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A Longitudinal Study of Pubertal Timing, Parent-Child Conflict, and Cohesion in Families of Young Adolescents With Spina Bifida

Rachael Millstein Coakley, MA, ***Grayson N. Holmbeck,*** PhD, ***Deborah Friedman,*** MA, ***Rachel Neff Greenley,*** MA, and ***Azure Welborn Thill,*** PhD
Loyola University of Chicago

Objective: **To study longitudinal associations between perceived pubertal timing and family conflict and cohesion during the transition to adolescence in 68 families of children with spina bifida and 68 matched families with able-bodied children. Children were 8 or 9 years old at Time 1 and 10 or 11 years old at Time 2.**
Methods: **Family conflict and cohesion were assessed with observational data and maternal, paternal, and child reports on questionnaires. Perceived pubertal timing was assessed with maternal report.**
Results: **Consistent with the literature on typically developing young adolescents, prospective longitudinal analyses revealed that early maturity was associated with higher levels of conflict and decreases in cohesion in families with able-bodied children. Contrary to these findings, perceived pubertal timing had less of an impact (or the opposite impact) in families of children with spina bifida. Findings were robust across respondents and methods of data collection.**
Conclusions: **Findings based on multimethod and multisource data suggest that familial response to developmental change differs across context (spina bifida vs. able-bodied). Possible reasons for differential responses to the adolescent transition are reviewed. Services are likely to be enhanced if health professionals routinely discuss adolescent developmental issues with parents and youths during clinic visits.**

Key words: *spina bifida; physical disability; family; puberty; pubertal timing; adolescence; conflict; cohesion.*

Past research conducted with typically developing children suggests that the early adolescent period is a time of transformation in parent-child relationships, a time when family relationships are renegotiated and redefined (Holmbeck, 1996; Larson, Richards, Moneta, Holmbeck, & Duckett, 1996; Paikoff & Brooks-Gunn, 1991; Steinberg, 1990). The frequency of conflicts between parents and children appears to peak during early adolescence (Holmbeck, 1996; Paikoff & Brooks-Gunn, 1991); moreover, the quality of such conflicts becomes more negative, and parents and children appear to display less positive affect as a function of both age and pubertal maturation (Holmbeck & Hill, 1991; Laursen, Coy, & Collins, 1998). Various theories have been proposed to explain these transformations (see Holmbeck, 1996, for a review); most suggest that perturbations in family relationships serve

Anne E. Kazak served as the Action Editor for this article. All correspondence should be sent to Grayson N. Holmbeck, Loyola University of Chicago, Department of Psychology, 6525 N. Sheridan Road, Chicago, Illinois 60626. E-mail: gholmbe@luc.edu.

a developmentally adaptive function. For example, incongruities in the expectancies that parents and children have for each other may make it more likely that the boundaries of parental authority will be renegotiated during this period, perhaps via increases in parent-child conflict (Collins, 1990; Smetana, 1988).

Although there is considerable consistency across studies in this research area (Paikoff & Brooks-Gunn, 1991), it is not clear whether developmental transformations in parent-child relationships are universal or whether such changes are exacerbated or attenuated by certain individual or family circumstances (Anderson, Hetherington, & Clingempeel, 1989; Holmbeck, 1996). Thus, the purpose of this investigation was to examine developmental change (i.e., pubertal timing) in relation to observed and perceived family conflict and cohesion in two types of families: those with children who have a physical disability (i.e., spina bifida) and those with able-bodied offspring.

Some have argued that the "task of parenting" is altered during the transition to adolescence (Holmbeck, Paikoff, & Brooks-Gunn, 1995). Indeed, because of the many developmental changes during the adolescent period (Feldman & Elliott, 1990), it is likely that many parents find it necessary to fine-tune their parenting practices to acknowledge the changing developmental needs of their offspring (Eccles et al., 1993; Holmbeck et al., 1995). One of the major tasks of parenting during adolescence is to be responsive to the adolescent's need for increasing responsibility and behavioral autonomy, while at the same time maintaining a high level of cohesiveness in the family (Holmbeck et al., 1995).

Navigating this transformation may be particularly difficult for a parent of a chronically ill or physically disabled child. Prior to adolescence, highly structured and organized family environments may be adaptive as parents attempt to care for a child who must follow a strict medical regimen (Seiffge-Krenke, 1998). However, during the transition to adolescence, the demands of raising a child who can function independently are often at odds with the demands of caring for a child with a disability or chronic condition. In fact, some parents of children with disabilities may be reluctant to grant decision-making control to their offspring, particularly in relation to medical issues (Anderson & Coyne, 1993). If we assume that adolescents with disabilities and chronic illnesses have the same desires for behavioral autonomy as their able-bodied age mates, one would predict that the transition to adolescence would involve more intense conflicts in families of affected children.

Children with spina bifida may be particularly at-risk for a difficult transition to adolescence. As a result of their neural tube defect, children with spina bifida are more likely to exhibit early or precocious puberty (Greene, Frank, Zachmann, & Prader, 1985). Secondary sex characteristics emerge as early as age 8 for girls and age 9 for boys (Brauner, Fontoura, & Rappaport, 1991); girls with spina bifida experience menarche at a mean age of 11.4 years, as compared to the population norm of 12.5 years of age (Blum, 1991). Such early maturity in children with spina bifida may intensify the incongruities between adolescents' desire for autonomous functioning and parents' willingness to grant it, thus producing even higher levels of parent-child conflict (Collins, 1990; Holmbeck, 1996).

An alternative perspective on the adolescent transition in children with physical disabilities yields an entirely different set of predictions. Given their dependence on medical and familial assistance, adolescents with a disability are less likely to be behaviorally autonomous than adolescents without disabilities (Blum, Resnick, Nelson, & St. Germaine, 1991; Murtaugh & Zetlin, 1988). With regard to physical development, parents of adolescents with spina bifida talk less about sexual matters with their offspring than do parents of able-bodied adolescents (e.g., in one study, only a third of parents of 12- to 22-year-olds with spina bifida had discussed such issues with their children; Blum et al., 1991). Thus, given the lower levels of adolescent autonomy and the possible parental "denial" surrounding issues of physical development and sexuality in families of children with disabilities, it could be predicted that the physical changes of adolescence will have *less* of an impact on family process in these families than in families of able-bodied children.

Research on transformations in parent-child relationships in able-bodied children during the early adolescent period has tended to focus on age, pubertal status (i.e., an individual's placement in the sequence of predictable pubertal changes), and/or pubertal timing (i.e., timing of pubertal changes relative to one's age peers) as the primary predictors of change in family relationships (Holmbeck & Hill, 1991; Steinberg, 1987). Pubertal variables have been employed because they signal, in an overt and observable way, the movement toward an adult physical appearance. In this study, we examined the impact of pubertal timing (rather than pubertal status or age) on changes in family relationships, given the likely salience of the timing of physical changes in children with spina bifida.

In summary, the purpose of this study was to examine whether group status (spina bifida vs. able-bodied) moderated associations between perceived pubertal timing and changes over time in family relationships. This study focused specifically on the constructs of family conflict and cohesion, given that research in this area typically focuses on these two family process dimensions and because of the central role they play in theories of adolescent development (Cox & Brooks-Gunn, 1999; Holmbeck & Hill, 1991; Paikoff & Brooks-Gunn, 1991). Moreover, these two constructs have been found to differentiate between families with and without chronic conditions and have also been linked to psychosocial outcomes (e.g., adherence) in pediatric populations (Holmbeck, Coakley, Hommeyer, Shapera, & Westhoven, 2002; Morris et al., 1997; Rait et al., 1992). We proposed two alternative hypotheses for the moderational role of group status. Based on one perspective, we expected that perceived early maturity would be more highly associated with increases in conflict and decreases in cohesion in families of children with spina bifida. From a different theoretical perspective, we argued that perceived pubertal timing would have less of an impact on family process in these families. Strengths of this research are the longitudinal nature of the family data (beginning prior to the onset of puberty), the use of a multisource and multimethod design, the inclusion of both perceived and observed family variables, the focus on dyadic and systemic family constructs, and the inclusion of fathers in the data collection. Finally, we examined the effects of gender, given the importance of this variable in previous puberty/family research (e.g., Laursen et al., 1998; Paikoff & Brooks-Gunn, 1991). Given past findings (Steinberg, 1987), we expected that early maturity would be more highly associated with disruption in family relationships for boys than for girls.

Method

Participants

Participants at Time 1 were 68 families with 8- and 9-year-old children with spina bifida (37 males, 31 females; *M* (age) = 8.34) and a matched comparison group of 68 families with 8- and 9-year-old able-bodied children (37 males, 31 females; *M* [age] = 8.49), who were part of a larger study on the transition to adolescence in families with children who have spina bifida (Holmbeck et al., 1997, Holmbeck, Coakley, et al., 2002; McKernon et al., 2001). Complete demographic information for both groups at Time 1 is provided in Holmbeck, Coakley, et al. (2002); the groups were successfully matched on 10 demographic variables. A wide range of family incomes is represented in both samples. The majority of participants were Caucasian (91% in the able-bodied group; 82% in the spina bifida group). Although biological mothers from all families from both groups participated in the study, only 55 (81%) fathers/stepfathers from the spina bifida group and 52 (76%) fathers/stepfathers from the able-bodied group participated. At Time 2, which took place two years after Time 1 (when the youngsters were 10 or 11 years old), only two comparison families and one family from the spina bifida sample declined to participate.

Information on a number of physical status variables for the spina bifida group was obtained based on maternal report and/or from information gleaned from the child's medical chart: (1) spinal lesion level: 32% sacral, 54% lumbosacral or lumbar, 13% thoracic; (2) spina bifida type: 82% myelomeningocele, 12% lipomeningocele, 6% other; (3) shunt status: 71% shunt, 29% no shunt; and (4) ambulation: 19% no assistance, 63% assistance with braces, 18% assistance with a wheelchair. The average number of shunt surgeries among those with shunts was 2.50 (*SD* = 2.91).

As expected, a significant difference was found between the samples on a measure of receptive language (Peabody Picture Vocabulary Test, Revised; Dunn & Dunn, 1981): *M* = 92.49 (*SD* = 18.49) for the spina bifida sample and *M* = 108.97 (*SD* = 15.06) for the able-bodied sample. This finding parallels results based on verbal IQ test scores, insofar as children with spina bifida typically score in the low average range (e.g., Wills, Holmbeck, Dillon, & McLone, 1990). Because lower receptive vocabulary scores were viewed as part of the symptom presentation in children with spina bifida and because children with spina bifida are typically mainstreamed into classrooms with able-bodied children, we made no attempt to match the samples on this variable. Although PPVT-R scores were associated with both measures of family cohesion in the spina bifida sample and with child-reported conflict intensity in the comparison sample, statistically controlling for PPVT-R scores did not alter any of the findings of this study. Thus, PPVT-R scores were not employed as covariates in the analyses.

Participant Recruitment

Participating families in the spina bifida group were recruited from lists provided by four sources: (a) a children's hospital, (b) a children's hospital that cares exclusively for youngsters with physical disabilities, (c) a university-based medical center, and (d) a statewide spina bifida association. A recruitment letter was sent to all parents of children within the 8- to 9-year-old age range (and those who would reach this age within the following year). Letters were followed up with phone calls. More specific recruitment information and rates of nonparticipation are provided in Holmbeck, Coakley, et al. (2002). A comparison of participating children with children from families that declined to participate (n = 64) revealed no differences with respect to lesion level (χ^2 [2] = .62, $p > .05$) or type of spina bifida (myelomeningocele vs. lipomeningocele),(χ^2 [1] = 1.63, $p > .05$). Participating families from the able-bodied comparison group were recruited by contacting schools where the children with spina bifida were enrolled (see Holmbeck, Coakley, et al., 2002, for more details).

Procedure

At Times 1 and 2, assessments of the participating families were conducted by graduate and undergraduate research assistants during 3-hour home visits. After parents gave informed consent and children gave assent, parents and children were asked to complete a set of questionnaires as well as 1 hour of audiotaped and videotaped family interaction tasks. Questionnaires were read aloud to children and all Likert-scale formats were presented on large laminated cards. Upon completion of the questionnaires and interaction tasks, families were paid $50 at Time 1 and $75 at Time 2.

Measures

Questionnaire Measure of Perceived Pubertal Timing. Perceived pubertal timing was assessed with the following item from the Pubertal Development Scale (PDS), a parent-report measure of pubertal status and pubertal timing developed by Petersen, Crockett, Richards, & Boxer (1988): "Does your son's/daughter's physical development seem to be earlier or later than most of the other boys/girls his/her age?" Response options included (1) much earlier, (2) somewhat earlier, (3) about the same, (4) somewhat later, and (5) much later. Given that we obtained maternal data for all participants, maternal report of timing was used. Past research supports the validity of a single-item measure of perceived pubertal timing (Wichstrom, 2001).

Because participants were just 8 or 9 years old at Time 1 and thus not likely to have experienced significant pubertal development, we used the Time 2 perceived pubertal timing responses (when the participants were 10 or 11 years old) in our analyses. That is, we chose to use Time 2 pubertal data because we expected that the older the child, the more accurate the ratings of pubertal timing. Indeed, correlations between maternal and paternal report of perceived pubertal timing were higher at Time 2 (r = .90 in the spina bifida sample; r = .81 in the comparison sample) than at Time 1 (r = .61 in the spina bifida sample; r = .59 in the comparison sample), presumably due, in part, to less variability in the ratings at Time 1. It is also worth noting that timing classifications were relatively stable; the association between the Time 1 and Time 2 perceptions of timing were significant (χ^2 = 26.17, $p <$ .001, for the spina bifida sample; χ^2 = 16.42, $p <$ .001, for the comparison sample). Also, 85% of the full sample was classified the same at Times 1 and 2 (based on the dichotomous scoring approach discussed below).

Given the age of the sample at Time 2, it was not possible for parents to differentiate between on-time versus late maturers. At ages 10 or 11, those who had not yet begun pubertal development could be on time (if they begin development relatively soon) or they could be late. Moreover, we made no predictions about late maturers. Thus, we chose to collapse this variable into a dichotomy in which "early maturity" represented children perceived as either "much earlier" or "somewhat earlier" than their peers and "on-time maturity" representing children who were perceived as being "about the same," "somewhat later," or "much later" than their peers. Such dichotomous coding also allowed us to increase the cell sizes in the analyses described later. In the spina bifida sample, 28% of the sample were classified as early; in the comparison sample, 21% were classified as early (see Table I). Although the rate of early maturers was, as expected, higher in the spina bifida sample, the difference between groups was not significant (χ^2 = .74, $p > .05$).

The validity of the perceived pubertal timing

Table I. Pubertal Status Tanner-Stage Classifications and Pubertal Timing Groups

	Pubertal status						Timing group (at time 2)	
	1	2	3	4	5	*M* (*SD*)	On time	Early
Boys-Time 1								
Spina bifida	35	2				1.05 (.23)		
Comparison	34	3				1.08 (.28)		
Boys-Time 2								
Spina bifida	28	6	3			1.32 (.63)	30	7
Comparison	30	6				1.17 (.38)	28	8
Girls-Time 1								
Spina bifida	24	4	3			1.32 (.65)		
Comparison	25	6				1.19 (.92)		
Girls-Time 2								
Spina bifida	11	6	8	2	1	2.14 (1.14)	17	11
Comparison	15	7	7	1		1.80 (.92)	24	6

For the pubertal status groups: 1 = prepubertal, 2 = beginning pubertal, 3 = midpubertal, 4 = advanced pubertal, and 5 = postpubertal. At Time 1, participants were 8 or 9 years old; at Time 2, participants were 10 or 11 years old.

measure was supported by significant correlations between maternal and paternal report of pubertal timing at both Times 1 and 2. We also computed correlations between maternal report of pubertal timing at Time 2 and ma*t*ernal report of pubertal status at Time 2. Like pubertal timing, perceived pubertal status was assessed with the PDS (Petersen et al., 1988). Average ratings were computed from six Likert-scale items pertaining to boys' physical development (body hair, skin changes, facial hair, voice change, growth spurt, body shape) and six items pertaining to girls' development (body hair, skin changes, menarche, breast growth, growth spurt, and body shape). Time 2 maternal ratings of perceived pubertal timing were significantly correlated with Time 2 maternal ratings of pubertal status for both samples (r = .57 for the spina bifida sample; r = .37 for the comparison sample).

To provide information on the developmental status of our sample, we converted average pubertal status ratings into five pubertal status groups that approximate Tanner stages (Tanner, 1962) via methods used by Wichstrom (2001; 1 = prepubertal, 2 = beginning pubertal, 3 = midpubertal, 4 = advanced pubertal, and 5 = postpubertal). As can be seen in Table 1, most of the participants were prepubertal at Time 1 but some of the girls were in the midpubertal stages by Time 2. Although only one girl with spina bifida and no comparison girls were menarchal at Time 1, seven girls with spina bifida and five comparison girls were menarchal at Time 2. Means for the pubertal status items and for the total pubertal status score tended to be higher in the spina bifida sample for both boys and girls, but such group differences did not reach statistical significance.

Questionnaire Measures of Family Functioning. We used the following two measures of family functioning.

1. Intensity of parent-child conflict. The 15-item Parent-Adolescent Conflict Scale is a brief version of the Issues Checklist (IC; Robin & Foster, 1989). This scale is comprised of a list of potential conflicts often discussed in families with adolescents (e.g., whether or not he or she does chores around the house). Each item requires three responses. The family member first responds "yes" or "no" according to whether the issue was discussed during the last 2 weeks. If an issue was discussed, the family member indicates the number of times the issue was discussed. Finally, if an issue was discussed, respondents rate on a 5-point Likert scale (ranging from "calm" to "angry") how intense these discussions were on average. Mothers, fathers, and children completed this questionnaire. Only the intensity ratings were used in this study (total scores are item means; thus, the possible range of scores is 1.0 to 5.0, with higher scores indexing higher levels of conflict intensity). Alphas for child, mother, and father report for the spina bifida group at Time 1 were .81, .76, and .77, respectively. For the able-bodied group, the corresponding alphas at Time 1 were .68, .65, and .55, respectively. Because of low correlations between reporters (across Times 1 and 2, mean r across all possible pairs of reporters = .10 for the spina bifida group and mean r = .22 for the comparison sample), these conflict variables were not collapsed across reporters (Holmbeck, Li, Schurman, Friedman, & Coakley, 2002). Such low correlations may be due to the nature of the questionnaire used. Since respondents only rate the intensity of conflict for issues that they identify as conflictive, disagreements across respondents over what issues are conflictive may have produced lower levels of overlap in ratings of intensity.

2. Family-level conflict and cohesion. Mothers and fathers completed a shortened version of the Family Environment Scale (FES), a 90-item self-report measure that assesses social-environmental characteristics of the family system (Moos & Moos, 1986). The FES is comprised of 10 subscales and was administered in a true/false format (recoded as 0 = false; 1 = true) at Time 1 and in a 4-point Likert scale format at Time 2 (the change being made to increase the number of response options and to increase the internal consistency of each of the sub-

scales). Given that we were using Time 1 and Time 2 FES data, the Time 2 responses were recoded into dichotomous format by coding responses 1 and 2 as false (0) and responses 3 and 4 as true (1). Because item means were employed as total subscale scores, totals could range from 0 to 1.0. For this study, items from the conflict and cohesion subscales were used. Based on data from this study, Cronbach alphas for the spina bifida group for the two subscales were as follows: mother report of conflict = .60, mother report of cohesion = .71, father report of conflict = .67, and father report of cohesion = .74. The same alphas for the able-bodied comparison sample were .74, .71, .78, and .57. The somewhat modest alphas for some subscales were due to the dichotomous format (Roosa & Beals, 1990). Because of high correlations between mother and father report on these variables (across Times 1 and 2, for conflict, mean $r = .40$ for the spina bifida group and mean $r = .58$ for the comparison sample; the same mean *r*s for cohesion were $r = .41$ and $r = .50$), these variables were collapsed across reporters by computing the mean of maternal and paternal report.

Observational Measures. Because inclusion of alternate methods and sources of data collection reduces single-informant bias and provides additional data on complex phenomena (Holmbeck, Li, et al., 2002), observational data were gathered for this study. Three tasks from the videotaped family session were coded (the order of which was counterbalanced across families): an unfamiliar board game task (developed for this study), a conflict task (Smetana, Yau, Restrepo, & Braeges, 1991), and the Structured Family Interaction Task (Ferreira, 1963). Description of each of these tasks is provided in Holmbeck, Coakley, et al. (2002).

Observational data for the three tasks described above were coded using a global-coding method developed by Holmbeck, Belvedere, Gorey-Ferguson, and Schneider (1995), based on a system developed by Smetana et al. (1991). As is typically done with global coding systems, coders viewed a single family interaction task and then provided 5-point Likert scale ratings on a variety of dimensions for that task. The manual that accompanies this coding system includes behavioral descriptions for each of the points along the Likert scale. Details regarding this coding system are provided in Holmbeck, Coakley, et al. (2002). For conflict, three highly correlated dyadic codes (at Time 1, mean $r = .42$ for the spina bifida group and mean $r = .56$ for the comparison sample) were averaged to create a family conflict composite (i.e., levels of observed mother-child conflict, father-child conflict, and mother-father conflict). Family-level cohesion variables included four codes that assessed the degree to which a family was (1) impaired (reverse-scored; assesses how well the family is able to respond to the task and how well they can communicate and discuss differences), (2) disengaged (reverse-scored), (3) open or warm, and (4) able to reach a resolution or agreement. Given high intercorrelations among the four family-level items (mean $r = .70$ in the spina bifida sample and .71 in the comparison sample), these items were combined into a family cohesion composite (scored in the direction of higher cohesion).

Undergraduate and graduate student coders were trained for approximately 10 hours until they obtained at least 90% agreement with an expert graduate coder. All coders were "blind" to the specific hypotheses of this study. For each of the three tasks, dyadic and family behaviors were rated by two coders. Item-level means of the two raters for each task were averaged across the three tasks to yield a single score for each coding item for each family (thus, total scores ranged from 1.0 to 5.0). The seven item-level (three conflict items and four cohesion items) intraclass correlations assessing interrater reliability ranged from .70 to .78 for the spina bifida sample and from .65 to .85 for the comparison sample.

Results

Plan of Analysis

The measures for this study included three between-subjects independent variables (group status, gender, and perceived pubertal timing), one within-subjects independent variable (time; Time 1 vs. Time 2), and seven dependent variables (FES conflict, child report of conflict intensity, maternal report of conflict intensity, paternal report of conflict intensity, observed family conflict, FES cohesion, observed family cohesion). Analyses of group (spina bifida vs. comparison), gender (of child), and perceived pubertal timing (on time vs. early) main effects and interactions with respect to the family variables were conducted with repeated measures ANOVAs. Our intention was to examine all between-subjects variables within the same analysis

Table II. Group Means (Standard Deviations) With Repeated Measures ANOVA Findings

	Spina bifida (SB)				Able-bodied (AB)					
	On-time pub. (1)		Early pub. (2)		On-time pub. (3)		Early pub. (4)		Significant effects	Post-hoc effects
	T1 (a)	T2 (b)	T1 (c)	T2 (d)	T1 (e)	T2 (f)	T1 (g)	T2 (h)		
Conflict										
Family conflict (FES: parent)	.30 (.18)	.27 (.18)	.31 (.17)	.27 (.18)	.30 (.24)	.32 (.22)	.51 (.14)	.49 (.22)	G**, P** GxP*	1 < 4, 2 < 4, 3 < 4
Conflict intensity (IC; child)	1.78 (.74)	1.60 (.60)	1.64 (.65)	1.37 (.54)	1.52 (.48)	1.68 (.70)	1.78 (.77)	2.05 (.69)	GxP*, GxT**	2 < 4 (m), 3 < 4 (m) SB:T2 < T1
Conflict intensity (IC; mother)	1.76 (.63)	1.76 (.65)	1.92 (.87)	1.97 (.63)	1.70 (.62)	1.73 (.61)	1.82 (.89)	1.86 (.59)	*ns*	
Conflict intensity (IC; father)	1.67 (.55)	1.55 (.58)	1.70 (.39)	1.54 (.58)	1.48 (.43)	1.58 (.60)	1.75 (.53)	1.82 (.82)	*ns*	
Conflict–observ.	1.58 (.41)	1.70 (.42)	1.44 (.30)	1.50 (.15)	1.49 (.36)	1.70 (.42)	1.46 (.34)	1.85 (.55)	T***, GxT*	AB:T1 < T2
Cohesion										
Family cohesion (FES: parent)	.82 (.21)	.79 (.20)	.85 (.15)	.79 (.10)	.89 (.15)	.86 (.15)	.77 (.14)	.75 (.21)	*ns*	
Cohesion–observ.	4.09 (.54)	4.17 (.42)	4.13 (.49)	4.32 (.34)	4.30 (.44)	4.28 (.37)	4.37 (.36)	4.04 (.40)	GxT***, GxPxT*	h < d, h < f, h < g

G = group, T = time, P = pubertal timing, (m) = marginally significant, FES = Family Environment Scale, IC = Issues Checklist. Numbers and letters in the "Post-hoc effects" column are referenced in the column headings (i.e., a, b, c, . . .; 1, 2, . . .).
*$p < .05$.
**$p < .01$.
***$p < .001$.

(i.e., three-way repeated measures ANOVAs), but this proved problematic due to small cell sizes when crossing group with gender and pubertal timing (*n*s of less than 10 per cell in some cases). On the other hand, when such analyses were run, no significant four-way interactions emerged (i.e., group × gender × pubertal timing × time). Thus, we report two sets of analyses: seven two-way repeated measures ANOVAs for group by pubertal timing and seven two-way repeated measures ANOVAs for gender by pubertal timing. Given our hypotheses that group and gender would moderate associations between perceived pubertal timing and the family variables (Holmbeck, 1997, 2002), we were particularly interested in the significance of the group × pubertal timing and the gender × pubertal timing interaction effects. All significant effects were followed up with appropriate univariate post-hoc tests.

Multiple ANOVAs were employed rather than single MANOVAs because the MANOVA algorithm uses listwise deletion for missing values. Use of MANOVA when father-report variables were included (e.g., father report of conflict intensity) would have reduced the *n* of all analyses to those families with father participants (i.e., use of MANOVA would have eliminated from the analyses all single-parent families and families where fathers refused to participate).

Group by Pubertal Timing

As can be seen in Table II for parental report of conflict on the FES, main effects for group, $F(1, 124) = 9.23$, $p < .01$, and perceived pubertal timing, $F(1, 124) = 6.29$, $p < .01$, were qualified by a significant group × pubertal timing interaction effect, $F(1, 124) = 5.39$, $p < .05$. After collapsing across Times 1 and 2, post-hoc analyses revealed that the on-time puberty spina bifida group ($M = .28$), $t\ [59] = -4.30$, $p < .001$, the early puberty spina bifida group ($M = .30$), $t\ [30] = -3.55$, $p < .001$, and the on-time puberty comparison group ($M = .31$), $t\ [64] = -3.60$, $p < .01$, all scored significantly lower on the FES conflict scale than the early puberty comparison group ($M = .50$). These findings are displayed graphically in Figure 1.

For child report of conflict intensity (see Table II), group × pubertal timing, $F(1, 114) = 5.14$, $p < .05$, and group × time interaction effects, $F(1, 114) = 7.31$, $p < .01$, were found. Post-hoc analyses revealed no significant group comparisons for the group × pubertal timing interaction, although two effects approached significance (marginal effects were found in other analyses, but are only reported in this single instance to facilitate interpretation of this interaction effect). Specifically, the early puberty spina bifida group ($M = 1.51$, $t\ [30] = -1.72$,

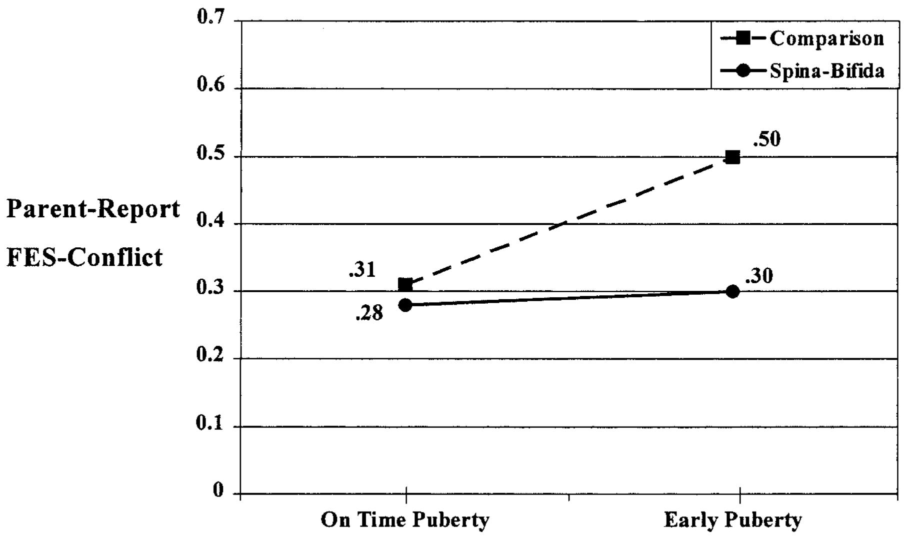

Figure 1. Group × pubertal timing interaction for parent-report of conflict on the FES.

$p = .09$) and the on-time puberty comparison group ($M = 1.55$, t [63] $= -1.90$, $p = .06$) both scored lower than the early puberty comparison group ($M = 1.84$). Post-hoc analyses for the group × time interaction revealed that child report of conflict intensity was lower at Time 2 ($M = 1.53$) than at Time 1 ($M = 1.74$, t [59] $= 2.32$, $p < .05$) in the spina bifida sample. The findings for child report of conflict intensity are displayed in Figure 2.

For ratings of observed conflict (see Table II), a main effect for time, $F(1, 119) = 16.64$, $p < .001$, was qualified by a significant group × time interaction effect, $F(1, 119) = 4.83$, $p < .05$. Post-hoc analyses revealed that ratings of conflict were lower at Time 1 ($M = 1.48$) than at Time 2 ($M = 1.74$, t [63] $= -4.29$, $p < .001$) in the comparison sample. These findings are presented in Figure 3.

For ratings of observed cohesion (see Table II), a significant group × time interaction effect $F(1, 119) = 11.31$, $p < .001$, was qualified by a significant group × pubertal timing × time three-way interaction, $F(1, 119) = 5.40$, $p < .05$. Post-hoc findings revealed that the early puberty comparison group ($M = 4.04$) scored lower at Time 2 than all of the following groups: the early puberty comparison group at Time 1 ($M = 4.37$, t [13] $= 3.26$, $p < .01$), the on-time puberty comparison group at Time 2 ($M = 4.28$, t [62] $= 2.11$, $p < .05$), and the early puberty spina bifida group at Time 2 ($M = 4.32$, t [30] $= 2.16$, $p < .05$). These findings are presented in Figure 4. No significant effects were found for mother or father reports of conflict intensity or for parental report of cohesion on the FES.

Gender by Pubertal Timing

Three-way gender × pubertal timing × time interactions were found for mother report of conflict intensity, $F(1, 125) = 6.88$, $p < .01$, and father report of conflict intensity, $F(1, 125) = 8.03$, $p < .01$. Post-hoc analyses for maternal report of conflict intensity revealed that males in the early puberty group scored higher in conflict at Time 2 ($M = 1.99$) than at Time 1 ($M = 1.64$, t [14] $= -2.47$, $p < .05$). For paternal report of conflict, males in the early puberty group scored higher in conflict at Time 2 ($M = 1.87$) than the on-time puberty group at Time 2 ($M = 1.48$, t [50] $= -2.24$, $p < .05$).

Discussion

The purpose of this study was to examine perceived pubertal timing in relation to family conflict and cohesion during the transition to adolescence in families of children with spina bifida and comparison families with able-bodied children. For the comparison sample, findings supported those in the literature on typically developing children (Holmbeck & Hill, 1991; Paikoff & Brooks-Gunn, 1991; Steinberg, 1987). Specifically, families of early maturing able-bodied children exhibited higher levels of conflict and greater decreases in family cohesion over time than families of able-bodied children who matured on time. Families of children with spina bifida did not exhibit the pubertal effects that are typically found in this literature; such families

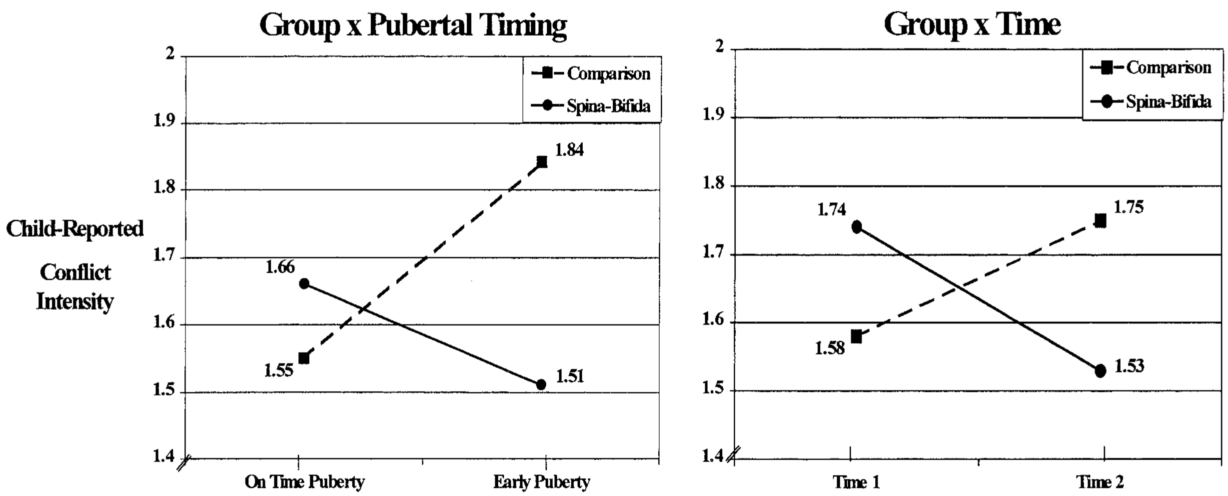

Figure 2. Group × pubertal timing and group × time interactions for child-report of conflict intensity.

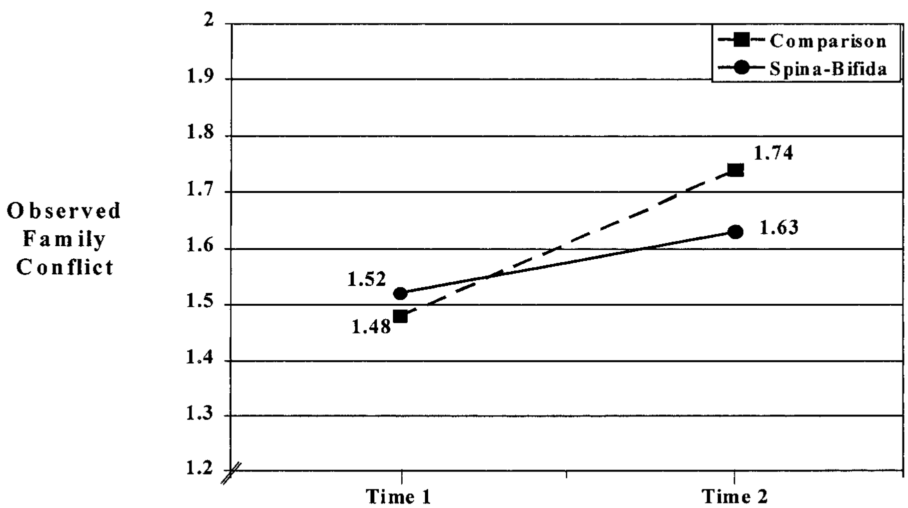

Figure 3. Group × time interaction for level of observed family conflict.

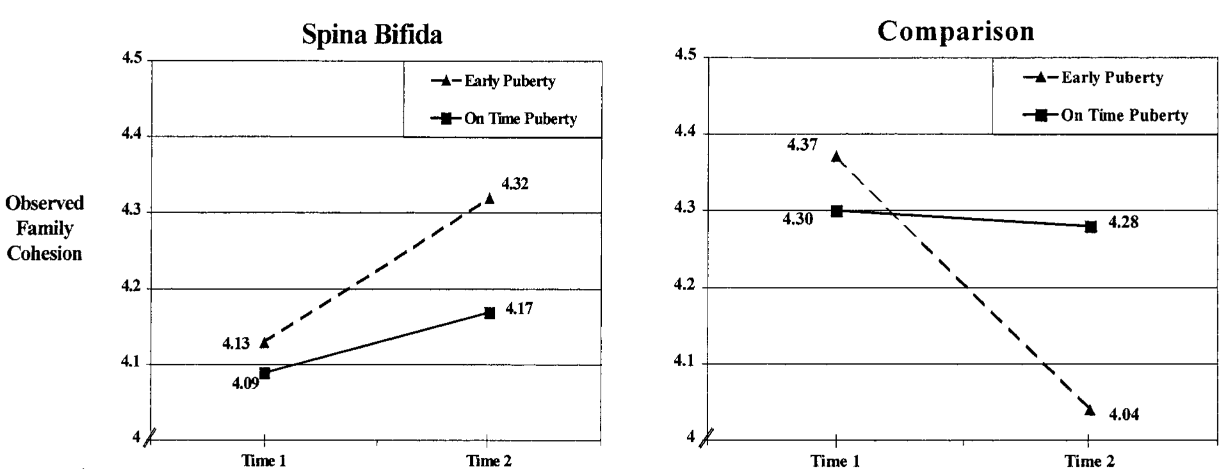

Figure 4. Group × pubertal timing × time interaction for level of observed family cohesion.

tended to exhibit either no response to pubertal timing or increases in positive functioning over time regardless of pubertal timing. Finally, early maturing boys exhibited greater increases in conflict (as reported by parents) than on-time males. Findings were robust across method and source of data.

The pattern of findings for the comparison sample replicates findings in the literature on perceived pubertal change and family relationships during the transition to adolescence. Past work suggests that families endure a transitional perturbation in parent-child relationships associated with the physical changes of puberty (Holmbeck & Hill, 1991; Larson et al., 1996; Laursen et al., 1998; Paikoff & Brooks-Gunn, 1991; Steinberg, 1997). Such was the case for the families of able-bodied participants in this study. In some cases, the findings suggested that families of early maturing able-bodied children were more conflictive across time (at Times 1 *and* Time 2), whereas other findings suggested that there were decreases in positive functioning over time (from Time 1 *to* Time 2). Moreover, regardless of pubertal timing group, the comparison sample exhibited increases in observed conflict over time. Similar findings emerged for parent report of family conflict, child report of conflict, observed conflict, and observed cohesion. Despite the consistency of such findings across method and source, causation cannot be assumed in this case. First, we used a measure of perceived pubertal timing from the Time 2 data collection. Although this was the preferred strategy, it also undermined our ability to establish causal ordering of variables. Second, it may be that families who are conflictive in late childhood are more likely to report that their child is early maturing because they assume that the conflicts are due to the early stages of adolescent development.

Associations between perceived pubertal timing and family relationships were less dramatic for the spina bifida group. Although null findings such as these could be dismissed and interpreted in relation to methodological shortcomings or sample size problems, the fact that the findings for the comparison sample replicate those of the larger literature lends credibility to the findings for the spina bifida sample. Why did perceived pubertal timing appear to have little impact on the functioning of families who have a child with spina bifida? We argued earlier that because of potential conflicts between adolescent developmental issues and the needs of children with physical disabilities, as well as the earlier onset of puberty in some children with spina bifida, we might find a more substantial link between pubertal timing and family conflict and cohesion in this sample than in the able-bodied sample. Instead, we found the opposite.

Factors within the parents or the children may account for the lack of findings for the spina bifida sample. As suggested earlier, it may be that parents of children with physical disabilities are less responsive to the pubertal changes of adolescence than parents of able-bodied children; indeed, parents of the former are less likely to discuss issues of sexuality with their offspring (Blum et al., 1991). Such an attenuation of responsiveness to developmental change may represent a "denial of development" on the part of parents. Or it may be the result of an investment in consistency over time in family relationships, which may be adaptive in such families. With respect to factors within the children, although it is possible that adolescents with spina bifida have the same desires for behavioral autonomy as their able-bodied agemates, results of past research suggest otherwise (Blum et al., 1991). Moreover, children with spina bifida are also more likely to have low self-esteem and exhibit depressive symptoms (Appleton et al., 1997), symptoms that would likely undermine one's motivation to achieve independence. Thus, if children with spina bifida express less interest in gaining increases in behavioral autonomy and if parents of these children are inclined to maintain consistency and status quo to promote compliance with medical regimens, responses to developmental change are likely to be less dramatic in these families. On the other hand, perturbations in family relationships may occur similarly across samples, but may evolve more slowly in families of children with physical disabilities. Whether these children could be considered "developmentally static" or if the process of development is "similar but slower" remains to be seen as we follow this sample into middle and late adolescence.

Findings that families of males were more likely than families of females to exhibit disruption as a function of perceived pubertal timing is consistent with past research. Indeed, Steinberg (1987) found that pubertal *timing* in boys (i.e., early maturity) and pubertal *status* changes in girls (i.e., more advanced development) tended to be associated with increases in family conflict. Similar findings emerged for the boys in this study. These findings emerged only for parental report of conflict intensity. This may suggest that parents are the first to detect such gender effects (before they are detected by the children themselves or by independent observers). The findings of this study are in line with gender role expectations (Holmbeck & Hill, 1991). Gender role intensification during adolescence (Hill & Lynch, 1983) often results in gains in assertiveness and power for boys in the family system. In some families, deference or "passive assertiveness" may be rewarded in girls (Hill, 1988). Thus, although families of girls and boys may be responsive to pubertal timing, the process may be more dramatic in families of boys and thus more detectable with questionnaire measures.

This study had certain limitations that have implications for future research. First, we studied only the early stages of pubertal development. It is possible that the effects of puberty in children with spina bifida are manifested only late in the pubertal process. Moreover, studies that examine the entire pubertal process as well as changes in pubertal status over time will be able to determine whether relations between puberty and family relationships are curvilinear as well as linear (Holmbeck & Hill, 1991; Steinberg, 1987). Second, unlike previous studies, this sample of children with spina bifida was not more likely to be early maturing, at least according to maternal report. Although only a small percentage of children with spina bifida appear to exhibit precocious puberty (Elias & Sadeghi-Nejad, 1994), we had expected there to be more early maturers in this sample. Future work should also include physician ratings of pubertal status. Third, the moderate sample size of this study prohibited the examination of four-way interactions and limited our ability to detect three-way interactions. Fourth, this study may have been biased toward detecting more findings for conflict than cohesion due to the inclusion of proportionally more measures of conflict. (Because the measures of conflict intensity were not highly intercorrelated, a composite intensity score could not be created.). Fifth, these findings cannot be generalized to all children with health-compromising conditions, given our exclusive focus on young adolescents with spina bifida. Finally, the generalizability of these findings is limited primarily to Caucasians (e.g., Spanish-speaking Latino children were underrepresented in this sample).

This study also has clinical implications. Given past work, which suggests that many parents of children with spina bifida do not discuss issues of sexual development with their offspring, and given our findings that these families appear to be less responsive to pubertal development than families of able-bodied children, it appears that health professionals should routinely discuss issues related to adolescent development during clinic visits. Specifically, issues of autonomy and independent functioning, pubertal development, the development of same-sex and opposite-sex friendships, identity development, and the prospect of attaining reproductive capability are all likely to be highly salient for young adolescents with spina bifida. Health professionals can be helpful in highlighting ways in which such issues are relevant to children with spina bifida. Moreover, professionals should be alert to the possibility that as parents and their children with physical disabilities begin to grapple with normative adolescent issues, family members may begin to see the disruptions in family relationships (i.e., temporary increases in conflict and decreases in cohesion) that have been observed in typically developing adolescents.

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