Gulley, B. L. (1992). Sibling effects on substance use and delinquency*. *Criminology*, 30(2), 217-234.
- Rowe, D. C., & Plomin, R. (1981). The importance of nonshared (E₁) environmental influences in behavioral development. *Developmental Psychology*, 17(5), 517 - 531.
- Ruble, D. N., Martin, C. L., & Berenbaum, S. A. (1998). Gender development. *Handbook of child psychology*. New York, NY: John Wiley & Sons, Inc.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68-78.
- Sanders, D. (2010). Cognitive and behavioural approaches. *Handbook of Counselling Psychology*, 3, 105-129.
- Sanders, R. (2011). Siblings in practice. In J. Caspi, (Ed.), *Sibling development: Implications for mental health practitioners*, 17-40. New York, NY: Springer Publishing.

- Scarr, S., & Grajek, S. (1982). Similarities and differences among siblings. In M. E. Lamb & B. Sutton-Smith (Eds.), *Sibling relationships: Their nature and significance across the lifespan*, (357-381). UK: Taylor & Francis, Psychology Press.
- Scarr, S., & McCartney, K. (1983). How people make their own environments: A theory of genotype→ environment effects. *Child Development*, 424-435.
- Scarr, S., & Weinberg, R. A. (1978). The influence of "family background" on intellectual attainment. *American Sociological Review*, 43(5), 674-692.
- Schachter, F. F., Gilutz, G., Shore, E., & Adler, M. (1978). Sibling deidentification judged by mothers: Cross-validation and developmental studies. *Child Development*, 543-546.
- Schachter, F. F., Shore, E., Feldman-Rotman, S., Marquis, R. E., & Campbell, S. (1976). Sibling deidentification. *Developmental Psychology*, 12, 418-427.
- Schachter, F. F., & Stone, R. K. (1987). *Practical concerns about siblings: Bridging the research-practice gap*. New York, NY: Psychology Press.
- Scharf, M., & Mayseless, O. (2001). The capacity for romantic intimacy: Exploring the contribution of best friend and marital and parental relationships. *Journal of Adolescence*, 24(3), 379-399.
- Shanahan, L., McHale, S. M., Crouter, A. C., & Osgood, D. W. (2008). Linkages between parents' differential treatment, youth depressive symptoms, and sibling relationships. *Journal of Marriage and Family*, 70(2), 480-494.

- Shantz, C. U., & Hobart, C. J. (1989). Social conflict and development: Peers and siblings. In T. J. Berndt & G. Ladd (Eds.), *Peer relationships and child development* (pp. 71–94). New York, NY: Wiley.
- Sheeber, L., Hops, H., & Davis, B. (2001). Family processes in adolescent depression. *Clinical Child and Family Psychology Review*, 4(1), 19-35.
- Simpkins, S. D., Davis-Kean, P. E., & Eccles, J. S. (2006a). Math and science motivation: A longitudinal examination of the links between choices and beliefs. *Developmental Psychology*, 42(1), 70-83.
- Simpkins, S., Fredricks, J. A., Davis-Kean, P. E., & Eccles, J. S. (2006). Healthy mind, healthy habits. In A. C. Huston & M. N. Ripke, (Eds.), *Developmental contexts in middle childhood: Bridges to adolescence and adulthood*, (p. 283-302). New York, NY: Cambridge University Press.
- Slomkowski, C., Conger, K. J., Rende, R., Heylen, E., Little, W. M., Shebloski, B., ... & Conger, R. D. (2009). Sibling contagion for drinking in adolescence: a micro process framework. *European Journal of Developmental Science*, 3(2), 161-173.
- Smedema, S. M., Catalano, D., & Ebener, D. J. (2010). The relationship of coping, self-worth, and subjective well-being: A structural equation model. *Rehabilitation Counseling Bulletin*, 53(3), 131-142.
- Stapel, D. A., & Suls, J. (2004). Method matters: effects of explicit versus implicit social comparisons on activation, behavior, and self-views. *Journal of Personality and Social Psychology*, 87(6), 860-875.
- Steele, C. M. (1988). The psychology of self-affirmation: Sustaining the integrity of the self. *Advances in Experimental Social Psychology*, 21, 261-302.

- Steele, C. M., Spencer, S. J., & Lynch, M. (1993). Self-image resilience and dissonance: the role of affirmational resources. *Journal of Personality and Social Psychology*, 64(6), 885-896.
- Stewart, R. B. (1983). Sibling attachment relationships: Child–infant interaction in the strange situation. *Developmental Psychology*, 19(2), 192-199.
- Stocker, C. M. (1994). Children's perceptions of relationships with siblings, friends, and mothers: Compensatory processes and links with adjustment. *Journal of Child Psychology and Psychiatry*, 35(8), 1447-1459.
- Stocker, C., & Dunn, J. (1990). Sibling relationships in childhood: Links with friendships and peer relationships. *British Journal of Developmental Psychology*, 8(3), 227-244.
- Stocker, C. M., Burwell, R. A., & Briggs, M. L. (2002). Sibling conflict in middle childhood predicts children's adjustment in early adolescence. *Journal of Family Psychology*, 16(1), 50-57.
- Stocker, C. M., Lanthier, R. P., & Furman, W. (1997). Sibling relationships in early adulthood. *Journal of Family Psychology*, 11(2), 210-221.
- Straus, M. A., Gelles, R. J., & Steinmetz, S. K. (1981). *Behind closed doors: Violence in the American family*. Garden City, NY: Anchor Books.
- Sulloway, F. J. (1996). *Born to rebel: Birth order, family dynamics, and creative lives*. New York, NY: Pantheon Books.
- Suls, J. E., Martin, R., & Wheeler, L. (2002). Social comparison: Why, with whom, and with what effect?. *Current Directions in Psychological Science*, 11(5), 159-163.

- Suls, J. E., & Wills, T. A. E. (1991). *Social comparison: Contemporary theory and research*. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
- Susanne, C. (1975). Genetic and environmental influences on morphological characteristics. *Annals of Human Biology*, 2(3), 279-287.
- Tesser, A. (1980). Self-esteem maintenance in family dynamics. *Journal of Personality and Social Psychology*, 39(1), 77-91.
- Tesser, A., Millar, M., & Moore, J. (1988). Some affective consequences of social comparison and reflection processes: the pain and pleasure of being close. *Journal of Personality and Social Psychology*, 54(1), 49-61.
- Teti, D. M. (2002). Retrospect and prospect in the psychological study of sibling relationships. In J. P. McHale & W. S. Grolnick (Eds.), *Retrospect and prospect in the psychological study of families*, 193-224. London, UK: Routledge, Taylor & Francis Group.
- Tucker, C. J., McHale, S. M., & Crouter, A. C. (2001). Conditions of sibling support in adolescence. *Journal of Family Psychology*, 15(2), 254-271.
- Updegraff, K. A., McHale, S. M., Whiteman, S. D., Thayer, S. M., & Delgado, M. Y. (2005). Adolescent sibling relationships in Mexican American families: exploring the role of familism. *Journal of Family Psychology*, 19(4), 512-522.
- Updegraff, K. A., McHale, S. M., & Crouter, A. C. (2002). Adolescents' sibling relationship and friendship experiences: Developmental patterns and relationship linkages. *Social Development*, 11(2), 182-204.
- Vandell, D. L., & Posner, J. K. (1999). Conceptualization and measurement of children's after-school environments. In S. L. Friedman & T. D. Wachs, (Eds.), *Measuring*

- environment across the life span: Emerging methods and concepts*, (p. 167-196).
Washington, DC, US: American Psychological Association.
- Waldinger, R. J., Vaillant, G. E., & Orav, E. J. (2007). Childhood sibling relationships as a predictor of major depression in adulthood: A 30-year prospective study. *American Journal of Psychiatry*, *164*(6), 949-954.
- Wheeler, L., & Miyake, K. (1992). Social comparison in everyday life. *Journal of Personality and Social Psychology*, *62*(5), 760-773.
- White, L. (2001). Sibling relationships over the life course: A panel analysis. *Journal of Marriage and Family*, *63*(2), 555-568.
- Whiteman, S. D., Bernard, J. M., & Jensen, A. C. (2011). Sibling influence in human development. In J. Caspi, (Ed.), *Sibling development: Implications for mental health practitioners*, (p. 1-15). New York, NY: Springer Publishing.
- Whiteman, S. D., & Christiansen, A. (2008). Processes of sibling influence in adolescence: Individual and family correlates. *Family Relations*, *57*(1), 24-34.
- Whiteman, S. D., Becerra, J. M., & Killoren, S. E. (2009). Mechanisms of sibling socialization in normative family development. *New Directions for Child and Adolescent Development*, *126*, 29-43.
- Whiteman, S. D., McHale, S. M., & Crouter, A. C. (2007). Competing processes of sibling influence: Observational learning and sibling deidentification. *Social Development*, *16*(4), 642-661.
- Wills, T. A. (1991). Similarity and self-esteem in downward comparison. In J. E. Suls & T. A. Wills (Eds.), *Social comparison: Contemporary theory and research* (p. 51-78). Hillsdale, NJ: Erlbaum.

Wood, J. V. (1989). Theory and research concerning social comparisons of personal attributes. *Psychological Bulletin*, 106(2), 231-248.

Youniss, J., & Yates, M. (1997). *Community service and social responsibility in youth*. Chicago, IL: University of Chicago Press.

Appendix A
Tables and Figures

Table 1.

Frequency and Percent of Youths by Age.

Age	Frequency	Percent
6	9	0.33
7	40	1.48
8	123	4.56
9	175	6.49
10	202	7.49
11	270	10.01
12	246	9.12
13	215	7.97
14	175	6.49
15	190	7.05
16	283	10.5
17	283	10.5
18	245	9.09
19	198	7.34
20	42	1.56

Table 2.

Means (SDs) for Sibling Differentiation in Activity Interests.

Variable	Mean (SD)	Minimum	Maximum
Time 1	22.16 (6.62)	7	46
Time 2	24.65 (6.19)	11	44
Time 3	23.90 (5.58)	12	46
Time 4	23.26 (6.43)	7	54
Time 5	23.58 (6.47)	10	39
Time 6	23.07 (6.19)	11	41
Time 7	23.17 (6.52)	8	41
Time 8	23.61 (5.34)	12	36

Table 3.

Means (SDs) for Sibling Relationship Outcomes.

	Intimacy		Conflict	
	First-born	Second-born	First-born	Second-born
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Time 1	25.23 (5.63)	23.76 (7.10)	13.74 (3.41)	14.01 (4.13)
Time 2	23.26 (5.27)	24.02 (6.44)	14.03 (3.22)	14.30 (4.33)
Time 3	23.12 (5.00)	23.64 (5.22)	13.51 (3.24)	14.08 (4.01)
Time 4	23.39 (5.28)	24.16 (5.55)	12.96 (3.08)	13.25 (3.22)
Time 5	24.22 (5.21)	24.66 (5.89)	12.09 (3.15)	12.48 (3.27)
Time 6	25.79 (5.49)	26.46 (6.28)	10.76 (3.12)	11.41 (3.50)
Time 7	26.77 (5.15)	26.91 (6.07)	10.15 (3.11)	10.66 (3.14)
Time 8	25.96 (5.77)	27.50 (6.76)	10.04 (2.84)	10.69 (3.14)

Table 4.

Means (SDs) for Self-worth.

	First-born	Second-born
	Mean (SD)	Mean (SD)
Time 1	3.32 (.53)	3.30 (0.54)
Time 2	3.25 (.51)	3.13 (0.57)
Time 3	3.36 (.52)	3.33 (0.51)
Time 4	3.32 (.58)	3.43 (0.52)
Time 5	3.13 (.67)	3.04 (0.68)
Time 6	3.19 (.62)	3.08 (0.68)
Time 7	3.18 (.59)	3.08 (0.66)
Time 8	3.13 (.50)	3.10 (0.75)

Table 5.
Regression Coefficients (Standard Errors) and Random Effects for the Growth Curve of Sibling Differences.

Fixed Effects	Sibling Differences
	γ (SE)
Intercept	25.54 (0.45)***
Age (linear)	-0.23 (0.15)
Age (quadratic)	-0.07 (0.03)**
Age (cubic)	0.03 (0.01)**
Gender constellation (0 = mixed; 1 = same)	-2.97 (0.55)***
Linear age x gender constellation	-0.29 (0.14)*
Random effects	Variance (SE)
Residual	10.64 (0.35)***
L2 intercept	-
L3 intercept	22.92 (2.66)***

Note. L2 = Level 2 (within family); L3 = Level 3 (between family).

^t = $p < .10$ * $p < .05$. ** $p < .01$. *** = $p < .001$

Table 6.

Regression Coefficients (γ) and Standard Errors (SE) for Multilevel Models Predicting Sibling Intimacy and Conflict from Sibling Differentiation.

Fixed effects	Sibling Intimacy	Sibling Conflict
	γ (SE)	γ (SE)
Intercept	21.11 (0.79)***	13.37 (0.44)***
Age (linear)	0.05 (0.09)	-0.26 (0.06)***
Age (quadratic)	0.17 (0.02)***	-0.11 (0.01)***
Parent-child warmth	0.01 (0.02)	0.01 (0.01)
Sibling shared time	0.002 (0.001)*	0.0002 (0.0004)
Birth order (0 = first; 1 = second)	1.86 (0.36)***	-0.84 (0.22)***
Gender constellation (0 = mixed; 1 = same)	-0.08 (0.55)	0.65 (0.30)*
Linear age x gender constellation	-0.24 (0.10)*	0.09 (0.05) ^t
Linear age x birth order	0.66 (0.10)***	-0.43 (0.07)***
Quadratic age x birth order	-0.09 (0.02)***	0.02 (0.02)
BF sibling differences	-0.13 (0.07)*	0.02 (0.04)
WF sibling differences	-0.08 (0.02)***	0.02 (0.01)
Random effects	Variance (SE)	Variance (SE)
Residual	14.27 (0.49)***	6.83 (0.23)***
L 2 intercept	6.46 (0.95)***	1.71 (0.31)***
L 3 intercept	8.00 (1.38)***	2.17 (0.40)***

Note. BF = between-family (Level 3); WF = within-family (Level 2)

^t = $p < 1.0$; * = $p < .05$; ** = $p < .01$; *** = $p < .001$

Table 7.

Regression Coefficients (γ) and Standard Errors (SE) for Multilevel Models Predicting Self-worth from Sibling Differentiation.

Fixed effects	Self-worth
	γ (SE)
Intercept	3.18 (0.08)***
Age (linear)	-0.07 (0.01)**
Age (quadratic)	-0.19 (0.07)**
Age (cubic)	-0.34 (0.08)*
Parent-child warmth	0.004 (0.002) ^t
Sibling intimacy	0.015 (0.002)***
Sibling conflict	-0.26 (0.003)***
Gender constellation (0 = mixed; 1 = same)	-0.047 (0.041)
Gender (0 = female; 1 = male)	0.123 (0.035)***
BF sibling differences	-0.013 (0.005)*
WF sibling differences	0.002 (0.003)
WF sibling differences*gender constellation	-0.008 (0.004)*
Random effects	Variance (SE)
Residual	0.18 (0.01)***
L 2 intercept	0.09 (0.01)***
L 3 intercept	0.03 (0.01)**

Note. BF = between-family (Level 3); WF = within-family (Level 2)

^t = $p < 1.0$; * = $p < .05$; ** = $p < .01$; *** = $p < .001$



Figure 1. Trajectory for sibling differentiation in reported activity interests

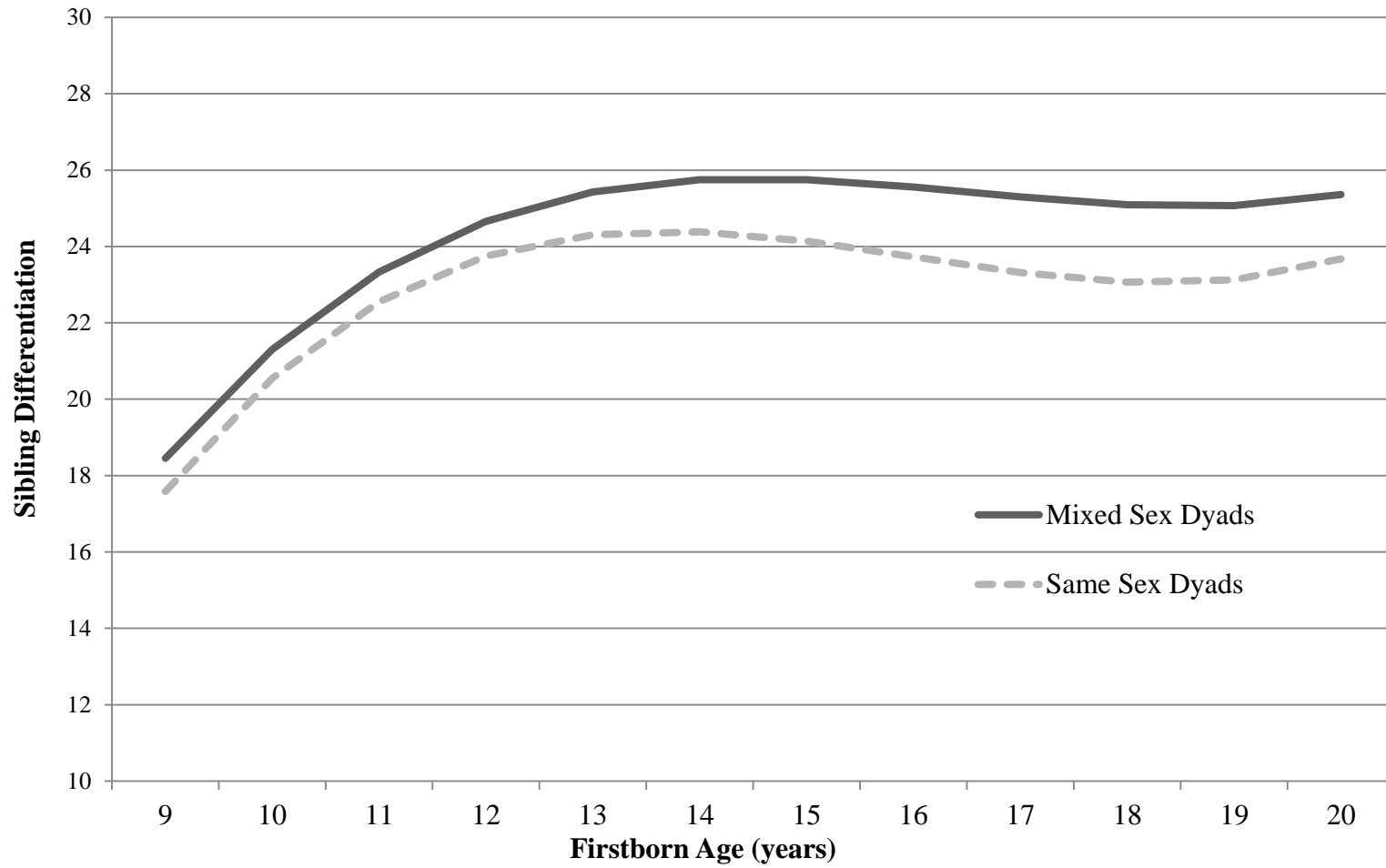


Figure 2. Trajectory for sibling differentiation in activity interests for mixed- and same-gender dyads

Appendix B

Activity List

1. **Sports**, like baseball, football, basketball, soccer, softball, volleyball, tennis, or hockey.
2. **Water Activities**, like swimming, diving, sailing, rowing, or canoeing.
3. **Gymnastics**.
4. **Dance**.
5. **Hunting and Fishing**.
6. **Computer Games**, including playing with computers and playing video games.
7. **Other Games**, including board games, puzzles, or cards.
8. **Hiking, Camping, or Going for Walks**.
9. **Biking or Skating**, this includes skateboards, roller blades, and ice skates (except hockey).
10. **Collecting Things**, like stamps, coins, rocks, or dolls.
11. **Art**, such as drawing, painting, coloring, or working with clay.
12. **Music**, including playing an instrument or listening to music.
13. **Handicrafts**, including knitting, sewing, or crocheting.
14. **Reading Stories, Magazines, or Newspapers**, not including work activities.
15. **Writing**, including letters, stories, journals, not including school activities.
16. **Outdoor Play**, such as playing on the playground, tag, hopscotch, or running games.
17. **Building things**, like carpentry or models, but not household repairs.
18. **Gardening**, planting, caring for flower or vegetable gardens; not yardwork.
19. **Language Arts**, like reading, writing, or spelling.
20. **Science**, like nature studies, or studying how our bodies work, or learning about the stars and planets.
21. **Math**, arithmetic or number problems.
22. **Social Studies**, like learning about people from around the world or studying current events.
23. **Watching TV** or videos.
24. **Playing/Working with pets** or animals.
25. **Religious Activities**, including going to services, youth groups, or prayer.
26. **Club Activities**, such as Girls Scouts or Boy Scouts.
27. ***Play with Vehicles**, like matchbox cars, remote control cars, does not include building models.
28. ***Play with Dolls**, trolls, or Barbies.
29. ***Play with Toy Animals**.
30. ***Play with Action Figures**.
31. ***Play with Legos**, blocks, or other construction toys.

Note: Activities removed after Time 3 are indicated by *.

Appendix C

Sibling Differentiation Variables

Although shared genes and family experiences impart to siblings a certain degree of similarity (Scarr & Grajek, 1982), it is also the case that siblings can be quite different from one another. In fact, some work suggests that siblings are often as different from each other as they are from unrelated individuals (Plomin & Daniels, 2011). Sibling differentiation describes the extent to which siblings are different from one another. Differences between siblings can arise in a number of ways. Some differences emanate from factors such as birth order and gender. Other differences develop over time through youths' individual experiences, both within and outside the family (Daniels et al., 1985; Daniels & Plomin, 1985; Plomin & Daniels, 1987; Rowe & Plomin, 1981). Although differentiation has long been a subject of interest in sibling research, little developmental research has been done on the topic. This study aimed to better understand the trajectory of sibling differentiation over time, as well as its linkages with sibling relationship quality and individual well-being. In order address these aims, a first step was to determine how sibling differentiation would be operationalized, a decision that needed to be based on both methodological and conceptual considerations.

Measurement Issues

One aspect of sibling differentiation that makes it difficult to study is that, due to the potential for differentiation to occur unconsciously, youths may be unaware of the degree to which their characteristics were influenced by their siblings. What an individual perceives to be nothing more than personal preference may in fact be unconsciously motivated by a desire to be more or less similar to their sibling. When

differentiation is brought to their attention, siblings may exaggerate or minimize the extent to which they differ from a sibling. Youths who desire to be like their sibling may exaggerate the degree to which they share common interests with their siblings. Conversely, siblings who seek to define themselves as different from their siblings may exaggerate differences that exist between them. The combination of a lack of conscious awareness and potential for bias makes relying on siblings' reports of differentiation potentially problematic. Another option when studying sibling differentiation is to collect siblings' reports of their own qualities and compare them to one another. This allows individuals to report on their own characteristics without bringing up their sibling at all, reducing the likelihood of bias.

As differentiation emerges over time, research in this area must also be conducted in such a way as to reduce the likelihood of a retrospective bias, wherein participants are asked to reflect back on a period of time and report the progression of the differentiation process. One tool against such bias is the use of a longitudinal design. This allows researchers to ask individuals about their current circumstances at many occasions across a longer time span—capturing change over time without introducing error from retrospective bias or memory loss.

The first goal of this research was to examine the trajectory of the difference between siblings' described interests from middle childhood into late adolescence. Because self-reports can suffer from self-concept biases and in order to avoid mono-method bias in assessing links between sibling differentiation and youth outcomes, differentiation was measured based on the two siblings' reports of their activity interests. The way in which sibling differences are assessed has methodological and conceptual

implications, the nuances of which impact interpretation of research findings. I therefore created the siblings' differential interests variable in a number of different ways, each reflecting a slightly different conceptualization of the sibling differential interests variable. I then compared the resulting versions for convergence and divergence to determine which version to use for further analyses, or whether it was useful to carry out analyses with more than one version of the variable.

Measurement of Activity Interests

The data were drawn from a sample of 203 families (including mother, father, and the first- and second-born children) that participated in a longitudinal study exploring family relationships and youth development. Data collection began in 1995-1996, when participating siblings were in middle childhood, and follow-up data collection occurred on up to eight occasions across 10 years. At each time point, youths were asked to rate their level of interest in each of 25 activities (e.g., sports, music, handicrafts) on a four-point Likert scale (1 = *not very interested*; 4 = *very interested*). Included activities were based on prior descriptions of children's time use (Medrich et al., 1982; Newson & Newson, 1976) as well as pilot work with youths from the same communities as the participating families (see Appendix D for list of activities). Activity interest was defined broadly, and included "liking to do an activity, read about an activity, or watch others engaging in the activity" (i.e., it was possible for youths to report interest in an activity in which they did not actively participate).

Version A: All Activity Interests. The "all activities" version of the sibling difference variable included all activity interest ratings collected at all phases of data collection. This allowed for the sibling difference variable to be calculated from the

maximum amount of data possible. It also allows the differentiation variable to reflect changes in the nature of participants' interests across development. To measure the difference between siblings' reported interests, the absolute value of the differences between the two siblings' ratings was calculated for each of the interest items collected at each phase an overall difference score for each phase was created by summing these individual absolute difference scores, and then calculating the mean difference score of all items in a given phase. Descriptive statistics for Version A of the siblings' differential interests variable can be seen in Table A2.

Version B: Activity Interests Consistent Across All Times. Due to the longitudinal nature of the study, some interests that were age-appropriate at the beginning of the study were eliminated from the scale at later waves when they were no longer thought to be relevant for the age of the participants (i.e. dolls, toy animals, blocks, outdoor play, action figures, and vehicles). Toward developmental equivalence of measurement (Friedman & Haywood, 2013), these activities were replaced with six new interests that reflected the changing interests of the participants (i.e. working out, home repairs, cooking, housework, financial planning, drama/theater). Although this approach maintained the validity of the interests scale, the variation of scale items poses a threat to measurement equivalence if the meaning of the scale changed as items were substituted across phases. To maintain measurement equivalence across all phases of data collection, a version of the “difference between siblings' reported interests” measure was created, which was based on only those 25 activities that were included at all phases of data collection, indicate in Table A1. To measure sibling differences, at each time point the absolute values of the differences between the two siblings' ratings on each of the 25

interest items were summed, and a mean difference score was calculated. Descriptive statistics for Version B of the siblings' differential interests variable can be seen in Table A2.

Version C: Activity interests endorsed by at least one sibling. A concern with the way Versions A and B of sibling differentiation are calculated is that neither takes into account the degree to which members of a sibling dyad are interested in each of the activities mentioned. Thus, for example, by focusing exclusively on the absolute difference between siblings' scores, it is impossible to tell whether an absolute difference of "0" results from siblings' shared interest in a particular activity, or if it is reflective of a mutual lack of interest. This poses a potential problem when coupled with the normative trend of youths' declining interest in all activities across adolescence (Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002), a trend that would result in increasing sibling similarity over time as youths' interests in most activities declined. It is unclear then whether such a trend should be interpreted as a sign of increasing sibling similarity in interests, or as a normative decline unrelated to sibling processes. Another question is whether a mutual lack of interest in an activity is equivalent to sharing a mutual interest in an activity. To avoid this source of uncertainty, a version of the absolute sibling difference variable was created using only those activities in which at least one sibling in each dyad indicated being either "fairly interested" or "very interested" (i.e. a 3 or 4 on the measurement scale). The number of activities eligible for inclusion varied across dyad and across phase, but overall absolute difference scores of siblings' reported activity interests were created as mean scores at each phase. Descriptive statistics for Version B of the siblings' differential interests variable can be seen in Table A2.

Version D: Activity interests in which at least one sibling reported

participation. A final issue addressed was the distinction between passive and active activity interests. The activity instructions for rating interests specified that an activity “can involve actually *doing* the activity--like a sport--, or others' performance of the activity--liking *watching* a sport in person or on TV or *reading* about it. Thus, youths expressing an interest in actively cooking would respond in the same manner as youths expressing an interest in reading about or watching others cook. Thus, endorsed interests may imply a greater degree of similarity between siblings than actually exists: one sibling with an interest in watching sports on television could report the same level of interest as their sibling who enjoyed playing sports. Accordingly, a version of the sibling differential interest variable was created that included only those interests in which siblings reported some degree of active participation. The requirement of participation in an activity as a criterion for inclusion has the additional advantage of better reflecting the ecological constraints on youths' activity choices (e.g. money, time, weather).

To ascertain activity participation, time use data were collected from participants through a series of nightly telephone interviews (five on weekdays and two on weekend days) at Time 1 through Time 5. Youths were asked to report on their daily activities outside of school—specifically, how many times they had participated in a list of free time activities from the time they woke up until the time of the call. For each instance of an activity reported, youths were asked how long they spent engaged in the activity and who else (if anyone) participated with them. A cued-recall procedure was used as the optimal procedure for enhancing memory. Previous work has shown this procedure to provide reliable accounts of daily activities (McHale et al., 2001). The reported activities

were then mapped onto the activities for which youths rated their interest (e.g. both “caring for pets” and “playing with pets” in the time use data met the criterion for participation in the “involvement with pets or animals” interest category). If at least one member of a sibling dyad reported participating in a given activity at some point during the 7 days, that activity was included in the dyad’s difference score calculations for that phase. Due to the variation in number of activities endorsed by each dyad, difference scores for each dyad at each phase were calculated using the mean of the absolute differences.

This method of calculating the absolute difference in siblings’ reported interests was limited to those time points at which time use data were collected—Times 1-5. This truncated the age range of the sample and limited interests to those on which time-use data were collected. Of the 25 activities on which youths rated their interest at each time point, time use data were unavailable for four of them (16%). Additionally, the data only reflected youths’ time use for seven days, which may not have fully captured all of the youths’ activities due to constraints such as weather, sports seasons, and seasonal variation in recreational opportunities. Indeed, the transition from the school year to summertime (the largest consecutive period of out-of-school time) alone may affect a wide range of youth activities, including amounts of discretionary time, hours spent without supervision, and involvement in endeavors such as paid employment and organized activities, each of which may impact youths’ participation in activities (e.g., Apel, Paternoster, Bushway, & Brame, 2006; Capizzano, Adelman, & Stagner, 2002). In addition, the fact that activities are themselves changing and developing entities needs to be taken into account. For example, the time commitment, goals, required skill,

personnel, participants, and resources for a given out-of-school activity often change in the space of months or even weeks, which could significantly alter participants' experiences (Mahoney & Zigler, 2006). Descriptive statistics for Version D of the siblings' differential interests variable can be seen in Table A2.

Analyses

Means were plotted for each version of the siblings' differential interests variable (See Figure 1). Correlation analyses were then performed (See Table 3). The high levels of correlation between versions A, B, and C of the variable led me to conclude that, although each version reflected meaningful theoretical/conceptual nuances, they were not different enough in this sample to warrant pursuing each variable independently. Version D of the variable exhibited very low levels of correlation with the other three versions of the variable. Given the limitations of the data (discussed above), the theoretical basis underlying Version D of the variable are sound, it was not suitable for further analyses. Due to its constancy in the face of developmental change, Version B was selected for use in further analyses.

Table C1.

Activities Used to Calculate Version D of the Sibling Interest Variable.

Home Interview Interests	Equivalent Time Use Interests
Sports, like baseball, football, basketball, soccer, softball, volleyball, tennis, or hockey.	Playing sports, going to watch sporting events
Water Activities, like swimming, diving, sailing, rowing, or canoeing.	Swimming, diving, boating
Gymnastics.	Gymnastics
Dance.	Dance
Hunting and Fishing.	Hunting, fishing
Computer Games, including playing with computers and playing video games.	Play computer games, play video games
Other Games, including board games, puzzles, or cards.	Board games, role-playing games, other games
Hiking, Camping, or Going for Walks.	Hike, camp, walk
Biking or Skating, this includes skateboards, rollerblades, and ice skates (except hockey).	Bike, rollerskate/blade, skateboard, ice skate (except hockey)
Collecting Things, like stamps, coins, rocks, or dolls.	Collect things (stamps, coins, rocks, etc.)
Art, such as drawing, painting, coloring, or working with clay.	Draw, paint, color, or clay
Music, including playing an instrument or listening to music.	Listen to music, play a musical instrument
Handicrafts, including knitting, sewing, or crocheting.	Knit, sew, crochet, or other handicrafts
Reading Stories, Magazines, or Newspapers, not including work activities.	Read books or magazines (not for homework)
Writing, including letters, stories, journals, not including school activities.	Write letters, stories, or poems (not for homework)
Building Things, like in carpentry or building models; <u>not</u> home repairs.	Build things (models, furniture)
Gardening, planting, caring for flower or vegetable gardens; <u>not</u> yardwork.	Gardening (other than yard work)
Language Arts, like reading or writing.	na
Science, like nature studies, biology or astronomy.	na

Table C1, cont.

Activities Used to Calculate Version D of the Sibling Interest Variable.

Math, arithmetic or number problems.	na	
Social Studies, like history, geography or current events.	na	
TV.	Watch tv (sports, educational programs, other) or videos	
Involvement with Pets or Animals, including playing with or "showing" animals.	Pets/animals (not caring for), care for a pet (feed, walk)	
Religious Activities, including going to services, youth groups, or prayer.	Religious activities (attend class, say prayers)	
Civic, Organizational or Club Activities.	Participate in extracurricular groups (school or community)	
*Outdoor Play	Outdoor play (swings, jungle gym, jump rope, hopscotch, tag)	
*Blocks	Play with blocks, Legos, construction sets	
*Dolls	Play with dolls or trolls	
*Toy Animals	Play with toy animals	
*Action Figures	Play with action figures (ex. Power Rangers)	
*Vehicles	Play with vehicles (toy cars, trains, etc.)	
† Working Out	Work out (jog, go to gym, aerobics, weight-lifting)	
† Cooking	Prepare a meal or snack (cook, set table), grocery shopping	N
† Housework	Vacuum, dust, or straighten up, do dishes, laundry	o
† Home repair	Small repairs around the house	t
† Financial Planning	Family finances (pay bills, balance checkbook)	e
† Drama, Theatre	Go to watch a movie, concert, or dancing	.

* = variable collected at Times 1, 2, and 3 only; † = variable collected at Times 4 and 5 only. All other variables collected at Times 1 – 5.

Table C2.

Mean (SD) of Sibling Difference Variable at Each Time Point.

Variable	1	2	3	4	5	6	7	8
Version A	.92 (.25)	1.00 (.24)	.96 (.23)	.93 (.25)	.94 (.25)	.92 (.24)	.93 (.25)	.94 (.20)
Version B	.89 (.27)	.98 (.25)	.95 (.22)	.93 (.26)	.94 (.26)	.92 (.25)	.93 (.26)	.94 (.22)
Version C	.98 (.27)	1.15 (.26)	1.14 (.25)	1.20 (.30)	1.23 (.30)	1.20 (.28)	1.26 (.40)	1.27 (.33)
Version D	1.97 (.58)	1.94 (.59)	2.12 (.68)	2.35 (.72)	2.37 (.82)	-	-	-

Note: Version A = All activity interests

Version B = Activity interests consistent across all eight phases

Version C = Activity interests endorsed by at least one sibling

Version D = Activity interests in which at least one sibling reported participation.

Table C3.

Correlations of Variable Versions at Each Time Point.

		Version A								Version B								Version C					
	Time	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	2	4	5	
Version B	1	.94																					
	2		.92																				
	3			.88																			
	4				.95																		
	5					.95																	
	6						.94																
	7							.95															
	8								.96														
Version C	1	.97								.94													
	2		.91								.89												
	3			.89								.84											
	4				.86								.85										
	5					.85								.82									
	6						.84								.81								
	7							.83								.79							
	8								.66								.64						
Version D	1	.12								.08								.12					
	2		.05								.05								.08				
	3			.20								.18								.19			
	4				.18								.13								.15		
	5					.16								.14								.13	

Note. Version A = All activity interests
 Version B = Activity interests consistent across all eight phases
 Version C = Activity interests endorsed by at least one sibling
 Version D = Activity interests in which at least one sibling reported participation

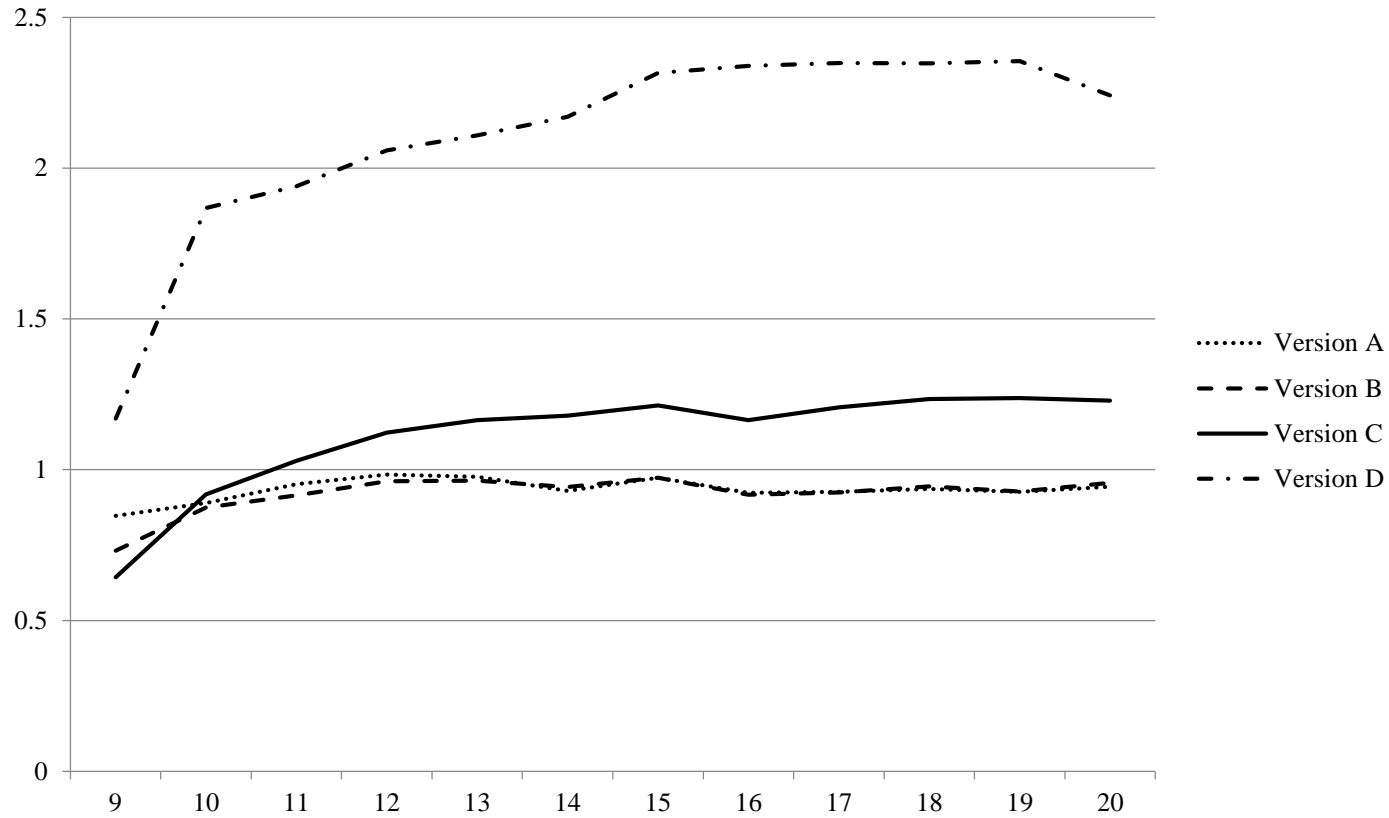


Figure C1. Observed means of four versions of the sibling difference variable.

Note: Version A = All activity interests

Version B = Activity interests consistent across all eight phases

Version C = Activity interests endorsed by at least one sibling

Version D = Activity interests in which at least one sibling reported participation.

Appendix D

Categorization of Interests

Social Comparison Theory (SCT) suggests that individuals have an innate motivation to compare themselves to others (Festinger, 1954). Consistent with SCT, siblings look to each other as a way to evaluate themselves and their standing in the family. As a member of the same family who is often similar in age and upbringing, siblings act as salient and omnipresent benchmarks against which to judge aspects of development and acceptance (Feinberg et al., 2003; Wills, 1991). Siblings make an especially salient point of comparison when children wish to evaluate their worth and standing within their family (Feinberg et al., 2000; Wills, 1991). Comparisons occur not only consciously and intentionally, but also subconsciously and unintentionally (Stapel & Suls, 2004; Suls et al., 2002). Importantly, these comparisons carry implications for individual well-being, but the consequences depend on the direction and valence of the comparison. Downward comparisons, or those evaluations made with those who are perceived as less well off (e.g., less skilled) have been linked with more positive self-concept, well-being, and adjustment. In contrast, upward comparisons, or evaluations made with those who are perceived as better off (e.g., more skilled) tend to be associated with a diminished self-concept, poorer well-being and adjustment (e.g., Mendes et al., 2011; Wheeler & Miyake, 1992).

What may make sibling comparisons so salient, however, is not only the extent to which siblings are different, but also the context in which those differences are made clear. The impact of sibling comparisons on youths' self-concept and sibling relationship may be linked to contextual factors beyond valence, such as how many people are privy

to the comparison or the extent to which differences are made obvious to others. Comparisons that occur in contexts with “higher stakes” contexts (e.g. witnessed by many, clear ranking of respective skills) may be expected to be more meaningful to youths as compared to those that occur in “low stakes” contexts (e.g. relatively private and egalitarian). In an effort to assess the potential moderating role played by contextual factors, two such factors were explored: competitive focus and performance orientation.

Measurement of Activity Interests

The data were drawn from a sample of 201 families (including the mother, father, and first- and second-born children) that participated in a longitudinal study exploring family relationships and youth development. Data collection began in 1995-1996, when participating siblings were in middle childhood, and follow-up data collection occurred on up to eight occasions across 10 years. At each time point, youths were asked to rate their level of interest in each of 25 activities (e.g., sports, music, handicrafts) on a four-point Likert scale (1 = *not very interested*; 4 = *very interested*). Included activities were based on descriptions of children’s time use (Medrich et al., 1982; Newson & Newson, 1976) as well as pilot work with youths from the same communities as the participating families (see Table 2 for list of activities). Activity interest was defined broadly, and included “liking to do an activity, read about an activity, or watch others engaging in the activity” (i.e., it was possible for youths to report interest in an activity in which they did not actively participate).

Competitive Focus

One factor that may influence linkages between sibling differentiation and relationship quality is the extent to which siblings’ activities had a “competitive” focus;

some activities may be more likely to promote rivalry and skills comparison, whereas other activities may be more likely to promote positive or neutral group dynamics. Further, activities that are highly competitive in nature (e.g. sports) may prompt higher levels of sibling conflict, should both siblings engage in them. In contrast, activities that tend to be more collaborative in nature (e.g. cooking, gardening, pet care) may be likely to promote intimacy and reduce conflict, given their reduced incentive for sibling rivalry and comparison.

To test this possibility, raters were asked to categorize each of the activity interests in terms of the extent to which it was competitive vs. collaborative in nature. The four raters had advanced degrees (M.S. or PhD.) in Human Development and Family Studies. Raters were asked to rate each of the activity interests examined in the study as being either “Competitive,” “Collaborative,” or “Neither.” Each rater was provided with a list of the relevant interests and only one rating was allowed per activity interest. Ratings were made independently, although a research assistant was available for clarifications as necessary.

After all raters had completed their assessments (see Table B1), results were examined for consensus. Inter-rater reliability was calculated using Fleiss’ kappa, a measure of the reliability of agreement between a fixed number of raters when assigning categorical ratings to a number of items or classifying items. This contrasts with other kappas such as Cohen's kappa, which are used when assessing agreement between two raters. The Fleiss measure calculates the degree of agreement in classification above what which would be expected by chance. Analyses revealed that raters did not reach an acceptable level of agreement ($k = .175$) (Landis & Koch, 1977). Discussion with raters

revealed that their ratings were highly tentative, and that they could easily imagine scenarios in which a different rating was more accurate. Additionally, the competitive focus within an activity category was difficult to ascertain (e.g. in the “playing games” category, working on puzzles was seen as collaborative, but playing cards was thought to be competitive). Raters suggested that a greater level of specificity in the activities being ranked would be needed to have more confidence in ratings of performance orientation. With these findings in mind, it was determined that there was not enough confidence in the ratings to warrant further analyses.

Performance Orientation

Similarly, activities that emphasize public performance (e.g. dance, gymnastics) may be particularly likely to promote comparison and rivalry between siblings—which would be theorized to increase conflict and decrease intimacy. Although upward comparisons may result in negative self-evaluation (Mendes et al., 2011; Wheeler & Miyake, 1992), this potential may become larger when differences in siblings’ skills are witnessed routinely by others. This may be particularly true during adolescence, a developmental period in which appraisal by others becomes especially important to self-concept (Harter, 1999).

To test this possibility, raters were asked to categorize each of the activity interests according to their performance orientation. Each of the four raters had an advanced degree (M.S. or PhD.) in Human Development and Family Studies. To force participants to make a choice, rather than offering a “Neither” option, raters were asked to rate activity interests dichotomously: having either a low performance orientation or a

high performance orientation. Ratings were made independently, with a research assistant available for clarifications as necessary.

After all raters had completed their assessments (see Table B2), results were examined for consensus. Inter-rater reliability was calculated using Fleiss' kappa, a statistical measure for assessing the reliability of agreement between a fixed number of raters when assigning categorical ratings to a number of items or classifying items. Analyses revealed a kappa of .70, or "considerable agreement" (Landis & Koch, 1977). Examination of ratings, however, revealed that, for 10 of the 36 interests, at least half of the raters were not able to decide whether it was competitive or collaborative, selecting "neither." Discussion with raters revealed that their ratings for all activities were highly tentative, and that they could easily imagine scenarios in which a different rating was more accurate. The competitive focus within an activity category seemed to be difficult to ascertain; for example, in the "music" category, listening to music was not thought to be performance oriented, but playing an instrument was. Raters suggested that a greater level of specificity in the activities being ranked would be needed to have more confidence in ratings of performance orientation. With these findings in mind, it was determined that, despite the acceptable kappa, there was not enough confidence in the ratings to warrant additional analyses.

Table D1.

Categorization of Activity Interests by Competitive Nature.

Type of Activity	Competitive	Collaborative	Neither
Sports, like baseball, football, basketball, soccer, softball, volleyball, tennis, or hockey.	100% (4)		
Water Activities, like swimming, diving, sailing, rowing, or canoeing.	25% (1)	25% (1)	50% (2)
Gymnastics.	100% (4)		
Dance.	50% (2)	25% (1)	25% (1)
Hunting and Fishing.	25% (1)	25% (1)	50% (2)
Computer Games, including playing with computers and playing video games.	25% (1)	75% (3)	
Other Games, including board games, puzzles, or cards.	50% (2)	50% (2)	
Hiking, Camping, or Going for Walks.		100% (4)	
Biking or Skating, this includes skateboards, rollerblades, and ice skates (except hockey).	25% (1)	50% (2)	25% (1)
Collecting Things, like stamps, coins, rocks, or dolls.	25% (1)	25% (1)	50% (2)
Art, such as drawing, painting, coloring, or working with clay.	25% (1)	50% (2)	25% (1)
Music, including playing an instrument or listening to music.	25% (1)	50% (2)	25% (1)
Handicrafts, including knitting, sewing, or crocheting.		75% (3)	25% (1)
Reading Stories, Magazines, or Newspapers, not including work activities.		25% (1)	75% (3)
Writing, including letters, stories, journals, not including school activities.		25% (1)	75% (3)
Building Things, like in carpentry or building models; <u>not</u> home repairs.	25% (1)	75% (3)	
Gardening, planting, caring for flower or vegetable gardens; <u>not</u> yardwork.		100% (4)	
Working Out, including jogging, aerobics.		50% (2)	50% (2)
Language Arts, like reading or writing.	25% (1)		75% (3)
Science, like nature studies, biology or astronomy.	50% (2)	25% (1)	25% (1)
Math, arithmetic or number problems.	75% (3)		25% (1)
Social Studies, like history, geography or current events.	25% (1)		75% (3)
Cooking, baking, preparing or planning meals.		100% (4)	
Housework (e.g. laundry, cleaning).		75% (3)	25% (1)
Home Repairs, fixing things.		100% (4)	
Financial Planning, investing, budgeting, keeping track of money.		50% (2)	50% (2)
Drama/Theater, going to/participating in plays, musicals.	25% (1)	75% (3)	
TV.		50% (2)	50% (2)
Involvement with Pets or Animals, including playing with or "showing" animals.		50% (2)	50% (2)
Religious Activities, including going to services, youth groups, or prayer.		75% (3)	25% (1)
Civic, Organizational or Club Activities.		75% (3)	25% (1)
Outdoor Play		100% (4)	
Blocks		75% (3)	25% (1)
Dolls		75% (3)	25% (1)
Toy Animals		75% (3)	25% (1)
Action Figures		75% (3)	25% (1)

Table D2.

Categorization of Activity Interests by Performance Orientation.

Type of Activity	High Performance Orientation	Low Performance Orientation
Sports, like baseball, football, basketball, soccer, softball, volleyball, tennis, or hockey.	100% (4)	0
Water Activities, like swimming, diving, sailing, rowing, or canoeing.	100% (4)	0
Gymnastics.	100% (4)	0
Dance.	50% (2)	50% (2)
Hunting and Fishing.	25% (1)	75% (3)
Computer Games, including playing with computers and playing video games.	50% (2)	50% (2)
Other Games, including board games, puzzles, or cards.	50% (2)	50% (2)
Hiking, Camping, or Going for Walks.	0	100% (4)
Biking or Skating, this includes skateboards, rollerblades, and ice skates (except hockey).	50% (2)	50% (2)
Collecting Things, like stamps, coins, rocks, or dolls.	0	100% (4)
Art, such as drawing, painting, coloring, or working with clay.	100% (4)	0
Music, including playing an instrument or listening to music.	75% (3)	25% (1)
Handicrafts, including knitting, sewing, or crocheting.	50% (2)	50% (2)
Reading Stories, Magazines, or Newspapers, not including work activities.	0	100% (4)
Writing, including letters, stories, journals, not including school activities.	25% (1)	75% (3)
Building Things, like carpentry or building models; <u>not</u> home repair	75% (3)	25% (1)
Gardening, planting, caring for flower or vegetable gardens; <u>not</u> yardwork.	0	100% (4)
Working Out, including jogging, aerobics.	50% (2)	50% (2)
Language Arts, like reading or writing.	75% (3)	25% (1)
Science, like nature studies, biology or astronomy.	100% (4)	0
Math, arithmetic or number problems.	100% (4)	0
Social Studies, like history, geography or current events.	75% (3)	25% (1)
Cooking, baking, preparing or planning meals.	50% (2)	50% (2)
Housework (e.g. laundry, cleaning).	0	100% (4)
Home Repairs, fixing things.	25% (1)	75% (3)
Financial Planning, investing, budgeting, keeping track of money.	0	100% (4)
Drama/Theater, going to/participating in plays, musicals.	75% (3)	25% (1)
TV.	0	100% (4)
Involvement with Pets or Animals, including playing with or "showing" animals.	25% (1)	75% (3)
Religious Activities, including going to services, youth groups, or prayer.	0	100% (4)
Civic, Organizational or Club Activities.	25% (1)	75% (3)
Outdoor Play	0	100% (4)
Blocks	0	100% (4)
Dolls	0	100% (4)
Toy Animals	0	100% (4)
Action Figures	0	100% (4)

Curriculum Vitae

Susan E. Doughty

- August 2011 MS, Human Development and Family Studies
The Pennsylvania State University, University Park, Pennsylvania
Thesis: *Sibling experiences as predictors of romantic relationship experiences in adolescence*
Advisor: Dr. Susan M. McHale
- May 2009 BA, Psychology
Bucknell University, Lewisburg, Pennsylvania
Undergraduate Honors/Psychology Thesis: *Assessing support sensitivity: What makes a good social support provider?*
Advisor: Dr. John T. Ptacek
Cum honore graduate, Magna cum laude graduate

Doughty, S. E., Lam, C. B., Stanik, C. S., & McHale, S. M. (2014). Links between sibling experiences and romantic competence from adolescence through young adulthood. *Journal of Youth and Adolescence*.

Doughty, S. E., McHale, S. M., & Feinberg, M. E. (2015). Sibling experiences as predictors of romantic relationship qualities in adolescence. *Journal of Family Issues*.