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Competing Processes of Sibling Influence: Observational Learning and Sibling Deidentification

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Abstract

Although commonly cited as explanations for patterns of sibling similarity and difference, observational learning and sibling deidentification processes have rarely been examined directly. Using a person-oriented approach, we identified patterns in adolescents' perceptions of sibling influences and connected these patterns to sibling similarities and differences and sibling relationship qualities. Participants included two adolescent-age siblings (firstborn age M = 16.39, second-born age M = 13.78) from 171 maritally intact families. Two-stage cluster analyses revealed three sibling influence profiles: modeling, deidentification, and non-reference. Analyses revealed differences in the correlations between firstborn and second-born siblings' personal qualities across the three groups and differences in the sibling relationship qualities of younger siblings who reported modeling vs. those who reported deidentifying from their older siblings. Discussion focuses on refining the study of sibling influence processes.

Keywords: sibling influence; sibling deidentification; observational learning; modeling

Despite notable declines in fertility rates, US Census data reveal that most children in the USA grow up with at least one sibling (Hernandez, 1997), and a body of work suggests that siblings are fixtures of children's family lives. For example, children and adolescents spend more time with and participate in more activities with their siblings than with either parents or peers outside of school hours (Larson & Richards, 1994; McHale & Crouter, 1996). In addition to acting as companions or social partners, older siblings often serve as models, advisors, and caregivers for their younger sisters and brothers (e.g., Brody & Murry, 2001; Tucker, Updegraff, McHale, & Crouter, 1999; Weisner, 1989; Zukow-Goldring, 1995). Recognition of siblings' significance in each other's everyday lives undergirds scholars' interest in the ways in which siblings influence one another's development.

Research and theory highlight several ways in which siblings may influence one another. For example, social learning mechanisms (e.g., observational learning or

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modeling) have been proposed as one basis for sibling influences, specifically as a basis for why siblings develop similar attributes, attitudes, and behaviors. In their role as models, siblings (especially older siblings) are thought to act as socialization agents. In contrast, there is also evidence suggesting that siblings may exert themselves to become different from one another, a process that has been termed sibling deidentification (Schacter, Gilutz, Shore, & Adler, 1978; Schacter, Shore, Feldman-Rotman, Marquis, & Campbell, 1976). Through deidentification processes, siblings are thought to develop distinct attributes and engage in different activities and behaviors in order to establish their unique identities within the family.

In the face of these two competing perspectives on sibling influences, our knowledge about these influence processes is limited because they have never been studied directly. Instead, inferences have been made about the operation of these processes based on patterns of association between siblings' personal qualities (i.e., positive associations equate to modeling and negative associations equate to deidentification). Additionally, because most studies have focused on one sibling influence process or the other (i.e., studies have looked for evidence of observational learning *or* sibling deidentification processes), the question of whether these processes operate independently or in concert is unknown. The goals of the present study were to learn more about the operation and potential significance of sibling influence processes and to investigate the conditions under which these processes occur by assessing younger siblings' perceptions of the extent to which they model and/or deidentify from their older siblings. The focus was on younger siblings given theory and research documenting that older siblings have greater influence on younger siblings than the reverse (e.g., Brim, 1958; Bryant, 1982; Cicirelli, 1975; Sutton-Smith & Rosenberg, 1970; Tucker et al., 1999).

Observational Learning

As noted, one reason why siblings are similar to one another is as a result of observational learning and imitation. In the family context, because of their age and higher status within the family, the tenets of observational learning theory underscore that older siblings are salient models for younger siblings (Mischel, 1966), and congruent with observational learning predictions, similarities between adolescent siblings have been demonstrated across many domains including: childbearing and sexual behavior (Cox, DuRant, Emans, & Woods, 1995; East, 1998; Rodgers & Rowe, 1988; Rodgers, Rowe, & Harris, 1992); health risk behaviors (D'Amico & Fromme, 1997); smoking, alcohol, and drug use (e.g., Ary, Tildesley, Hops, & Andrews, 1993; Bard & Rodgers, 2003; Brook, Whiteman, Gordon, & Brenden, 1983; Needle, McCubbinn, Wilson, Reineck, Lazar, & Mederer, 1986; Slomkowski, Rende, Novak, Lloyd-Richardson, & Niaura, 2005); and aggression and delinquency (e.g., Bank, Patterson, & Reid, 1996; Patterson, 1984, 1986; Rowe & Gulley, 1992; Rowe, Rodgers, & Meseck-Bushey, 1992; Slomkowski, Rende, Conger, Simons, & Conger, 2001). In addition to research on risky and deviant behaviors, other studies have shown similarities in siblings' adaptive personal qualities such as empathy (Tucker et al., 1999), gender roles (McHale, Updegraff, Helms-Erikson, & Crouter, 2001), and social competencies (Stormshak, Bellanti, & Bierman, 1996).

Observational learning theory posits that imitation is more likely when models possess three characteristics: (1) power; (2) nurturance; and (3) similarity to the observer (Mischel, 1966). Of relevance to the present study is that older siblings may

be especially likely to possess these qualities in the eyes of younger sisters and brothers, thereby making them salient models. For example, research shows that, through their leadership roles as tutors, managers, and caregivers, older siblings often provide younger siblings with models as well as explicit direction for how to behave; younger siblings serve in the corresponding roles of learners and supervisees (Azmitia & Hesser, 1993; Brody, Stoneman, & MacKinnon, 1982; Brody, Stoneman, MacKinnon, & MacKinnon, 1985). Adherence to these complementary roles is probably one reason why younger siblings perceive their older brothers and sisters as powerful and even bossy (Fine, 1986).

Because similarity is thought to enhance imitation (e.g., Bandura, 1977; Sutton-Smith & Rosenberg, 1970), modeling effects should be more pronounced for same-sex than for opposite sex siblings. Consistent with the tenet that modeling is more likely in the context of a nurturing relationship, research also documents that sibling similarity is most evident when sibling relationships are warm and close (e.g., Rowe & Gulley, 1992; Slomkowski et al., 2001, 2005). Such findings, coupled with literature on sibling relationship quality that shows that same-sex sibling dyads (especially sister-sister dyads) experience more warmth and intimacy (Buhrmester, 1992; Hetherington, 1991; Tucker, Barber, & Eccles, 1997), leads to the hypothesis that modeling and imitation processes should be more evident in same-sex sibling dyads as compared to mixed-sex dyads.

Sibling Deidentification

Despite a growing literature on sibling similarity suggesting that modeling may be important in explaining brothers' and sisters' commonalities, behavioral geneticists point out that two siblings growing up together are often no more alike than unrelated youth (e.g., Dunn & Plomin, 1990; Plomin & Daniels, 1987; Rowe, 1990; Rowe & Plomin, 1981). Although behavioral geneticists have suggested that differences between siblings emerge because of non-shared genes and environments, they may also arise through sibling deidentification processes (Feinberg & Hetherington, 2000).

Originally proposed in the writings of Alfred Adler (Ansbacher & Ansbacher, 1956), sibling deidentification refers to the tendency for siblings to consciously or unconsciously define themselves as different from one another in order to reduce competition, establish their own identities within the family, and garner their share of parental love and attention (Ansbacher & Ansbacher, 1956; Schacter et al., 1976, 1978). Grounding their ideas in Adler's individual psychology, theorists have offered somewhat different explanations for sibling deidentification (Festinger, 1954; Schacter et al., 1976, 1978; Sulloway, 1996; Tesser, 1980). Despite their theoretical and conceptual distinctions, however, most explanations of sibling deidentification include a common theme: that siblings protect themselves from social comparison and rivalry by defining themselves differently from one another. Towards the end of reducing competition, sibling deidentification processes are posited to operate more strongly when siblings are more objectively similar (Schacter & Stone, 1985; Schacter et al., 1976, 1978). Thus, in direct contrast to the propositions of observational learning theory, deidentification theory suggests that sibling differences should be most evident when siblings are similar in age and when siblings share the same sex.

Although investigated less extensively than observational learning processes, a small set of studies has found evidence for the propositions of sibling deidentification theory. Firstly, in two studies of siblings' personality characteristics, Schacter et al.

(1976, 1978) documented that deidentification dynamics were more prevalent for siblings who were more similar in age. Specifically, they found that consecutively born children (i.e., firstborn and second-born; second-born and third-born) were more different than 'jump-pairs' (i.e., firstborns and third-borns). Also consistent with the predictions of sibling deidentification theory, Schacter and colleagues found that differentiation between siblings was most evident in same-sex sibling dyads. In the area of vocational interests as well, Grotevant (1978) found that girls with sisters reported fewer feminine interests than did girls with brothers. Finally, studying siblings' gender role orientations, McHale et al. (2001) found that firstborn adolescent-age siblings became more different from their younger siblings over time.

Goals of the Present Study

To date, studies of sibling influence have been limited by the fact that they do not measure sibling influence processes (i.e., modeling, differentiation) directly, but rather invoke observational learning and sibling deidentification mechanisms as *post hoc* explanations for observed similarities and differences between siblings. The present study takes one step toward studying sibling influence processes directly by measuring younger siblings' perceptions of how often they try to be like and how often they try to be different from their older siblings in four domains: athletics, arts, academics, and conduct/risky behavior. The literature on sibling influence processes is also limited by the fact that most research has looked for evidence of observational learning *or* sibling deidentification. Although posited as independent processes, whether these processes operate independently or whether they act in concert is unknown. It is possible, for example, that siblings may try to be like one another in certain areas, while exerting themselves to be different in other areas. Accordingly, the present study assessed the *patterning* of younger siblings' reports of these sibling influence dynamics across the four domains of interest. Such an approach is congruent with the call for 'person-oriented' analytic approaches by developmental scholars (e.g., Magnusson & Cairns, 1996).

Because the present study focused on modeling and deidentification dynamics in four domains, a second goal was to connect reported patterns of influence to similarities and differences in firstborn and second-born siblings' functioning in each domain. Specifically, we assessed siblings' participation in athletic and art activities, their school achievement, and their risky behavior, and tested the hypothesis that there would be higher correlations between older and young siblings' personal qualities when younger siblings reported that 'they try to be like' their brothers and sisters, but lower correlations between siblings' personal qualities when younger siblings reported 'trying to be different' from their siblings.

In the face of research and theory suggesting that the nature and quality of sibling relationships may be related to the operation of modeling and deidentification processes, we know little about the links between sibling relationship dynamics and these sibling influence processes. One way this issue has been addressed has been to examine whether sibling relationship qualities moderate observed patterns of sibling similarity (e.g., Rowe & Gulley, 1992; Slomkowski et al., 2001, 2005). For example, in studying sibling similarities in smoking behaviors, Slomkowski et al. (2005) documented that sibling similarity was most evident in dyads with high levels of warmth. Such results are consistent with the notion that individuals are most likely to imitate warm models. By illuminating some of the dynamics underlying sibling similarities, findings like

these provide a stronger foundation for inferences about the operation of observational learning processes in sibling similarity. By connecting youth's reports of modeling and deidentification to sibling relationship qualities such as intimacy and hostility, our goal was to further our understanding of sibling influence mechanisms. Given the competing predictions about the role of similarity in social influence postulated by observational learning theory vs. sibling deidentification theory, all of our analyses took into account the gender constellation of the sibling dyad. Specifically, we expected that modeling and deidentification dynamics would be more evident in same-sex as compared to mixed-sex sibling dyads.

Method

Participants

Data were drawn from a longitudinal study of family relationships. Data from Study Years 6 and 7 were used here because it was in those years that measures central to the questions of interest were collected. In Study Year 6 (the year in which the primary data for the present analyses were collected), the participants included 171 maritally intact families with two adolescent-age siblings ($M = 16.39$, $SD = .76$ years of age for first-born siblings; $M = 13.78$, $SD = 1.13$ years of age for second-born siblings). The sibling dyads were almost equally divided by the sex constellation of the sibling dyad (47 sister-sister pairs, 48 sister-brother pairs, 36 brother-sister pairs, and 40 brother-brother pairs). Approximately 40 percent of the families included children younger than the second-born sibling. Reflecting the demographics of the small towns, cities, and rural areas where they resided, families were almost exclusively White and working and middle class. In these families, less than 1 percent of parents had not completed high school, 24 percent had high school educations (grade 12), 30 percent had some college or vocational training, 23 percent were college graduates, and 22 percent had post-graduate or professional degrees.

To generate the sample, families were recruited through letters sent home with fourth or fifth graders in school districts throughout a northeastern state. These school districts were generally small in size (on average, about 200 students per grade) and served the rural communities and small cities of the region. Families were informed that the researchers were interested in studying 'the challenges of rearing children in contemporary US society'. Interested families returned a postcard to the project and were contacted by phone to confirm whether they fit the criteria for participation: that parents were not divorced and that the family included two siblings in the targeted age range. This recruitment strategy meant that we did not have a count of how many families meeting our criteria failed to volunteer. Of those families who returned postcards to us and who met our criteria, however, more than 90 percent agreed to participate.

Although the sample is not representative of US families, in general, it comes close to capturing the racial background of families from the region of the northeastern state where the data were collected (>94 percent White) and the economic background of dual-earner families in that state. US Census data gathered in 2000, for example, indicated that 33 percent of all families in the state consisted of married couples with children under the age of 18 living in the home. Additionally, census data revealed that the average family income in the state was $49 184. In 2001 (Study Year 6), the average family income for the present sample was $83 124. Income in project families should

be higher than the state average because our sample included only two-parent and virtually only two-earner families with adolescent-age children (i.e., parents who were older and in the labor force for a greater period of time), but the income figures suggest that project families were more affluent than average.

Procedures

Two data collection procedures were employed. Firstly, interviews that averaged between two and three hours in duration were conducted with mothers, fathers, and both firstborn and second-born offspring. Informed consent/assent was obtained from each family member, the family received an honorarium of $200 for their participation, and then family members participated separately in semi-structured interviews and completed individually administered questionnaires.

During the two to four-week period following the home interviews, a series of seven evening telephone interviews was also conducted (five calls on weekdays, two calls on weekends). Both siblings participated in all seven calls, and mothers and fathers each completed four calls (i.e., on three weeknights and one weekend night, for each parent). The telephone interview focused on siblings' involvement in daily activities (e.g., chores and leisure), including how long each activity lasted and who else participated in that activity (e.g., siblings, parents, and friends).

Measures

Sibling Influence Processes. Modeling and sibling deidentification processes were assessed during the semi-structured interviews using a measure created for this study and administered in Study Year 6. Across four separate domains (athletics, arts, academics, and conduct) second-born siblings were asked to rate, on a scale of 1 (never) to 5 (all of the time), how often they: (1) tried to be like their sibling in that domain; (2) tried to be different from their sibling in that domain; and (3) competed with their sibling in that domain.

Siblings' Similarities and Differences. Firstborn and second-born siblings' participation in athletic and art activities was indexed by their reports, summed across the seven nightly phone calls, of how many minutes they had engaged in athletic and artistic activities. Athletic activities included youth's reports of their participation in sports (baseball, football, basketball, soccer, softball, volleyball, and hockey), swimming and diving, and gymnastics ($M = 80.83$, $SD = 97.52$ minutes for firstborns; $M = 99.07$, $SD = 99.30$ minutes for second-borns). Artistic activities included youth's reports of their participation in art (drawing, painting, coloring, or clay) and playing a musical instrument ($M = 26.58$, $SD = 55.78$ minutes for firstborns; $M = 20.73$, $SD = 38.96$ minutes for second-borns). Because the distributions of scores for time spent in athletic and artistic activities were positively skewed, square root transformations were applied. Overall, firstborn and second-borns' time spent in athletic ($r = .35$, $p < .01$) and artistic ($r = .36$, $p < .01$) activities were positively correlated.

Firstborn and second-born siblings' school grades were obtained in Study Year 6 from their most recent report cards; grade point averages were calculated based on grades in math, social studies, science, and language arts. Letter grades (A–F) were assigned numerical scores (A = 4, B = 3, C = 2, D = 1, E/F = 0) such that higher scores

indicated higher grades ($M = 3.27$, $SD = .68$ for firstborns; $M = 3.31$, $SD = .67$ for second-borns). Overall, firstborn and second-borns' grade point averages were positively correlated, $r = .26$, $p < .01$.

Firstborn and second-borns' risky behavior was measured in Study Year 6 via Eccles and Barber's (1990) 18-item index of the frequency of youth's participation in risky behaviors (e.g., 'Drink alcohol without your parents' permission'). On this measure, youth were asked to report on a scale of 1 (never) to 4 (more than 10 times) how often they engaged in 18 different risky behaviors during the past year. Scores were summed such that higher scores indicated greater participation in risky behaviors. Total scores could range from 18 to 72 ($M = 26.41$, $SD = 7.76$ for firstborns; $M = 23.56$, $SD = 6.37$ for second-borns). Cronbach's alphas were .89 and .91 for firstborn and second-borns' reports, respectively, and firstborn and second-borns' reports were correlated, $r = .19$, $p < .05$.

Sibling Relationship Qualities. Intimacy in the sibling relationship was rated by both firstborn and second-born siblings in Study Years 6 and 7 using an adaptation of an eight-item questionnaire developed by Blyth, Hill, and Thiel (1982). Specifically, youth rated their experiences with their sibling on a scale ranging from 1 (not at all) to 5 (very much). An example item is: 'How much do you go to your brother/sister for advice/support?' One item, 'How much do you try to be like your brother/sister?' was removed from the scale because of the conceptual overlap with the modeling scale. Intimacy scores were summed across the seven items, with higher scores representing greater intimacy. Total scores could range from 7 to 35 ($M = 21.35$, $SD = 4.83$ for firstborns in Study Year 6; $M = 22.14$, $SD = 4.70$ for firstborns in Study Year 7; $M = 21.62$, $SD = 4.92$ for second-borns in Study Year 6; $M = 22.05$, $SD = 5.29$ for second-borns in Study Year 7). Cronbach's alphas for reports of intimacy were acceptable, ranging from .81 to .83 for firstborns and second-borns, and Pearson's correlations revealed that firstborn and second-born siblings' reports of intimacy were both stable ($r = .69$, for firstborns; $r = .66$, for second-borns) and correlated with one another (rs range from .42 to .54).

Negativity in the sibling relationship was rated by youth in Study Years 6 and 7 via a five-item scale from Stocker and McHale's (1992) sibling relationship inventory. Specifically, using a five-point scale ranging from 1 (not at all) to 5 (very much), youth rated the frequency with which they behaved in particular ways toward their siblings (e.g., 'How often do you feel mad or angry at your brother/sister?'). Negativity scores were summed across the five items, with higher scores representing greater negativity. Total scores could range from 5 to 25 ($M = 13.02$, $SD = 3.06$ for firstborns in Study Year 6; $M = 12.17$, $SD = 3.23$ for firstborns in Study Year 7; $M = 13.28$, $SD = 3.32$ for second-borns in Study Year 6; $M = 12.51$, $SD = 3.25$ for second-borns in Study Year 7). Cronbach's alphas for reports of negativity were acceptable, ranging from .73 to .76 for firstborns and second-borns. Pearson's correlations revealed that firstborn and second-born siblings' report of negativity were stable ($r = .61$, for firstborns; $r = .60$, for second-borns) and correlated (rs range from .28 to .35).

Siblings' dyadic involvement was assessed in Study Years 6 and 7 using data collected in the telephone interviews. Specifically, youth's reports of the time spent in activities with their sibling were aggregated across the seven telephone interviews to create a measure of total time with sibling. Higher scores represent more time (in minutes) spent together across the seven days. Because the two siblings reported on time spent together and because their reports were highly correlated ($r = .92$ and .96 for

Study Years 6 and 7, respectively), the index of siblings' dyadic involvement was the average of firstborn and second-born siblings' reports of time spent together ($M = 530.56$, $SD = 352.13$ for Study Year 6; $M = 448.08$, $SD = 366.68$ for Study Year 7). Dyadic involvement was stable across phases, $r = .64$, $p < .01$.

Results

Results are organized around the three study goals: (1) to describe the patterning of second-born's reports of modeling and deidentification in the domains of athletics, arts, academics, and conduct *vis-à-vis* their older siblings; (2) to connect sibling influence patterns to similarities and differences between firstborn and second-born siblings in time spent in athletic and artistic activities, school grades, and frequency of risky behavior; and (3) to assess the relation between patterns of sibling influence and sibling relationship qualities across time.

The Patterning of Sibling Modeling and Deidentification Processes

In order to capture the patterning of sibling influence processes, cluster analysis was used. Specifically, younger siblings' reports of modeling ('try to be like'), deidentification ('try to be different'), as well as the degree of sibling competition in four domains (athletics, arts, academics, and conduct) were subjected to cluster analysis.[1] For all analyses, younger siblings' reports of modeling, deidentification, and competition were standardized with a mean of zero and a standard deviation of one so that variables with larger variances did not unduly affect the cluster structures (Blashfield & Aldenderfer, 1988).

Following recent research (e.g., Allen & Olson, 2001; Fowers & Olson, 1992; Lavee & Olson, 1993), a two-step method of clustering was used. Firstly, a hierarchical cluster analysis was conducted, using a cosine index of similarity with unweighted pair group mean averaging (or average) linkage; a cosine index was chosen given our interest in patterning of sibling modeling and deidentification. Secondly, an additional cluster analysis utilizing the *k*-means method was used to determine whether the cluster structure found with the hierarchical cluster technique was replicable. Because the *k*-means method is sensitive to how the data are organized and requires the researcher to specify the number of clusters *a priori*, the data were organized (i.e., sorted and number of clusters determined) by the results of the hierarchical cluster structure. Despite its sensitivities, when used in conjunction with other clustering methods, the *k*-means method has been shown to be an effective method of replication (Blashfield & Aldenderfer, 1988).

Two-step Cluster Analysis. On the basis of several stopping criteria (e.g., careful inspection of the dendrogram, ability of solutions to differentiate outcome measures, interpretableness, cell size, and ability of the solution to replicate using the *k*-means method), a three group solution was selected as the best characterization of the data. Comparing the hierarchical and *k*-means solutions revealed strong agreement, $\chi^2(df = 2) = .12$, $p = .94$. The final cluster structures from the *k*-means analysis, presented in Figure 1, revealed evidence for a deidentification group (high on trying to be different from the older sibling, low on trying to be like the older sibling, and low levels of competition across all four domains; N = 46) and a modeling group (high on trying to be like the older sibling, average on trying to be different from the sibling, and above

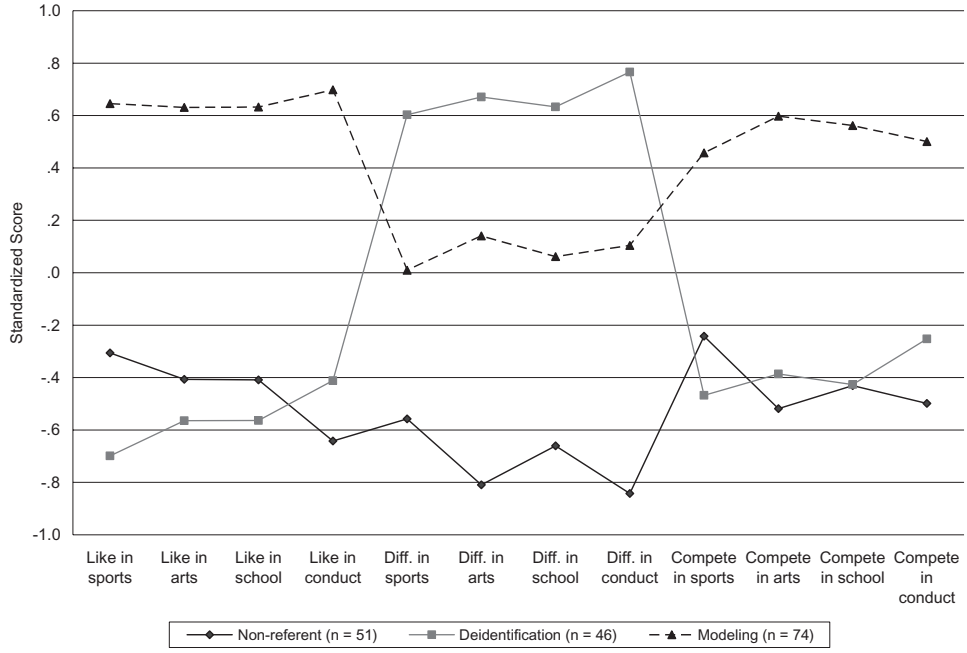

Figure 1. Profiles of Sibling Influence Processes for Final Three-cluster Solution.

average competition across all four domains; N = 74). Furthermore, the solution revealed what we labeled a non-referent group (low on trying to be both like and different from the older sibling, and low levels on competition across all four domains; N = 51) to reflect younger siblings' seeming lack of investment in the sibling relationship.

Describing the Three-cluster Solution. To ascertain whether the obtained cluster patterns differed significantly from zero (i.e., average) on the items that were used to create them, we calculated 95 percent confidence intervals around the mean for each item for each cluster. The modeling group was characterized by significantly above average endorsement of the trying to be like items, average endorsement (i.e., not different than zero) of the trying to be different items, and significantly above average endorsement of the competition items. The deidentification group was typified by significantly below average endorsement of the trying to be like items, significantly above average endorsement on the trying to be different items, and significantly below average endorsement of the competition items with the exception of competing in conduct. The non-referent group was characterized by significantly below average ratings of the trying to be like items, significantly below average ratings of the trying to be different items, and significantly below average ratings of the competition items with the exception of competing in sports.

Next, a series of one-way analyses of variance (ANOVAs) was conducted to test differences between the three clusters on each of the measures used to create them. In each instance, cluster membership was used as the independent variable, and the measures of sibling influence processes (i.e., try to be like or different in each of the domains as well as the degree of competition in each domain) were the dependent variables. As can be seen in Table 1, ANOVAs with Tukey follow-ups revealed that the

Table 1. Unstandardized Means (and Standard Deviations) for Group Comparisons of Sibling Influence Process Variables for the K-Means Solutions

Sibling Influence Process	Deidentify (N = 46)	Model (N = 74)	Non-Referent (N = 51)
Try to be like in sports	1.63[a] (.80)	3.23[b] (1.07)	2.10[c] (.96)
Try to be like in the arts	1.37[a] (.53)	2.73[b] (1.20)	1.55[a] (.83)
Try to be like in academics	1.74[a] (.93)	3.30[b] (1.20)	1.94[a] (1.05)
Try to be like in conduct	1.72[a] (.72)	2.91[b] (.98)	1.47[a] (.73)
Try to be different in sports	3.78[a] (1.03)	3.12[b] (.98)	2.49[c] (1.03)
Try to be different in the arts	3.54[a] (1.21)	2.88[b] (1.01)	1.68[c] (.91)
Try to be different in academics	3.65[a] (1.02)	3.00[b] (.92)	2.18[c] (1.09)
Try to be different in conduct	3.72[a] (.96)	2.95[b] (.93)	1.84[c] (.88)
Compete in sports	2.15[a] (.94)	3.22[b] (1.11)	2.41[a] (1.06)
Compete in the arts	1.39[a] (.61)	2.26[b] (.91)	1.27[a] (.60)
Compete in academics	1.85[a] (.89)	3.04[b] (1.20)	1.84[a] (.97)
Compete in conduct	1.72[a] (1.00)	2.47[b] (1.00)	1.47[a] (.61)

Note: Higher scores on all sibling influence variables indicate higher endorsement of the process.
[a,b,c] Across different rows superscripts indicate significant differences between clusters according to Tukey's Honestly Significant Differences (HSD), $p < .05$.

modeling and deidentification groups differed on all domains; in contrast, the non-referent group differed from the deidentification groups on about half of the measures and from the modeling group on all of the measures.

In contrast to the predictions of both observational learning and sibling deidentification theory, chi-squared analyses revealed that the groups from the three cluster *k*-means solution were independent of the sex constellation of the sibling dyad ($\chi^2(df = 6) = 7.74$, NS); they also were balanced in terms of males and females, ($\chi^2(df = 2) = 3.38$, NS). An additional series of one-way ANOVAs revealed that the cluster groups did not differ in terms of family income ($F(2, 159) = 0.62$, NS), parents' average level of education ($F(2, 168) = 1.10$, NS), sibling age spacing ($F(2, 168) = 1.57$, NS), or family size ($F(2, 168) = 2.74$, NS).

Sibling Influence Processes and Sibling Similarities and Differences

In order to assess how youth's perceptions of sibling influences were linked to sibling similarities and differences, a series of zero-order correlations was conducted. Specifically, Pearson's correlations were calculated separately for each of the three cluster groups (i.e., deidentification, modeling, and non-referent groups) to assess the associations between older and younger siblings' scores on: (1) time spent in athletic activities; (2) time spent in artistic activities; (3) school grades; and (4) risky behavior. Then, the correlations for the clusters were compared using Fisher's *r*-to-*z* transformations. Given our directional hypotheses about differences between the deidentification and modeling groups, 90 percent confidence intervals were computed around the difference scores of the groups. However, because no *a priori* hypotheses existed

Table 2. Correlations between Firstborn and Second-born Siblings' Athletic and Artistic Activities, School Grades, and Risky Behavior as a Function of Cluster Group

Domains	Deidentify (N = 45)	Modeling (N = 72)	Non-referent (N = 49)
Athletic activities	.37**[a]	.21*[a]	.47***[a]
Artistic activities	.13[b]	.45***[a]	.43***[ab]
Language arts grades	−.13[b]	.21*[a]	.36**[a]
Math grades	.19[a]	.18[a]	.24*[a]
Science grades	.05[a]	.21*[a]	.26*[a]
Social studies grades	−.08[b]	.32***[a]	−.08[b]
Risky behavior	.03[b]	.35***[a]	.03[ab]

* $p < .10$, ** $p < .05$, *** $p < .01$.
[a,b] For each row of correlation different superscripts indicate significant differences between correlations according to confidence intervals computed around Fisher's r to z-scores, $p < .10$ for deidentify vs. modeling contrast; $p < .05$ for non-referent vs. deidentify and vs. modeling contrasts.

about how the non-referent group would differ from the deidentification or modeling groups, 95 percent confidence intervals were computed around difference scores involving this group.

Table 2 shows the correlations for the three influence groups for each domain. With one exception (athletic activities), siblings' personal qualities were not significantly related in the deidentification group. In contrast, we found positive correlations between siblings' functioning in each domain in the modeling group. Finally, the qualities of siblings in the non-referent group were correlated in all but two domains.

Comparisons between the deidentification and modeling groups revealed significant differences between correlations with respect to siblings' artistic activities, language arts and social studies grades, and risky behaviors. Specifically, younger siblings' activities, grades, and behaviors were more closely linked to their older siblings' attributes when younger siblings reported patterns of modeling as compared to when they reported patterns of deidentification. Comparisons between the non-referent group and the deidentification and modeling groups revealed two significant differences. Firstly, the language arts grades of siblings in the non-referent group were more strongly associated than were those of the deidentification group. Secondly, the social studies grades of siblings in the non-referent group were less highly correlated than were those of siblings in the modeling group.

Sibling Relationship Correlates

In order to assess whether the three sibling influence groups varied in concurrent and longer-term sibling relationship qualities, a series of 3 (sibling influence group) × 2 (sibling: firstborn vs. second-born) × 2 (sex constellation: same- vs. mixed-sex sibling dyad) × 2 (time: Year 6 and Year 7) mixed model ANOVAs was conducted. In the present study, the mixed model ANOVA strategy is advantageous because it is able to

account for both repeated measures effects as well as the correlated nature of data from individuals within the same family. In these analyses, the sex composition of the sibling dyad served as the between subjects factor whereas sibling (firstborn vs. second-born) and time served as the within groups or repeated measure factors. For the analyses of siblings' temporal involvement, no sibling (within-subjects) factor was included because the average of siblings' reports of time was used as the dependent variable. Further, because of the number of between- and within-group interactions tested, only significant effects involving sibling influence group are reported. Finally, because three patterns of influence were observed, only two of which were grounded in theory, *a priori* contrasts were conducted to compare the sibling modeling and deidentification groups. In addition to these contrasts, when the overall group effect was significant, Tukey follow-up tests were conducted to compare the non-referent group to the modeling and deidentification groups. We calculated Cohen's *d* (Cohen, 1988) as a measure of effect size for all analyses; adjusted *d*s were computed for within-group comparisons (Cortina & Nouri, 2000).

Sibling Relationship Correlates of Sibling Influence Groups. Analyses examining sibling intimacy revealed a significant between-groups main effect for sibling influence group, $F(2, 160) = 3.60$, $p < .05$, and follow-ups showed that dyads in which younger siblings modeled their older siblings were characterized by significantly greater intimacy ($M = 22.63$, $SD = 3.67$) than dyads in which younger siblings deidentified from their older siblings ($M = 20.49$, $SD = 4.17$; $t = 2.85$, $p < .01$, $d = .54$). Dyads in the non-referent group ($M = 21.70$, $SD = 4.14$) were not significantly different from either group.

Analyses examining sibling hostility revealed a sibling × sibling influence group trend, $F(2, 160) = 2.84$, $p < .10$. As can be seen in Figure 2, older siblings were more hostile as compared to their younger siblings in the deidentification group, whereas younger siblings were more hostile in relation to their older siblings in the modeling group, and these sibling differences were significantly different, $t = 2.39$, $p < .05$, $d = .35$. There were no effects, however, for the non-referent group.

Analyses examining the amount of time that siblings spent in shared activities revealed a between-groups trend for sibling influence group, $F(2, 156) = 2.55$, $p < .10$. Follow-ups revealed that in dyads in which younger siblings reported patterns of deidentification, siblings spent more time together ($M = 572.30$, $SD = 374.55$); their time together was greater than that of siblings in the non-referent group ($M = 442.38$, $SD = 305.06$; $t = 2.28$, $p < .05$, $d = .47$) but not significantly different from that of the modeling group ($M = 491.23$, $SD = 303.33$).

Discussion

The purposes of the present study were to assess younger siblings' perceptions of older siblings' influence and to examine how these perceptions were connected to sibling similarities and differences as well as sibling relationship qualities. In the following pages, we discuss the findings related to each study goal, address the strengths and limitations of the study, and suggest future directions for research on sibling influence processes.

Guided by theory on observational learning and sibling deidentification, we explored second-born siblings' reports of their desires to be like and to be different from their older siblings and their ratings of how often they competed with their sibling

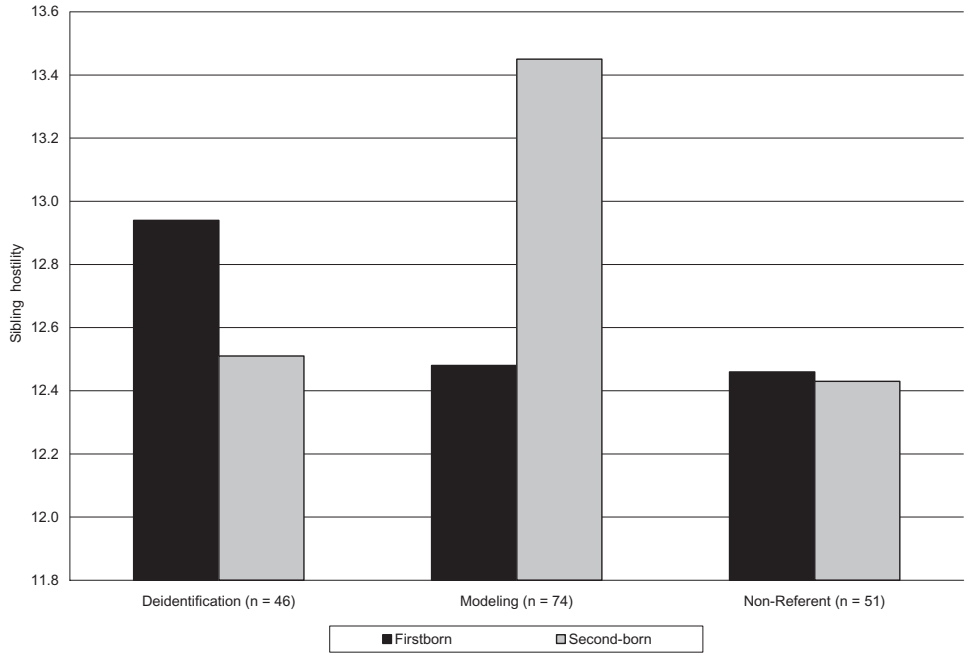

Figure 2. Firstborn and Second-born Siblings' Reports of Sibling Hostility as a Function of Influence Group.

in four domains. Analyses revealed three patterns of influence, two of which were theory-grounded. Consistent with principles of observational learning, the pattern of influence that was endorsed by the majority of second-born siblings was one of trying to be like an older sibling in all measured domains, and not trying to be different from that sibling in any domain; in addition, these youth reported competing with their siblings in all domains. The second pattern that emerged was one of younger siblings trying to be different, not trying to be like, and not competing with their siblings in these same domains. The latter pattern, differentiation, is consistent with predictions from sibling deidentification theory as is the low level of competition in these dyads: deidentification theory's rivalry-defense hypothesis suggests that becoming different from one's brothers and sisters reduces sibling rivalry and competition.

In contrast to both observational learning and deidentification theory predictions, we found no evidence that either modeling or deidentification was more prevalent in same-sex as opposed to mixed-sex dyads. One explanation for this finding could be that, after dividing our sample into smaller groups and then dividing those groups by the sex constellation (same- vs. mixed-sex), we lacked sufficient power to detect these effects. It is also possible that certain influence dynamics may be more prevalent in male-male or female-female dyads, and by averaging same-sex dyads together we may have obscured these potential differences.

Interestingly, both the modeling and deidentification patterns were characterized by second-born siblings trying to be like or different from their older siblings in every domain measured (i.e., sports, arts, academics, and conduct); the data did not support the notion that siblings would differentiate and model in a domain-specific way. This pattern of findings, however, may be grounded in the measurement strategy used here:

the measure may have included too few domains or not made a sufficiently fine-grained distinction within the domains. For example, within the domain of sports, older siblings who are proficient in baseball or softball may have younger brothers or sisters who want to be different and so choose to play soccer or basketball. Thus, although they resemble each other in displaying a penchant for playing sports, the measure employed here could not detect whether these siblings were actually different in the specific sports activities they chose. Similar issues arise in the other domains studied here, and as such, future studies would benefit from the study of sibling deidentification dynamics in greater depth.

It is also possible that some differences between the domains may have been hidden by the agglomerative cluster analysis. Because hierarchical cluster analysis successively pairs individuals on the basis of a similarity algorithm until all individuals are paired into a common cluster, differences between domains may be obscured. For example, it is possible that youth who reported wanting to be like their sibling in three domains (e.g., athletics, academics, and conduct), but not a fourth (e.g., artistic activities), could have been most similar to youth reporting wanting to be alike in three other domains (e.g., athletics, arts, and academics, but not conduct) and as such, both were placed into a common cluster. To the extent that a limited number of these patterns were present in data, the cluster analyses would likely yield aggregate clusters with above average means for each category. In order to detect such nuanced patterns, future studies would benefit from the examination of larger and more diverse samples.

In addition to identifying younger siblings who reported sibling influence processes consistent with observational learning and sibling deidentification theories, the results also revealed a third, unpredicted, sibling group: younger siblings who did not appear to use their older siblings as referents. The discovery of such a group is surprising given extant work on sibling relationships (e.g., Bank et al., 1996; Dunn, 1998; Hoffman, 1991), which suggests that older siblings play an important role in youth development. The non-referent group, however, is consistent with the results from studies of sibling relationship types, which provide evidence for an uninvolved or distant type of sibling relationship (Gold, 1989; McGuire, McHale, & Updegraff, 1996).

These findings also provide an important insight into why the outcomes of sibling influences may be difficult to document. Observational learning processes are posited as one basis for why siblings are similar; sibling deidentification processes operate to make siblings different, and the results from the present study suggest that some siblings may not even look toward their siblings as either models or foils. Because different patterns of sibling influence operate toward different ends and may, in effect, cancel one another out when researchers take a variable-oriented approach to studying sibling influences, researchers instead should consider: (1) using person-oriented approaches to discover the patterning of sibling influence dynamics; and (2) measuring influence processes more directly in addition to measuring similarities and differences in siblings' personal qualities.

Adopting a person-oriented approach and measuring younger siblings' perceptions of sibling influence, the present study examined the connections between different sibling influence patterns and similarities and differences in siblings' activities, academic competencies, and behaviors. Consistent with observational learning hypotheses, positive correlations between siblings' attributes were observed in every domain in dyads in which younger siblings reported patterns of modeling, and the correlations between siblings in these dyads were significantly higher in the majority of domains (four of seven) than were such correlations in sibling dyads in which younger siblings

reported deidentifying. In most cases, however, correlations between siblings' attributes in dyads in which younger siblings deidentified were low and non-significant, rather than negative and significant as would be predicted by deidentification theory. A possible explanation for the pattern observed in the deidentification dyads is that sibling differentiation is a developmental process, and as such, siblings may diverge increasingly over time. Moreover, it could also be argued that deidentification processes simply offset the many dynamics that push for sibling similarities (e.g., observational learning *vis-à-vis* parents, shared genetics, shared home, neighborhood, and school environments). If this is the case, zero correlations rather than negative correlations make sense.

Interestingly, in the domain of athletic activities, dyads in which younger siblings deidentified showed as much similarity as did siblings from the modeling and non-referent groups. This finding may be rooted in the fact that the measure of athletic activity involvement grouped together too many different activities (e.g., football, baseball, basketball, swimming, gymnastics). Thus, siblings who reported trying to be different and participated in different athletic activities would have received similar scores on athletic activities in the present analyses.

Sibling dyads in which younger brothers and sisters did not report looking to their older sibling as a source of reference, with two exceptions (social studies grades and risky behavior), tended to be as similar as dyads in which younger siblings' reported modeling their older brothers and sisters. One explanation for these findings is that despite their reports of not looking towards their older siblings as sources of influence, younger siblings in this group may be unaware of the ways in which their brothers and sisters influence their activities and behavior. With respect to siblings' academic achievement, these findings are also consistent with behavioral genetics research showing that shared genetic and environmental factors explain variance in general cognitive abilities (e.g., Petrill et al., 2004), and as such, sibling similarity should be expected in these domains. If, however, observational learning mechanisms serve to make siblings even more similar than shared genetic and environmental characteristics would predict, sibling correlations in the modeling group should be higher than the correlations in the non-referent group.

In short, the sibling influence patterns did not entirely map onto sibling similarities and differences in the ways observational learning and deidentification theories predict. One possible basis for the inconsistencies may be that siblings' perceptions of whether they try to be like or different may have a lot to do with what an older brother or sister is like or how well they get along with that sibling. Future research would benefit from the examination of how older siblings' personal qualities (e.g., temperament, self-esteem, depression) and treatment of their younger siblings relates to younger brothers' and sisters' reports of influence. Another potential reason for these inconsistencies was that siblings reported how often they tried to be like or different from their siblings rather than whether they were successful in doing so. As noted, theories of sibling influence make developmental predictions, and as such, examining how these processes relate to sibling similarities over a longer period of time is an important step for this work. Finally, as deidentification theory and our findings regarding the non-referent group highlight, these processes may operate without siblings' conscious awareness. Future studies may benefit from using parent reports of whether they perceive their children as trying to be similar or different from one another or experimental methods in which siblings' imitative and differentiating behaviors are directly observed.

The present study also adds to the literature on sibling deidentification and observational learning by studying the dyadic contexts in which sibling influence patterns are reported. We found some evidence that modeling and deidentification processes were linked to differences in sibling relationship qualities. In general, and consistent with the predictions of observational learning theory and research suggesting that modeling should be more evident in the context of warmer and more intimate relationships, youth in the modeling group reported greater intimacy in their sibling relationship as compared to those who reported sibling deidentification. Inconsistent with the predictions of sibling deidentification theory, that deidentification improves relationships by reducing sibling rivalry, there was no evidence that youth who reported patterns of deidentification experienced more positive relationships or improvement in their relationship over time.

In comparison to the links between sibling influence processes and intimacy, linkages with hostility and conflict in the sibling relationship were not as clear-cut. Specifically, modeling and deidentification were linked to differences in sibling conflict reported by firstborn vs. second-born siblings: In dyads in which younger siblings tried to be different from their older siblings, younger siblings reported displaying significantly less hostility toward their sibling than their older brothers or sisters reported displaying toward them. These data may suggest that younger siblings deidentify with older siblings because these siblings treat them badly, a process that is much different than that invoked by deidentification theory. In contrast, in the modeling group, younger siblings reported exhibiting more hostility than their older siblings did. This finding, taken in conjunction with the overall pattern of findings (i.e., that modeling was linked to greater intimacy and competition), suggests that older siblings in these dyads elicit intense reactions from their younger brothers and sisters, and that these reactions are both positive and negative. Such a pattern corresponds to the characterization of siblinghood as a love-hate relationship (e.g., Bryant & Crockenberg, 1980; Furman & Buhrmester, 1985).

Finally, analyses revealed that the sibling relationship evaluations of youth in the non-referent group tended to fall between those of youth in the modeling and deidentification groups. Taken in conjunction with the findings that youth in the non-referent group spent less time with each other as compared to youth in the modeling and deidentification groups, this pattern may also reflect that these siblings lead separate lives. Because siblings have many different types of relationships, it is important for future research to continue to examine the connections between multiple dimensions of family relationships.

Conclusion

At the most general level, the results of this study are consistent with the hypothesis that siblings can influence each other in a variety of ways. Although a body of literature on sibling influences documents that siblings play important roles in each other's psychosocial development, with few exceptions (e.g., Dunn, 1998; Patterson, 1984, 1986), researchers have not measured influence mechanisms directly. The findings of the present study highlight the competing ways in which siblings act as sources of social influence and social comparison within families. As mentioned earlier, one reason why sibling influences are difficult to document is that they seem to operate in different ways across different dyads. The present study took a first step toward measuring sibling influences directly with respect to understanding why some siblings

are more alike and others are more different. More research, however, is needed to assess these influence processes, elucidate how they are connected to sibling similarities and differences, and identify the individual, family, and larger environmental conditions that promote or mitigate their operation.

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Note

1. Initial cluster analyses were conducted examining younger siblings' reports of modeling and deidentification processes only (i.e., omitting competition items). An interpretable three-cluster solution was produced in the first step of clustering and was examined. The three clusters were indicative of modeling, deidentification, and non-referent patterning. In the second step of the cluster process, however, group membership was quite fluid (e.g., 20 members of the modeling group shifted to the deidentification and non-referent groups). Because of this fluidity, younger siblings' reports of competition in each domain were included in the final cluster analyses. The inclusion of these indices resulted in a replicable, stable solution.