Developmental Change in Sibling Support and School Commitment Across Adolescence

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School commitment typically declines across adolescence, but the family-level factors that explain this decline have not been fully characterized. This study investigated sibling support as a family resource in predicting school commitment across 7th–10th grade using a sample of 444 adolescents ($M_{\text{ages}} = 12.61, 13.59, 14.59, 15.58$ years). Results showed that sibling support linearly increased and school commitment decreased and stabilized, independently, over time. Sibling support positively predicted school commitment in seventh grade and across time, suggesting that having supportive siblings may help to offset adolescents’ declines in school commitment. Furthermore, having a brother enhanced this association versus having a sister. These findings provide insight into ways to help youth maintain school commitment across the middle- to high school transition.

Previous research suggests that feelings of school commitment promote well-being, such as displaying lower levels and trajectories of aggressive behavior (e.g., Harachi et al., 2006) and a lower likelihood of alcohol use and binge drinking (e.g., Eitle & Eitle, 2007). School commitment includes school interest (Wigfield & Eccles, 2000); school belonging, which encompasses social and emotional connectedness at school (Gillen-O’Neel & Fuligni, 2013); and school engagement, which includes a student’s willingness to invest in learning using strategies that promote understanding (Blumenfeld, Kempler, & Krajcik, 2005). Disconcertingly, many adolescents experience a decline in school commitment across the teenage years, particularly during the transition from middle school to high school (Anderman, 2003; Dotterer, McHale, & Crouter, 2009; Li & Lerner, 2011; Melby, Conger, Fang, Wickrama, & Conger, 2008; Ryan, 2001). Given the difficulty youth have in maintaining school commitment across adolescence, investigating potential factors that may prevent these declines is paramount, particularly during school transitions. Although research has focused on the role of parents in predicting school commitment during adolescence (e.g., Simons and Conger, 2007; Wang & Eccles, 2013), sibling relationships offer a unique resource in preventing academic declines during developmental transitions (e.g., Melby et al., 2008). This study tests the hypothesis that supportive sibling relationships serve as a source of support in maintaining school commitment across adolescence.

Developmental Transitions and Social Support

Existing research suggests that developmental transitions and social support can strongly impact school commitment across adolescence. Declines in school commitment are thought to be related to the normative challenges that adolescents encounter during developmental transitions. Adolescents must navigate a variety of social (e.g., peer relationships), cognitive (e.g., academic rigor), psychological (e.g., identity development), and biological (e.g., hormones) transitions and challenges (Graber & Brooks-Gunn, 1996). In particular, most high school students encounter new settings, peers, teachers, and academic expectations (Petersen, 1988). These changes can pose challenges during adolescence that may predispose adolescents to having less positive perceptions of school, especially during a school transition. For example,
eductional commitment has been found to decrease across the transition from middle to high school (e.g., Kalakoski & Nurmi, 1998), suggesting that adolescents are susceptible to experiencing declines in their commitment to school during these educational transitions.

Receiving social support is a critical factor thought to promote positive development and prevent maladjustment. In alignment with relational regulation theory (RRT), individuals can regulate their affect, thought, and actions through their social interactions (Lakey & Orehek, 2011), such as perceived social support. Specifically, RRT proposes that day-to-day interactions via conversations and shared activities can help individuals maintain positive perceptions about the self, interests, engagement in activities, and social relationships in other contexts through feeling supported by others. Of note, it is the perceived support from others that is critical to maintaining well-being, as opposed to the specific conversations and behaviors that relate to the domain of interest. Supportive social relationships outside of the school context, such as parents, may be critical for preserving school commitment through time spent together and the provision of other resources such as educational guidance (Simons & Conger, 2007). Although parents have been examined as the primary nonschool social resource for perceptions and behaviors related to school commitment, siblings may play a role in school commitment as well. Sibling relationships appear to be an important part of adolescents’ perceived support. Surprisingly, little research has focused on whether sibling support changes or remains stable across adolescence, given the benefits of social support in maintaining well-being across development (RRT; Lakey & Orehek, 2011). Kim, McHale, Osgood, and Crouter (2006) found no significant changes in sibling support from 7 to 19 years old, on average; however, Branje, van Lieshout, van Aken, and Haselager (2004) found that sibling support increases from 11 to 13, and then decreases, for younger siblings. The field would benefit from more longitudinal investigations of sibling support across adolescence to clarify these discrepancies, and to identify at what grade(s) perceptions of sibling support is greatest so that these relationships can be leveraged as a resource to help adolescents maintain well-being. As such, the first aim of our study was to identify the specific trajectory of sibling support, and of school commitment as discussed earlier, across the transition from middle to high school.

Supportive sibling relationships during adolescence are associated with facets of adjustment such as greater concurrent self-concept, sense of autonomy, and self-esteem, as well as subsequent self-esteem and positive peer relationships (Branje et al., 2004; Dailey, 2009; Yeh & Lempers, 2004). Additionally, longitudinal work has found that perceptions of sibling support during adolescence positively predict competence, autonomy, connectedness with siblings, and life satisfaction above and beyond sibling structural characteristics such as dyad sex and birth order (Hollifield & Conger, 2015; Milevsky & Levitt, 2005). Given the positive association between supportive sibling relationships and healthy self-perceptions and well-being, which is consistent with the framework of RRT, sibling relationships may also correlate with

**SIBLING RELATIONSHIPS AS A SOURCE OF SUPPORT**

Sibling support is a dynamic characteristic that is subject to fluctuations in the relationship (Dunn, 2014). Sibling support can predict child and adolescent development alongside, and independent of, structural sibling relationship characteristics, such as birth order and sex (Feinberg, Solmeyer, & McHale, 2012). Adolescents report siblings as an important source of intimacy, companionship, and support (Lempers & Clark-Lempers, 1992; Tucker et al., 2001). For example, when adolescents were asked, “What does having a brother or sister mean to you?” over 41% described reciprocity of positive dynamic characteristics such as companionship, trust, and intimacy (Oliva & Arranz, 2005). Specifically, factor analysis has shown that the critical components that make up sibling support include emotional support, acceptance, and the quality of information received (advice), which was distinct from support received from parents and a best friend (Scholte, van Lieshout, & van Aken, 2001). Sibling relationships appear to be an important source of sibling support during adolescence to preserve school commitment alongside, and independent of, structural sibling relationship characteristics, such as birth order and sex (Feinberg, Solmeyer, &
adolescent school commitment through these processes.

Sibling Relationships and Academic Outcomes

Relational regulation theory emphasizes the link between supportive relationships and the maintenance of well-being across development, which provides a natural foundation for investigating the associations between a range of dimensions pertaining to sibling relationships and academic outcomes in adolescence and emerging adulthood. Some cross-sectional research has found a positive association between perceived adolescent sibling relationship quality and concurrent positive school attitudes and motivation (Alfaro & Umaña-Taylor, 2010; Milevsky & Levitt, 2005). A longitudinal study found this as well for academic achievement during emerging adulthood (Melby et al., 2008). However, other research suggests that perceived older sibling support is associated with declines in the younger sibling’s academic self-concept and in the valuing of school during adolescence (Bouchey, Shoulberg, Jodl, & Eccles, 2010). Bouchey et al. (2010) propose that supportive behavior from an older sibling may undermine a younger sibling’s ability to develop positive school commitment perceptions. Given the evidence that sibling relationships positively associate with adolescent outcomes, and the lack of consistent findings investigating school commitment as a function of supportive sibling relationships, the second aim of our study was to test whether change in sibling support would predict change in school commitment across the transition from middle to high school. In the context of RRT (Lakey & Orehek, 2011), we specifically sought to examine whether increases in sibling support would prevent declines in school commitment across adolescence.

Moderators of Sibling Support and School Commitment

Sibling structural characteristics, which are immutable features of the relationship (e.g., birth order and sex constellation), may additionally modify the way in which perceived sibling support associates with school commitment. Because RRT (Lakey & Orehek, 2011) emphasizes the importance of how individuals perceive the social relationship from which they receive support, it is essential to consider how aspects of these relationships modulate the association between sibling support and school commitment. Sibling structural characteristics can shape the power dynamic, family social roles, distribution and access to resources, and degree of similarity in developmental goals between siblings (Conger, Bryant, & Brennam, 2004; McHale, Updegraff, & Whiteman, 2012; Whiteman, Becerra, & Killoren, 2009). In addition, sibling behaviors, such as sibling school commitment, have the potential to modulate the association between sibling relations and adolescent school commitment. As adolescents observe their sibling’s behavior, this likely interacts with how adolescents perceive support received from their sibling to predict their level of, and change in, school commitment. For example, an adolescent who observes their sibling highly engaged in school work and activities and who feels heavily supported by this sibling may be more likely to also exhibit high school commitment, compared to an adolescent who does not observe school commitment behaviors from their sibling, or who feels unsupported by their sibling. Because siblings’ characteristics and behaviors can potentially modulate the association between perceptions of sibling support and adolescents’ commitment to school, the third aim of this study tested the moderating effects of birth order, adolescent sex, sibling sex, sex constellation, and sibling school commitment.

Birth order. Older siblings provide more modeling, advice, support, and knowledge to their younger siblings than vice versa due to their greater power, authority, experience, and access to resources (Bandura, 1977; Hollifield & Conger, 2015; Tucker, Barber, & Eccles, 1997). Tucker et al. (2001) reported that both older and younger siblings perceive older siblings as a source of support for nonfamilial topics including socializing, school work, and risky behaviors. Birth order also shapes siblings’ perceptions of their relationship. For example, younger siblings perceive higher sibling relationship quality and satisfaction compared to older siblings across childhood and adolescence (e.g., Alfaro & Umaña-Taylor, 2010; Derosier & Kupersmidt, 1991; Tucker et al., 1997). Specifically, younger siblings perceive greater levels of intimacy from ages 10 to 17 years and maintain these perceptions for longer (until 15 years old) compared to older siblings (until 12 years old; Kim et al., 2006). Differences between older and younger siblings’ perceptions about their relationship are likely due to the support and guidance that older siblings often provide for younger siblings. Drawing from RRT (Lakey & Orehek, 2011), we expected that the association between sibling support and school
commitment would be higher for younger compared to older siblings, as younger siblings typically perceive greater support within their sibling relationship.

**Adolescent sex, sibling sex, and sex constellation.** The sex of each child in a family can affect perceptions and behaviors in family relationships. For example, observational and self-report data indicate that girls receive more advice and influential guidance, as well as experience greater closeness and relationship satisfaction, in the context of sibling relationships, than do boys (Hollifield & Conger, 2015; Minnett, Vandell, & Santrock, 1983; Tucker et al., 1997). In addition, girls’ perceptions of positivity in the sibling relationship are associated with higher adolescent peer attachment, self-esteem, school adaptation, and life satisfaction compared to boys’ perceptions (Milevsky & Levitt, 2005; Oliva & Arranz, 2005). Consideration of a sibling’s sex is also important. Relative to their brothers, adolescents report receiving greater intimacy, companionship, and advice from sisters and feel more similar to, greater admiration for, and closer to sisters (Hollifield & Conger, 2015; Tucker et al., 1997). Adolescent girls and adolescents who have a sister benefit more from sibling relationships compared to adolescent boys and those with a brother. Furthermore, pairs of sisters report greater intimacy across ages 9–15 years of age compared to pairs of brothers and mixed-sex pairs (Kim et al., 2006). However, these authors also found that mixed-sex pairs exhibited a U-shaped change in sibling intimacy with the greatest dip occurring in early adolescence, whereas same-sex pairs reported stable levels across this time span. Based on this literature, we expected the association between sibling support and school commitment to be greater for girls, adolescents with sisters, and same-sex sibling pairs, compared to boys, adolescents with brothers, and mixed-sex sibling pairs.

**Sibling school commitment.** The school commitment of a sibling may also predict the school commitment of the focal adolescent through social learning, an agentic process in which individuals observe one another, update cognitive schemas, and execute a chosen magnitude of the adopted behavior (Bandura, 2001). Additionally, although focused on negative outcomes, sibling deviancy research (e.g., Patterson, Dishion, & Bank, 1984; Whiteman, Jensen, & Maggs, 2013) suggests that high levels of sibling support would amplify the similarity between an adolescent’s school commitment and the school commitment of their sibling (e.g., Slomkowski, Rende, Conger, Simons, & Conger, 2001). For example, if an adolescent perceived a highly supportive relationship with their sibling and their sibling was highly committed to school, we would expect that the adolescent’s school commitment would also be high. Sibling relationship quality and sibling behavior are important predictors of adolescents’ behavior, and as such, it would be advantageous to account for sibling support and sibling school commitment as they independently, and interactively, contribute to adolescents’ school commitment.

**CURRENT STUDY**

This study investigated the association between adolescents’ perceived sibling support and school commitment across 7th–10th grades as well as key moderators of this association. The first aim of this study was to assess the independent trajectories of adolescents’ perceived sibling support and school commitment across 7th–10th grades to establish patterns of change in these variables over time. We predicted that school commitment would decline linearly across these grades; however, given the scarcity of longitudinal research on perceptions of sibling support across adolescence, no a priori hypothesis was made. The second aim of this study was to examine initial level of and change in sibling support as predictors of initial level of and change in school commitment. Given the emphasis of RRT on positive social interactions for maintaining well-being and engagement in activities (Lakey & Orehek, 2011), we expected that higher perceptions of sibling support would be associated with better academic outcomes (e.g., Alfaro & Umaña-Taylor, 2010; Melby et al., 2008). As such, it was hypothesized that perceived sibling support across Grades 7 through 10, during the transition from middle school to high school, would positively predict concurrent, and change in, school commitment during this time. The third aim was to test whether perceived sibling support in seventh grade interacted with adolescent sex or birth order, sibling sex or school commitment, or sex constellation of the sibling pair to predict initial level of and change in school commitment. It was hypothesized that girls, participants with a sister, adolescents in same-sex pairs, and younger siblings would independently, and in tandem, show a stronger positive association between sibling support and school commitment in seventh grade, and across 7th–10th grades, than participants who were a boy, had a brother, or were an older sibling. In
addition, we expected that sibling school commitment would be associated positively with only adolescent school commitment if perceptions of sibling support were high.

The second and third aims were assessed after controlling for academic achievement. Elevated levels of school commitment during adolescence are associated with high levels of later academic achievement (e.g., Dotterer & Lowe, 2011); and academic achievement may positively predict later school commitment during adolescence (e.g., Wang & Eccles, 2013). Although these variables capture some similar characteristics, it is noteworthy that school commitment encompasses attitudes and behaviors toward school, whereas academic achievement reflects objective assessments of one’s achievement in school (e.g., grades, standardized test scores). Thus, controlling for academic achievement is advantageous for capturing school commitment, while accounting for previous academic performance (Wang & Eccles, 2013). The expected results of this study could provide insight into the mechanisms that shape trajectories of adolescents’ school commitment and perceptions of sibling support, as well as highlight the salience of sibling relationships in offsetting the decline of school commitment during adolescence.

**METHOD**

**Participants**

Using the Family Transitions Project (FTP), a longitudinal study of 558 target youth and their families, interviews were first conducted when adolescents were in seventh grade. Of the original 558 families, 107 lived in single-mother families and the remainder of these youth lived with both of their biological parents; the retention rate was on average 90% throughout data collection. The majority of the participants were drawn from rural counties in north central Iowa. Because this area had a minority population of only about 1% at time of study inception (see Goudy, Burke, & Hanson, 1999), all participants were White European Americans from primarily lower middle and middle class families. All families were recruited from middle schools in the community rather than self-selected volunteers from advertising or clinical cases, and resided in rural and small-town settings with similar socioeconomic characteristics. Additional information about the initial recruitment, participating families, and procedures is available in Conger and Conger (2002).

The current study includes only those FTP families with two biological married parents (n = 451) who were first recruited when the target adolescent was in seventh grade. Participants in single-mother families were not included in the analyses due to inconsistency in the frequency and timing of assessments compared to participants who were in families with two biological parents. This strategy optimized the latent growth curve model (LGCMM) with four time points instead of three. Target adolescents and the sibling closest in age within 4 years, older or younger, completed questionnaires at four annual time points. On average, the target adolescent and sibling were 2.5 years apart in age; the sex composition of the sibling dyads were 29% sisters, 25% brothers, 23% younger brothers with older sisters, and 23% younger sisters with older brothers. The home visits occurred when the adolescent was in 7th, 8th, 9th, and 10th grades (Mage = 12.61, 13.59, 14.59, 15.58 years). Adolescents and siblings answered questions regarding their own school commitment, and adolescents reported on their perceptions of sibling support. In addition, the birth order and sex of the adolescents were reported by the parents and focal adolescent academic achievement was collected from school records. The final sample included 444 adolescents after twins were excluded (n = 7).

Full data were collected at the first time of assessment during seventh grade; measurements at 8th, 9th, and 10th grade included missing data. In eighth grade, 418 adolescents reported on school commitment and sibling support, and 418 siblings reported on school commitment. During ninth grade, 400 adolescents completed questionnaires on school commitment and sibling support, and 393 siblings reported on school commitment. In 10th grade, 396 adolescents report on school commitment and sibling support, and 292 siblings completed the school commitment questionnaire. Data from all 444 participant dyads were used in the analyses, but it should be noted that 65% of dyads had complete data at four time points, 25% at 3, 6% at 2, and 4% at 1 (initial assessment). We assumed that the data were missing at random because analysis of variance (ANOVA) tests showed no significant differences in the mean of sibling support or school commitment at any of the four time points between individuals who participated at all four time points compared to individuals who missed participation in at least one time point. Full information maximum likelihood (FIML) was used to estimate distributions of the missing data. According to Enders and Bandalos
(2001), FIML estimation is unbiased and more efficient than other estimation methods under normal conditions and based on a moderate sample size.

Measures

School commitment. Adolescents and their siblings answered questions regarding how much they agreed or disagreed with statements about school. The scale included 16 items that reflected their interest in school, relationships at school, and school competence (Conger, 1988). These items were answered during 7th, 8th, 9th, and 10th grades. The scale ranged from 1 = strongly disagree to 5 = strongly agree. Two example items included “In general, I like school a lot” and the reverse-scored “School bores me.” Items were coded such that higher scores indicated high levels of school commitment. The internal reliability was very good at each annual assessment (see Table 1).

Sibling support. Adolescents answered questions regarding their perceptions of sibling supportive affect and behaviors toward them in the past month. The scale, comprised of eight items from the behavioral affective rating scale (BARS; Conger, 1989), was administered during 7th, 8th, 9th, and 10th grade. Only the focal adolescent’s report was included in the analyses to clarify the trajectory of perceived sibling support from 7th to 10th grade, a salient developmental period of transitions. The scale ranged from 1 = never to 7 = always. The adolescents answered items such as “How often does your sibling listen carefully to your point of view?” and “How often does your sibling help you do something that was important to you?” Items were coded such that higher scores indicated greater perceptions of support from siblings. The reliability was very good across all 4 years (see Table 1).

Moderators. Adolescent sex and birth order in relation to the sibling in the study, sibling sex, and school commitment (reliability was high and the same across waves, α = .91), as well as sex constellation of the sibling pair, were used as latent moderators between sibling support in seventh grade and both school commitment in seventh grade and across 7th–10th grade. Parents reported on participants’ birth order and sex of all offspring as part of the household roster. Sibling birth order was coded as 0 = elder born sibling and 1 = later born sibling. Participant sex and sibling sex were coded as 0 = boy and 1 = girl. The sibling reported on their own levels of school commitment in seventh grade.

Covariates. In addition to the moderators, mother support, father support, sibling conflict, academic achievement, number of siblings in the household, and age spacing between the focal adolescent and sibling were included to control for factors associated with school commitment and sibling support based on previous literature. Mother and father support were reported by the focal adolescent and measured using the same items as the sibling support scale, but with the text framed in relation to the mother and father (α = .88–.92; Conger, 1989). Mother and father report were included as covariates to test whether sibling support significantly predicts school commitment concurrently and across time, above and beyond other salient contributions within the family context. In addition, adolescents reported on sibling conflict using the same rating scale as the

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Note. SS = sibling support; SC = school commitment; M = Mean; SD = standard deviation; α = Cronbach’s alpha. All correlations significant (p < .01). Two-tailed significance.
sibling support measure, but the items reflected perceived hostility from the sibling ($\alpha = .91$; Conger, 1989). The adolescent’s academic achievement was assessed in seventh grade using the Iowa academic basic skills test, a standardized test percentile score based on the performance of all seventh graders who completed the test that year. Adolescents reported the number of siblings who lived in the same household, and age spacing was created by subtracting the focal adolescent’s age from the sibling’s age. The sex constellation of the sibling dyad was coded as $0 = \text{mixed sex pair}$ and $1 = \text{same sex pair}$.

Analytic Plan

All factor analyses and structural equation modeling analyses were carried out using the lavaan and psych packages in R v3.2.0 (R Core Team, 2014). The statistics were evaluated using two-tailed tests at the significance level of $p < .05$. In addition, the following fit indices and their satisfactory ranges were used to assess model fit: the comparative fit index (CFI; $> .93$; Byrne, 1994); the Tucker Lewis index (TLI; $> .90$; Hu & Bentler, 1999); the standardized root mean square residual (SRMR; $< .08$; Hu & Bentler, 1999); and the root mean square error of approximation (RMSEA; $< .10$; Steiger, 1990).

Confirmatory factor analysis was used to evaluate the measurement model for each latent variable separately. The measurement pathways of interest included the factor loadings for the latent variables of school commitment and sibling support at each time point (i.e., 7th, 8th, 9th, and 10th grades; see Figure 1). The latent construct of sibling support was comprised of three manifest variables, each including randomly assigned questionnaire items that were averaged. Two of the manifest variables included three questionnaire items, and one manifest variable was comprised of two items. Pseudo-randomization included (1) randomly assigning items to each of the three parcels and (2) checking that each parcel contained items from each of the three factors of school commitment. Confirmatory factor analysis showed that the parcel loadings for each latent construct of sibling support at 7th, 8th, 9th, and 10th grades were very good ($\alpha > .83$; Figure 1). In addition, the statistical fit was good: $\chi^2 (39) = 164.20$, $p < .001$; and all practical fit indices were satisfactory: CFI = .970, TLI = .949, SRMR = .026, and RMSEA = .091, 95% CI (.077--.106).

The latent construct of school commitment consisted of three manifest variables, including five pseudo-randomly assigned items for two variables and six items for the third variable for each of the four times of assessment. Pseudo-randomization included randomly assigning items to each variable and then verifying that items from each of the three subscales (i.e., school engagement, interest, and connectedness) were represented in each parcel. Confirmatory factor analysis showed that the parcel loadings for each latent construct of school commitment at 7th, 8th, 9th, and 10th grades were satisfactory ($\alpha > .74$; Figure 1). Furthermore, the
statistical fit for this model was satisfactory: \( \chi^2 \) 
(39) = 112.62, \( p < .001 \); and all practical fit indices were very good: CFI = .978, TLI = .964, SRMR = .021, and RMSEA = .073, 95\% CI (.057–.088).

Strong factorial invariance for factor loadings and intercepts across each measurement occasion of school commitment and sibling support were evaluated. Establishing measurement invariance is important to establish construct reliability, and thus comparability, across time (Millsap & Heining, 2012). Furthermore, this approach allows appropriate assessment of change across time (Widaman, Ferrer, & Conger, 2010).

Latent growth curve modeling was used to test the three hypotheses of this study because it is an effective approach for examining developmental change, which was the primary motivation of this study (McArdle, 2009). Specifically, latent growth curve models provide the opportunity to describe within-person changes (i.e., trajectories of sibling support and school commitment), evaluate determinants of between-person change (i.e., whether changes in sibling support predict changes in school commitment), and test moderators in the same model (i.e., sex, birth order; Grimm & Ram, 2012). Latent growth curve models provided the opportunity to examine if social support buffers against declines in psychosocial adjustment as proposed by RRT—specifically in this case, whether increases in sibling support would prevent decreases in school commitment across adolescence.

Hypothesis 1 was tested by computing chi-squared difference tests and comparing the fit statistics and fit indices of models that set varying constraints on the slope of sibling support and school commitment independently. To test hypothesis 2, the covariates, intercept of sibling support, and slope of sibling support were estimated to predict the intercept and slope of school commitment. These estimates indicate the degree to which initial levels and change between sibling support and school commitment are associated across 7th–10th grades. Hypothesis 3 was tested by including interaction terms between each moderator (adolescent sex, sibling sex, sex constellation, and birth order) and each centered parcel of sibling support in seventh grade in the model. These four interaction terms were centered again and used to create four latent interaction variables (Lin, Wen, Marsh, & Lin, 2010): sibling support with adolescent sex; sibling support with sibling sex; sibling support with sex constellation; and sibling support with birth order of the adolescent. These same steps were used for sibling school commitment as a moderator, with the exception that nine interactions terms were used to create a latent variable. The interaction terms were included in the models independently, and together, in predicting the intercept and slope of school commitment. Therefore, we tested whether adolescent sex, sibling sex, sex constellation of the sibling pair, birth order, and sibling school commitment altered the magnitude of the association between sibling support and school commitment.

RESULTS

Descriptive and Correlation Analyses

The bivariate correlations, means, and standard deviations for sibling support and school commitment from 7th to 10th grades are displayed in Table 1. As expected, correlations among the measure of sibling support at all four time points were significantly correlated (\( r = .54–.70, p < .05 \)). In addition, the means of sibling support showed that adolescents reported similar levels of support from their sibling across 7th–8th grades, and increases across 8th–10th grades. Correlations in school commitment were also high across all four grades (\( r = .59–.76, p < .05 \)), but mean values showed that school commitment decreased across 7th–9th grades and leveled out between 9th and 10th grades. Sibling support and school commitment had positive correlations ranging from low to moderate magnitude across all four grades (\( r = .13–.37, p < .05 \)), such that higher levels of sibling support were related to higher levels of school commitment.

Latent Growth Curve Analyses

Factorial invariance of sibling support and school commitment across the four time points of data was tested in configural (identical items in factor loadings across time), weak (also known as metric; invariant factor loadings across time), and strong invariance (also known as scalar; invariant factor loadings and intercepts across time; Widaman et al., 2010) models. Sibling support and school commitment independently yielded appropriate fit in strong invariance models (e.g., SRMRs ≤ .07, CFIs > .94, TFI s > .93). As such, sibling support and school commitment showed construct reliability from 7th to 10th grades. Thus, the remaining results reflect that sibling support and school commitment were comparable across time (Millsap & Heining, 2012). In other words, these variables could be interpreted as measuring the same construct in 7th, 8th, 9th, and 10th grades.
Developmental trajectories. Descriptive means of school commitment across 7th and 10th grades are shown in Figure 2. School commitment decreased between 7th and 9th grades (Ms = 3.91, 3.82, 3.71) and exhibited no significant change from 9th to 10th grade (M = 3.73). This magnitude of annual change is consistent with other studies that examined school belonging during adolescence (e.g., Gillen-O’Neel & Fuligni, 2013). The same five models tested to identify the best fitting slope for sibling support were also used for school commitment (Table 2). Based on chi-square difference tests and comparisons of fit statistics and indices, the partial estimation model of school commitment fit the data the best, $\chi^2 (53) = 226.84, p < .001$; Bayesian information criterion (BIC) = 7154.50. This model estimated a trajectory that decreased across 7th, 8th, and 9th grades, and then stabilized by 10th grade. As such, the slope for school commitment was specified as 0 for the 7th-grade latent variable, freely estimated for 8th and 9th grade, and specified as 1 for 10th grade in subsequent analyses.

Descriptive means of sibling support across 7th, 8th, 9th, and 10th grades are displayed in Figure 2. Although sibling support remained stable across 7th and 8th grades (Ms = 3.84, 3.83), it increased from 9th to 10th grade (Ms = 4.04, 4.11). These increments in change are consistent with other studies that examined annual changes in sibling support during adolescence (e.g., Branje et al., 2004; Kim et al., 2006). To establish the best fitting slope for sibling support, five models were tested: estimation of all values except for the first (full estimation); estimation of the second and third data values (partial estimation); linear trajectory (0, 1, 2, 3); quadratic shape (0, 1, 4, 9); and a peaking

![Panel (a) School Commitment Mean Levels](image)

![Panel (b) Sibling Support Mean Levels](image)

**FIGURE 2** Mean levels of school commitment (Panel a) and sibling support (Panel b) across 7th–10th grade. School commitment was measured on a scale from 1 = strongly disagree to 5 = strongly agree. Sibling support was measured on a scale from 1 = never to 7 = always.

**TABLE 2** Fit Statistics and Fit Indices for Trajectory Models Across 7th–10th Grades

<table>
<thead>
<tr>
<th>Trajectory Models</th>
<th>$\chi^2$</th>
<th>df</th>
<th>RMSEA (90% CI)</th>
<th>SRMR</th>
<th>CFI</th>
<th>TLI</th>
<th>BIC</th>
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</thead>
<tbody>
<tr>
<td><strong>Sibling support</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No growth</td>
<td>302.52</td>
<td>54</td>
<td>.102 (.091–.113)</td>
<td>.075</td>
<td>.946</td>
<td>.934</td>
<td>12818.98</td>
</tr>
<tr>
<td>Full estimation</td>
<td>228.98</td>
<td>51</td>
<td>.089 (.077–.101)</td>
<td>.046</td>
<td>.961</td>
<td>.950</td>
<td>12763.73</td>
</tr>
<tr>
<td>Partial estimation</td>
<td>228.98</td>
<td>52</td>
<td>.088 (.076–.099)</td>
<td>.046</td>
<td>.961</td>
<td>.951</td>
<td>12757.64</td>
</tr>
<tr>
<td>Linear</td>
<td>231.55</td>
<td>54</td>
<td>.086 (.075–.098)</td>
<td>.045</td>
<td>.961</td>
<td>.953</td>
<td>12748.02</td>
</tr>
<tr>
<td>Quadratic</td>
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<td>54</td>
<td>.088 (.077–.099)</td>
<td>.049</td>
<td>.959</td>
<td>.950</td>
<td>12756.03</td>
</tr>
<tr>
<td>Peaking</td>
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<td>54</td>
<td>.094 (.083–.105)</td>
<td>.054</td>
<td>.954</td>
<td>.944</td>
<td>12781.01</td>
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<tr>
<td><strong>School commitment</strong></td>
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<td></td>
</tr>
<tr>
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<td>54</td>
<td>.105 (.095–.117)</td>
<td>.106</td>
<td>.932</td>
<td>.916</td>
<td>7242.40</td>
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<tr>
<td>Full estimation</td>
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<td>.088 (.077–.100)</td>
<td>.068</td>
<td>.955</td>
<td>.942</td>
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</tr>
<tr>
<td>Partial estimation</td>
<td>226.84</td>
<td>53</td>
<td>.086 (.075–.098)</td>
<td>.068</td>
<td>.955</td>
<td>.944</td>
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</tr>
<tr>
<td>Linear</td>
<td>242.33</td>
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<td>.089 (.077–.100)</td>
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<td>.941</td>
<td>7163.90</td>
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<tr>
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<td>.937</td>
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<tr>
<td>Peaking</td>
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<td>.067</td>
<td>.951</td>
<td>.940</td>
<td>7165.48</td>
</tr>
</tbody>
</table>

*Note. RMSEA = root mean square error of approximation; SRMR = standardized root mean residual; CFI = comparative fit index; TLI = Tucker-Lewis index; BIC = Bayesian information criterion.*
trajectory (0, 1, 2, 1) (Preacher, 2010). The fit statistics and indices for these five models are displayed in Table 2. Sibling support best fit a linear trajectory out of the five models based on chi-square difference tests and comparisons of fit statistics and indices, \( \chi^2 (54) = 231.55, p < .001; \) \( \text{BIC} = 12748.02. \) The slope for sibling support was fixed as a linear trend for subsequent analyses.

Predicting school commitment. The standardized beta coefficients and fit statistics and indices for models testing associations between sibling support and school commitment are shown in Table 3. Because none of the moderators or covariates showed significant main effects on the slope of school commitment, the final model included these variables predicting only to school commitment in seventh grade and pathways among the variables of interest. The statistical fit of the final model was satisfactory, \( \chi^2 (552) = 1344.70, p < .001. \) Practical fit indices were satisfactory except for the SRMR: \( \text{CFI} = .921, \) \( \text{TLI} = .915, \) \( \text{SRMR} = .123, \) and \( \text{RMSEA} = .057, 95\% \text{CI} (.053–.061). \) Adolescent academic achievement and sex, and age spacing between siblings each significantly and positively predicted the intercept of school commitment (\( \beta = .40, p < .001; \beta = .11, p < .01; \beta = .26, p < .01). \) Higher academic achievement (i.e., performance on the Iowa test of basic skills), being a girl, and being a younger sibling were each associated with higher adolescent school commitment in seventh grade. Furthermore, age spacing between siblings, sibling school commitment, and mother support predicted the intercept of school commitment (\( \beta = .27, p < .01; \beta = .14, p < .001; \beta = .29, p < .001). \) indicating that greater distance in age between siblings, and both higher sibling commitment to school and higher perceived mother support were each related to higher adolescent school commitment in seventh grade. In addition, perceived sibling conflict negatively predicted school commitment (\( \beta = -.20, p < .001), \) whereby greater perceived sibling conflict was associated with lower adolescent school commitment in seventh grade. Sibling support, sibling sex, sex constellation of the sibling dyad, number of siblings living at home, and father support did not significantly predict the intercept of school commitment.

The intercept of sibling support did not significantly predict change in school commitment across
7th–10th grade. However, the slope of sibling support did positively predict the slope of school commitment ($\beta = .43, p < .01$), such that greater change in sibling support was associated with greater change in school commitment across 7th–10th grades. Given the positive linear trajectory of sibling support across 7th–10th grades (Figure 2b) and the decline in school commitment across 7th–9th grades (Figure 2b), these findings suggest that greater increases in sibling support are associated with lower declines in school commitment.

**Interaction effects.** The interaction models included the moderating variables and covariates from the previous analyses. Two-way, three-way, and four-way interaction terms were included in the models to assess the combined effects of adolescent sex, sibling sex, sex constellation of the sibling pairs, birth order, and sibling school commitment on adolescent school commitment across 7th–10th grades. Adolescent sex, sex constellation, and sibling school commitment did not significantly interact with sibling support to predict the intercept or slope of school commitment across 7th–10th grades. Sibling sex did significantly interact with the intercept of sibling support to predict the slope of school commitment ($\beta = -.14, p < .05$), such that the association between sibling support in seventh grade and school commitment from 7th to 10th grade significantly differed between adolescents with sisters compared to adolescents with brothers (Figure 3). Adolescents with sisters versus brothers significantly differed from one another, as the association between sibling support and change in school commitment was positive for adolescents with brothers and negative for those with sisters. In addition, sibling sex and birth order significantly interacted with the intercept of sibling support to predict school commitment ($\beta = -.06, p < .05$), whereby the association between sibling support and school commitment differed significantly between younger and older siblings who had sisters or brothers (Figure 4). Although simple slope analyses were not significant for either interaction, these results indicate that adolescents who were a younger versus older sibling, and those who had a sister versus a brother, significantly differed from each other in the association between their perceptions of sibling support and school commitment in seventh grade.

**DISCUSSION**

This study examined the trajectories and associations between adolescents’ perceptions of the support they received from their siblings and their commitment to school, as well as moderators, across the transition from middle school to high school. This was investigated through structural equation modeling using adolescent and sibling questionnaire data. One of the key findings was that adolescents perceived increasing levels of sibling support across 7th–10th grades and experienced decreasing school commitment across 7th–9th grades. In addition, we found that change in sibling support positively associated with change in school commitment, such that more support over time related to more school commitment, a finding that aligned with our hypotheses drawn from RRT connecting perceived social support and well-being. Finally, we found that sibling sex and birth order modulated the association between sibling
support and school commitment, such that having a brother, specifically an older brother, magnified the positive association between sibling and school commitment.

Developmental Trajectories

To understand the way in which sibling support and school commitment change from middle to high school, we tested five different trajectories across 7th through 10th grades. Sibling support had a trajectory that increased across these grades in a linear manner. Prior cross-sectional research shows that sibling intimacy and companionship tend to be high during adolescence (e.g., Lempers & Clark-Lempers, 1992), particularly at 16 years old (Scholte et al., 2001). Consistent with these past findings, we found that adolescents’ perceived increasing support from their siblings across their early to mid-adolescent years. However, our results contrast with Kim et al.’s (2006) finding that, on average, perceptions of sibling intimacy do not change significantly across adolescence. Our results also contrast with Branje et al.’s (2004) finding that, on average, perceptions of sibling support do not change significantly for older siblings, but increase from 11 to 13 years old, and then decrease from 13 to 15 years old. It is possible that scale measurement differences account for the differences between our findings and those of these other two studies. Participants in our study used a 7-point scale, whereas the other two studies used a 5-point scale (Branje et al., 2004; Kim et al., 2006), which may have contributed to more variability in sibling support. In addition, our study focused on a specific time period, and receipt of global support, which RRT proposes is important for maintaining well-being. Our scale specifically obtained more variability in global sibling support 30 days prior to administering the questionnaire, which likely explains the discrepancy in results between our study and other studies. Importantly, this study is one of the first studies to illustrate this positive linear trend in sibling support across 7th–10th grades using longitudinal data. This finding suggests that, as adolescents navigate new challenges and relationships during the transition from early to mid-adolescence, they may seek out more emotional and behavioral support from their siblings.

School commitment showed a different trajectory pattern than did sibling support; it decreased linearly across 7th–9th grades, but stabilized between 9th and 10th grades. This finding partially supported our hypothesis that school commitment would linearly decrease across this time. Although some work shows stability in components of school commitment after the transition to high school (e.g., Dotterer et al., 2009), it remains unclear why school commitment remained stable from 9th to 10th grades. This pattern may relate to students feeling more connected to their high school after the transition from middle school and being more comfortable and engaged in this new school context. Additionally, school commitment may stabilize from 9th to 10th grade due to adulthood goals becoming more salient, such as preparation for college and career pathways. Although we found small increments of change exhibited in both
sibling support and school commitment, it is still important to acknowledge that these changes are meaningful. We imposed factorial invariance across time within the latent growth curve model, which is necessary to obtain a high construct reliability (Millisap & Heining, 2012; Widaman et al., 2010). Given these large constraints within each variable across time, these findings reflect meaningful change in sibling support and school commitment during the transition to high school.

Predicting School Commitment

We found that change (but not initial seventh grade levels) in sibling support significantly predicted change in school commitment across 7th–10th grades after accounting for a wide range of covariates. The specific trajectories of sibling support and school commitment that emerged from this study should be considered when interpreting their association with each other across time. The direction and magnitude of cumulative change in these patterns, which remained significant above and beyond the rigorous constraints imposed on each variable across time, importantly frame the process of how sibling support predicts school commitment over this transitional period within adolescence (Abelson, 1985; Widaman et al., 2010). Because sibling support rose and school commitment declined across time, their longitudinal positive association suggests that perceiving supportive sibling relationships helps maintain school commitment during adolescence, especially across seventh to ninth grades. This finding is consistent with RRT (Lakey & Orehek, 2011) as perceived social support is proposed to enhance regulation and mental health, as well as to strengthen associations between social support and well-being across contexts (i.e., from the family context to the school context). Although sibling support and school commitment were associated across 7th–10th grade, this positive association was not found in seventh grade. The lack of association between sibling support and school commitment may be due to the moderate effect sizes of the covariates (e.g., mother support, academic achievement, being a younger sibling, and age spacing between siblings) on adolescents’ school commitment in seventh grade. It is noteworthy that even when accounting for these variables in the presence of the variables of interest, greater perceived sibling support remained associated with greater school commitment across the transition to high school and early high school years.

Interaction Effects

This study demonstrated significant moderation effects of sibling sex and birth order with sibling support in predicting school commitment. That is, the association of sibling support with school commitment varied as a function of the sibling’s sex and the order in which the adolescent and their sibling were born. Contrary to our hypothesis, adolescents with sisters showed a stronger negative association between sibling support and change in school commitment across 7th–10th grades than did adolescents with brothers, who showed a weaker positive association between these variables. Of note, this finding persisted regardless of whether the adolescent was a boy or girl. Furthermore, the effect of having a brother was specific to adolescents who were a younger versus older sibling, which was consistent with our hypothesis. These findings suggest that having a brother, compared to a sister, during adolescence strengthens the link between supportive sibling relationships and greater school commitment at a time when school commitment generally declines in the prevention of declines in commitment, particularly for younger siblings. Although the benefit of having a brother over a sister appears counter intuitive based on the literature (e.g., Hollifield & Conger, 2015), brothers who are supportive may be particularly beneficial as a source of social support. Highly supportive brothers may be more sensitive to the needs of their siblings, and as such may provide essential support through conversations and time spent together, particularly when commitment to school may be waning. Alternatively, the nature of support provided by brothers and sisters may differ. For example, sisters often provide socioemotional support such as intimacy, advice, and solving personal problems (e.g., Tucker et al., 1997); perhaps the nature of support provided by brothers is more instrumental and associated with activities, such as schoolwork. In addition, support perceived from older brothers may differentially predict adolescent school commitment, compared to older sisters, based on gender socialization of the family. For example, some research has indicated that mother and father gender socialization can predict adolescent interests, and engagement in household tasks and leisure activities, based on birth order and sex constellation of the sibling dyad (McHale, Crouter, & Tucker, 2012). Due to the surprising nature of this finding, it should be interpreted with caution. Furthermore, it would be advantageous to first replicate these analyses in
other samples to help elucidate the nonsignificant simple slopes results, and second, to explore specific domains and contexts in which relationships with brothers are especially salient as a source of support during adolescence.

Adolescent sex and sex constellation of the sibling dyad did not significantly moderate the association between sibling support and adolescent school commitment. Although the results indicated that girls had higher perceptions of sibling support and school commitment across all 4 years, this finding is unsurprising given that sibling sex was a better predictor in the models alongside adolescent sex, suggesting that these variables were both similarly accounting for variance in school commitment. Another explanation for this nonsignificant finding is that girls and boys appear to equally benefit from perceiving support in sibling relationships as it predicts school commitment.

Finally, sibling school commitment did not significantly moderate the relation between sibling support and adolescent school commitment. Although research has shown greater similarity between behaviors of siblings when adolescents perceive high levels of sibling warmth and support (e.g., Slomkowski et al., 2001), this did not apply to school commitment. One interpretation of this finding is that, despite the level of a sibling’s commitment to school, the support provided by that sibling is a stronger predictor of adolescent school commitment. On the other hand, the similarity in school commitment between siblings, and the moderating effect of their relationship quality, may be attributable to more complex processes than were measured in this study. For example, the motivation to be similar (e.g., social learning; Bandura, 1977) or dissimilar (e.g., de-identification; Whiteaker et al., 2009) to the sibling in the study was not assessed. These motivational processes may play a role in whether siblings in warm relationships, or in relationships that lack support, have similar views and behaviors in school commitment.

Limitations and Conclusion

Limitations of this study deserve acknowledgment. First, because only White families from rural communities were recruited, conclusions from the present results may not generalize to ethnically diverse populations. For example, the mean level of frequency and intensity of support received from siblings, and the association between sibling support and school commitment, may differ across ethnicities depending on cultural values about family roles and expectations (e.g., *familismo* in Mexican culture; e.g., Updegraff, McHale, Whiteman, Thayer, & Delgado, 2005). Future school commitment research should replicate these analyses in diverse adolescent samples to increase the external validity of this study’s findings. The authors note, however, that several results from this sample on a range of topics have been replicated in diverse samples in both national and international samples (e.g., Conger and Conger, 2002; Parke et al., 2004), which increases validity of the findings reported here.

Second, because the data in this study were collected from 1989 to 1992, cohort effects may contribute to the present results. Specifically, the FTP was designed to capture the effect of economic hardship on family relationships and health given the economic downturn in Iowa in the late 1980s. This naturally occurring event may reduce the external validity of the results because adolescents in later cohorts likely experienced a different family environment due to differences in economic climate. For example, high economic pressure is associated with less positive sibling interactions through higher levels of parental hostility (Conger, Conger, & Elder, 1994). Nonetheless, the processes and benefits of sibling support today are likely to be similar to those occurring a few decades ago. The current results indicated that above and beyond individual, dyadic, and family characteristics, sibling support still buffered against the decline of school commitment across adolescence. Support from siblings may serve as a mechanism through which adolescents feel socially connected and empowered, and thus maintain a positive mindset across key transitions in adolescence. Future research would benefit from recruiting adolescents in several cohorts to validate the current findings.

Third, this study recruited sibling pairs, and therefore did not consider support from other siblings that the target adolescent may have had. Specifically, the sibling closest in age to the adolescent in seventh grade was included in the study. A greater age discrepancy between siblings (i.e., this study only includes 4 years or less) may alter the potential impact of sibling support on school commitment. For instance, a younger sibling may not benefit as much from an older sibling’s support if they are far apart in age given the disparity in their school experiences. Future work would benefit from recruiting all children and adolescents living at home for each family. Such an approach would align well with family systems theory (see Cox & Paley, 1997), which emphasizes that the whole family is greater than the sum of its parts.
Specifically, the characteristics of the family, such as resiliency and risk factors, cannot be fully understood from investigating only two individuals in a family. Drawing on data from all children and all adults in a family would provide fuller explanations of family dynamics and how family support contributes to adolescent school commitment.

This study shed light on several previously unaddressed questions about school commitment and sibling relationships, including the longitudinal nature of sibling support and its association with school commitment across adolescence. Although this study focused on adolescent school commitment, the incorporation of other sibling relationship dynamic characteristics, such as time spent together and family values, could clarify how sibling support associates with school commitment concurrently, and across time. More work is needed on the specific mechanisms through which supportive sibling relationships prevent the decline of school commitment during adolescence (e.g., effective problem solving, conscientiousness). In addition, it would be advantageous to differentiate the unique contributions of parents, peers, and siblings in explaining the maintenance of school commitment across adolescence.

Because previous literature recognizes that these social agents explain unique variance in adolescent-positive and -negative outcomes (e.g., McHale, Crouter, et al., 2012; McHale, Updegraff, et al., 2012), elucidating these processes would benefit the adolescent development literature and better inform school intervention programs.

To conclude, this work identifies siblings, particularly brothers, irrespective of birth order and adolescent sex, as a significant social resource toward the maintenance of school commitment across adolescence. In addition, the present results highlight the perception of support from siblings, globally and not specific to school, as a mechanism through which sibling relationships associate with change in school commitment. Delineating ways to increase warm affect and supportive behaviors within sibling relationships may be a potential point of intervention, which could enhance academic commitment across the transition from middle school to high school, a time when youth typically experience declines in their commitment to school.

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