

Observed Macro- and Micro-Level Parenting Behaviors During Preadolescent Family Interactions as Predictors of Adjustment in Emerging Adults With and Without Spina Bifida

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Objective To examine observed autonomy-promoting and -inhibiting parenting behaviors during preadolescence as predictors of adjustment outcomes in emerging adults with and without spina bifida (SB). **Methods** Demographic and videotaped interaction data were collected from families with 8/9-year-old children with SB ($n = 68$) and a matched group of typically developing youth ($n = 68$). Observed interaction data were coded with macro- and micro-coding schemes. Measures of emerging adulthood adjustment were collected 10 years later (ages 18/19 years; $n = 50$ and $n = 60$ for SB and comparison groups, respectively). **Results** Autonomy-promoting (behavioral control, autonomy-relatedness) and -inhibiting (psychological control) observed preadolescent parenting behaviors prospectively predicted emerging adulthood adjustment, particularly within educational, social, and emotional domains. Interestingly, high parent undermining of relatedness predicted better educational and social adjustment in the SB sample. **Conclusions** Parenting behaviors related to autonomy have long-term consequences for adjustment in emerging adults with and without SB.

Key words autonomy; emerging adulthood; observational methods; parenting; spina bifida.

Emerging adulthood (ages 18–25 years) is a distinct developmental period characterized by widespread change, such as exploration of career interests, changes in world views, intensification of romantic partnering, and increased autonomy (Arnett, 2000). For youth with spina bifida (SB), a congenital birth defect, the achievement of milestones during emerging adulthood may be particularly difficult because of the challenges inherent in intense medical care management (e.g., intermittent catheterization, bowel programs, medications, and nutritional programs), impaired cognitive ability, and lower social skills (Zukerman, Devine, & Holmbeck, 2011). Emerging adults with SB demonstrate difficulties

with social (e.g., peer/romantic relationships), educational (e.g., college attendance), emotional (e.g., internalizing/externalizing symptoms), and health-related adjustment (e.g., substance use; Bellin et al., 2010, 2011; Murray et al., 2014; Roux, Sawin, Bellin, Buran, & Brei, 2007; Zukerman et al., 2011). Further, parenting behaviors that support or inhibit the development of autonomy may be especially important for youth with SB, whose families are often highly involved in their medical care. Yet, few studies have examined parenting behaviors as prospective predictors of autonomy-related emerging adulthood adjustment across social, educational, emotional, and health-related domains.

The development of autonomy is a dynamic and interactive familial process in which the child achieves independence while maintaining connectedness with parents (Friedman, Holmbeck, DeLucia, Jandasek, & Zebracki, 2009). Parenting behaviors that promote or undermine a child's autonomy development begin before adolescence and may have important implications for the development of more mature forms of autonomy and subsequent adjustment at later developmental stages. Children with chronic health conditions are often granted more decision-making control (e.g., over medical regimens) starting in middle childhood (Holmbeck et al., 1998), yet research has revealed that children with SB tend to lag behind their typically developing (TD) peers by ~2 years with respect to several indices of autonomy development (e.g., behavioral, decision-making, and emotional autonomy; Davis, Shurtleff, Walker, Seidel, & Duguay, 2006; Devine, Wasserman, Gerschens, Holmbeck, & Essner, 2011; Friedman et al., 2009). Difficulties with autonomy development in children with SB may persist into emerging adulthood and influence the likelihood that young adults attend college, experience romantic relationships, and develop stable social networks (Zukerman et al., 2011).

The influence of autonomy-promoting or -inhibiting parenting on youth adjustment has emerged as a crucial area of research, particularly in studies of pediatric populations (e.g., epilepsy, SB; Fastenau et al., 2004; Holmbeck, Coakley, Hommeyer, Shapera, & Westhoven, 2002; Holmbeck, Johnson et al., 2002; McKernon et al., 2001). The majority of this research has identified three distinct and salient parenting constructs that impact youth adjustment: Psychological control, behavioral control, and acceptance. *Psychological control* is characterized by parenting behaviors that are critical and manipulative of a child's thoughts and feelings (Barber & Harmon, 2002; Holmbeck, Johnson et al., 2002; Holmbeck, Shapera, & Hommeyer, 2002). Psychologically controlling behaviors include parental stifling of the child's communication, encouragement of emotional/psychological dependence, and parental suppression of individuality (Steinberg, 1990). In contrast, *behavioral control* (i.e., parental demandingness) refers to expectations and rules that parents set forth for age-appropriate child behavior, such as parental willingness to confront their child if he/she disobeys, age-appropriate supervision, and expectations for mature behavior (Baumrind, 1991). Finally, *parental acceptance* is typically defined as the degree to which a parent is affectionate, emotionally supportive, approving, and involved (Holmbeck, Shapera et al., 2002).

Generally, youth tend to be adversely affected by psychological control, whereas behavioral control and

parental acceptance promote positive adjustment outcomes. For example, studies have indicated that higher levels of behavioral control and acceptance are linked to better academic performance, social competence, and fewer behavior problems (Holmbeck, Hommeyer, & Shapera, 2002). In contrast, excessive psychological control may disrupt autonomy development and promote dependency (Barber & Harmon, 2002; Baumrind, 1991). Psychological control has been associated with higher rates of internalizing symptoms, externalizing symptoms, and adolescent substance use in pediatric (Luyckx, Goossens, Missotten, & Moons, 2011) and nonpediatric populations (Aquilino & Supple, 2001). This body of research suggests that optimal development occurs when youth are granted developmentally appropriate levels of autonomy in the context of continued parental involvement and support.

Similarly, investigators have measured more specific autonomy-related parenting behaviors. In particular, researchers have studied parenting that aids in the promotion of autonomy while maintaining a positive and accepting relationship between parent and child (termed "autonomy-relatedness"), which has been associated with a number of positive psychosocial outcomes. For example, research suggests that greater autonomy-relatedness in parenting is linked to better dating competence, ability to better cope with peer pressure, and higher levels of self-esteem (Allen, Hauser, Bell, & O'Connor, 1994; Best, Hauser, & Allen, 1997). Further, perceived parental promotion of autonomy for children with SB has been associated with positive adjustment during adolescence and emerging adulthood, such as educational achievement (Loomis, Javornisky, Monahan, Burke, & Lindsay, 1997) and increased well-being (e.g., lower levels of internalizing and externalizing symptoms; Allen et al., 1994, 2006; Barber, 1996; Noom, Dekovic, & Meeus, 1999; Pavlidis & McCauley, 2001).

Although the link between autonomy-promoting or -inhibiting parenting behaviors and child adjustment is well-established, advances in this area of research have been limited by a heavy reliance on single method (usually questionnaires), single informant (usually mothers), single group (i.e., lack of a matched comparison sample), and cross-sectional research approaches (Holmbeck, Coakley et al., 2002; Holmbeck et al., 2003). Unfortunately, exclusive reliance on questionnaire data, even when collected from multiple informants, introduces the problem of shared method variance (Holmbeck, Coakley et al., 2002; La Greca & Lemanek, 1996). In contrast, macro- and micro-level observational methods provide researchers with rich information and permit a less-biased approach

to examining youth–parent interactions, which may be distinct from the family member’s own perceptions (Kaugars et al., 2011). In macro-level analyses, a researcher codes for the overall frequency, intensity, and quality of observed parental behaviors (e.g., warmth, responsiveness, intrusiveness, and permissiveness) throughout family interactions. In contrast, micro-level coding involves assessment of specific parent–child conversation pragmatics at the level of utterances (i.e., each statement by each family member receives a code; Lasky & Klopp, 1982). To date, the majority of observational approaches in pediatric psychology research have relied on broad and macro-level indicators of parent–child communication and behavior (Dunn et al., 2011; Lim, Wood, Miller, & Simmens, 2011). However, studies that integrate macro- and micro-levels of analyses would be helpful in providing cross-validation of research findings and in identifying variables to be used in future targeted interventions (Holmbeck et al., 2003; Rodriguez et al., 2013).

Thus, the present study sought to examine macro- and micro-level observed parenting behaviors during preadolescence as predictors of emerging adulthood adjustment in individuals with SB, thereby addressing limitations of the existing literature. Specifically, we assessed the long-term impact of observed macro-level (e.g., psychological and behavioral control and acceptance) and micro-level (e.g., autonomy-relatedness, undermining autonomy, and undermining relatedness; Allen, Hauser, Bell, Boykin, & Tate, 1996; Johnson & Holmbeck, 1995) preadolescent family interactions on educational (i.e., college attendance), social (i.e., romantic/sexual experience, friends), emotional (i.e., internalizing and externalizing symptoms), and health-related (i.e., cigarette and alcohol use) adjustment outcomes in emerging adults with and without SB 10 years later. It was hypothesized that parenting behaviors that *undermine* autonomy development (high levels of psychological control and undermining autonomy and relatedness) would predict less adaptive outcomes across the educational, social, emotional, and health-related domains in emerging adults with SB and TD youth. Similarly, it was expected that parental behaviors that *encourage* autonomy (high levels of autonomy-relatedness, behavioral control, and acceptance) would lead to better adjustment in all domains in emerging adulthood. Given that youth with SB may display greater dependence on their parents for medical and social needs, and that youth with SB spend more time with their parents (and less time with friends) than their TD peers (Blum, Resnick, Nelson, & St. Germaine, 1991), relations among the parenting variables and outcomes were expected to be especially strong for youth with SB.

Method

Participants

Participants in this study were involved in a larger and longitudinal investigation that examined family relationships and psychosocial outcomes in children with SB and TD children (Holmbeck et al., 2003; Holmbeck, Johnson et al., 2002). Families of children with SB were recruited from three Midwest hospitals and a statewide SB association. A matched comparison sample of TD children and their families were recruited from schools where participating children with SB were enrolled. TD children and youth with SB were matched on 10 demographic variables, including age, gender, ethnicity, socioeconomic status (SES), and parental marital status and age (see Holmbeck et al., 2003 for details on the matching process), and groups did not differ significantly on any of these matching variables ($ps > .05$; Holmbeck et al., 2003).

At Time 1, children with SB ($n = 68$) and TD children ($n = 68$) were either 8 or 9 years old (SB M age = 8.34; TD M age = 8.49) and data were collected from families every 2 years. At Time 6, 10 years after Time 1, data were collected from 50 (76% of those assessed at Time 1) families of youth with SB and 60 (88%) families of TD children. Across the full sample, there were no significant differences with respect to gender, race, or SES between families who participated at Time 6 versus those who did not participate at this time point. On the other hand, there was a significant group difference for SES (as assessed at Time 1) among those who were still in the study at Time 6. That is, the SB group reported lower SES ($M = 42.63$, $SD = 10.46$, see further text for a description of how SES was assessed) than the comparison group ($M = 46.91$, $SD = 10.85$, $t(105) = -2.08$, $p < .05$). Thus, SES was controlled in all analyses. Table 1 provides sociodemographic characteristics at Time 1 for the Time 6 sample.

The present study used family observational data collected at Time 1 to predict emerging adulthood outcomes at Time 6. At Time 6, participants were 18–19 years old (SB M age = 18.64; TD M age = 18.60), and the majority of participants were Caucasian (85% in SB group; 90% in TD). Fifty-four percent of the participants in both groups were male. Medical records indicated that 83% of the SB sample was diagnosed with myelomeningocele (i.e., the most severe and common form of SB), and the majority of participants were shunted for hydrocephalus (71%). Fifty-nine percent of the SB sample had lumbar lesions, 29% had sacral lesions, and 12% had thoracic lesions. According to maternal report of ambulation, 21% ambulated without assistance, 62% used braces, and 17% used a wheelchair. A statistically significant difference on the

Table 1. Descriptive Data of Analytic Sample at Time 1

Characteristic	SB (n = 50) M (SD) or %	TD (n = 60) M (SD) or %	SB vs. TD
Youth age at Time 1	8.34 (0.48)	8.49 (0.50)	$t(106.14) = -1.53$
Maternal age at Time 1	37.98 (5.46)	37.68 (4.97)	$t(108) = 0.30$
Paternal age at Time 1 ^a	41.08 (5.38)	40.39 (6.25)	$t(83) = 0.54$
Gender			
Male	54.00%	50.00%	$\chi^2(1) = 0.18$
Female	46.00%	50.00%	
Child racial background			
Caucasian	84.00%	90.00%	$\chi^2(1) = 0.88$
Other	16.00%	10.00%	
Verbal IQ at Time 1	93.14 (17.39)	109.53 (15.33)	$t(108) = -5.25^*$
Hollingshead SES at Time 1 ^b	42.63 (10.46)	46.91 (10.85)	$t(105) = -2.08^*$

Note. The statistically significant difference in verbal IQ, measured using the Peabody Picture Vocabulary Test (PPVT-R), was expected owing to cognitive difficulties associated with SB.

^aSB (n = 39), TD (n = 46).

^bSB (n = 48), TD (n = 59).

* $p < .001$.

Peabody Picture Vocabulary Test-Revised Edition (PPVT-R; Dunn & Dunn, 1981; assessed at Time 1) emerged for the Time 6 groups, $t(108) = -5.25$, $p < .05$. This difference was expected, as children with SB typically score in the low average range on verbal reasoning tests (Wills, Holmbeck, Dillon, & McLone, 1990). Given that lower receptive vocabulary scores were viewed as part of the symptom presentation in children with SB and that children with SB are typically mainstreamed into classrooms with TD children, we made no attempt to match the samples on this variable. On the other hand, given that group status and PPVT-R scores were confounded, we were interested in whether significant group differences would continue to be significant after accounting for PPVT-R scores. Thus, we ran all analyses controlling for Time 1 PPVT-R scores.

Procedure

University- and hospital-based institutional review boards approved this study. At Time 1 through 5, data were collected during 3-hour home visits conducted by trained graduate and undergraduate research assistants. In addition to informed consent from parents, a release of information form to obtain data from medical records was collected during each visit. Before age 18, children provided written assent at each home visit; once participants turned 18, they provided written consent to participate. Families completed questionnaires, which were counterbalanced to protect against order effects. During home visits, one or more parents and the target child completed semi-structured interaction tasks that were videotaped. While both parents were encouraged to participate in the interaction tasks,

sometimes only one parent was available; this was determined based on the individual circumstances of each family (e.g., one parent had to work). Tasks were presented in a counterbalanced order and consisted of a warm-up task, an unfamiliar board game, a structured family interaction task (Ferreira, 1963), and a conflict task (Smetana, Yau, Restrepo, & Braeges, 1991). The present study examined observational data obtained from all tasks, except for the warm-up task (see Holmbeck, Johnson et al., 2002, for a more detailed description of tasks). All three tasks were coded with macro-level scales, as these tasks provided opportunities for psychological control, behavioral control, and acceptance parenting behaviors to be observed. Micro-level analyses were conducted only on the conflict task, as this task yielded the greatest variability for the autonomy and relatedness parenting behaviors and because such coding was much more time intensive and expensive than the macro-coding procedures. Home visits were not conducted at Time 6, but rather, emerging adults and their parents completed questionnaires by mail. At each time point, participants received monetary compensation (\$50 for Time 1 and \$75 for Time 2 through 6) for their time.

Measures

Demographics

Mothers and fathers completed the Parent Demographic Questionnaire, which included questions regarding the child's age, gender, ethnicity, race, medical variables, parent's education level, and parent's occupation. The Hollingshead Four-Factor Index of Socioeconomic Status was used to assess SES (Hollingshead, 1975), which was computed by assigning a score to mothers' and/or fathers'

occupations and education level; higher scores represent higher SES. For two-parent families in which both caregivers were employed, education and occupation scores were combined and were averaged to calculate SES. For single-parent families, or for two-parent households in which only one parent was employed, the employed individual's information was used to calculate Time 1 SES.

Verbal Intelligence

Receptive language ability was measured using the PPVT-R (Dunn & Dunn, 1981; Kaugars et al., 2011) at Time 1. The PPVT-R has high levels of validity and reliability. Because it correlates moderately with other measures of verbal intelligence (Sattler, 2002), it was used to estimate the child's verbal intellectual functioning.

Parenting Predictors

Macro-Level Observational Measures of Preadolescent Parenting Behaviors

Three family interaction tasks were coded using a global coding system developed by Johnson and Holmbeck (1995) that is based on a methodology devised by Smetana et al. (1991). As is typical of global rating systems, coders viewed individual family tasks and then provided ratings on a variety of dimensions.¹ Undergraduate- and graduate-level research assistants coded the videos. Coders were trained for roughly 8-10 hours until they achieved 90% agreement with an expert graduate student coder (during training, agreement was assumed when two codes were within one Likert-scale point). All coders were blind to the specific hypotheses of this study; however, owing to the nature of SB (e.g., physical disabilities), they were not necessarily blind to the group status of the preadolescent. Two coders separately viewed each of the three interaction tasks and rated items on a 5-point Likert scale.

Parent psychological control (e.g., manipulative and critical behaviors toward child's thoughts and feelings) was measured by averaging the ratings for the following five codes (Holmbeck, Shapera et al., 2002): (a) pressures others to agree, (b) the nature of parental control: Democratic (reverse-scored), (c) tolerates differences and disagreements (reverse-scored), (d) receptive to statements made by others (reverse-scored), and (e) nature of parental control: Overprotective. Parental behavioral control (e.g., expectations and rules set by parents for age-appropriate child behaviors) included the following three codes: (a) overt power, (b) the nature of parental control: Permissive (reverse-scored), and (c) parental structuring of the task.

¹ Copies of this coding system are available upon request from Grayson N. Holmbeck.

Parental acceptance (e.g., behaviors demonstrating affection, emotional support, and approval) included five codes: (a) listens to others, (b) humor and laughter, (c) warmth, (d) anger (reverse-scored), and (e) supportiveness.

For data analyses, the value for each coding item reflects the average of two coder's responses across three family interaction tasks (i.e., a total of six codes). Satisfactory reliability was found between raters on their observations of all three parenting constructs. For the SB group, interrater reliabilities (intraclass correlation coefficients; Suen & Ary, 1989) across coders and tasks were 0.79, 0.74, and 0.68 for maternal acceptance, behavioral control, and psychological control, respectively. Intraclass rater reliabilities were 0.88, 0.87, and 0.80 for paternal acceptance, behavioral control, and psychological control, respectively. For the TD sample, the rater reliabilities were 0.79, 0.85, and 0.69 for maternal acceptance, behavioral control, and psychological control and 0.79, 0.85, and 0.79 for paternal behaviors, respectively. In accordance with past recommendations, these values were deemed acceptable (Hartmann & Wood, 1990; Landis & Koch, 1977). Satisfactory scale reliability was also established for these macro-coded observational scales. In the SB group, the scale Cronbach's alphas were 0.86, 0.66, and 0.71 for maternal behaviors and 0.88, 0.68, and 0.76 for paternal behaviors, respectively. For the TD group, Cronbach's alphas were 0.85, 0.85, and 0.73 for maternal behaviors and 0.80, 0.78, and 0.76 for paternal behaviors, respectively. Maternal and paternal behavioral control, acceptance, and psychological control were collapsed across parents to reduce the number of potential analyses. Maternal and paternal acceptance ($r = .57, p < .05$), psychological control ($r = .25, p < .05$), and behavioral control ($r = .71, p < .05$) were significantly correlated.

Micro-Level Observational Measures of Preadolescent Parenting Behaviors

Micro-level codes were derived using a coding system developed by Allen et al. (1996; Autonomy and Relatedness Coding System). This coding system examines each family member's tendency to promote or inhibit the autonomous functioning of other family members. In addition to assessing inhibition and promotion of autonomy, the coding scheme examines relatedness or the tendency to support the ability of other individuals to connect with or relate to other family members. To assist in coding, the conflict task was transcribed verbatim so that coders could use both the transcripts and videotaped interactions to code utterances for the presence of autonomy and relatedness within dyadic and triadic family interactions (Holmbeck et al., 2003). Two coders provided ratings for all interactions.

Each utterance was coded for (1) autonomy-relatedness (five codes: States his/her reasons, confidence in stating opinions, information seeking/queries, validates the other person, and engages with the other person), (2) undermining autonomy (three codes: Recanting one's position, over-personalizing a disagreement, and pressuring another person to agree), and (3) undermining relatedness (two codes: Distracting, ignoring, or cutting off the other person and hostility expressed toward the other person). For each of these 10 codes, a separate score was calculated for each dyad in both directions (e.g., father to child and child to father). The current study only examined codes in the direction of parent to adolescent (e.g., mother to child and father to child). Item-level intraclass correlations ranged from .35 to .84 across groups and dyads ($M = .67$; as described by Holmbeck et al., 2003). Maternal and paternal autonomy-relatedness, undermining autonomy, and undermining relatedness were collapsed across parents to reduce the number of potential analyses. Maternal and paternal autonomy-relatedness and undermining relatedness ($r_s = .39$ and $.52$, respectively, $p_s < .05$) were significantly correlated. However, maternal and paternal undermining of autonomy were not significantly correlated ($r = .17$, $p > .05$), thus only maternal undermining of autonomy was used because a greater number of mothers ($n = 131$) than fathers ($n = 101$) participated in the family videotaped interaction tasks.

Emerging Adult Outcomes

Academic Attainment

Emerging adults reported college attendance (i.e., yes/no).

Peer and Romantic Relationships

The number of close friends was assessed using one item from the Adult Self-Report (ASR) version of the Achenbach Behavior Checklist (Achenbach & Rescorla, 2003). The item is scored using a 4-point Likert scale (0 = "none," 1 = "1 friend," 2 = "2 or 3 friends," and 3 = "4 or more friends"). A romantic relationship questionnaire was created for the study to assess romantic relationship involvement and sexual intercourse experience. Emerging adults were asked to report whether they had ever been involved in a romantic relationship (yes/no) and had sexual intercourse (yes/no). For the purposes of the current study, initiation of sexual intercourse was not conceptualized as a health-related outcome because we sought to measure developmentally normative initiation, rather than risky sexual behavior (e.g., multiple partners, intercourse without condom use, etc.). Previous studies with TD and SB youth have also made this distinction (Murray et al., 2014).

Internalizing and Externalizing Symptoms

Mother and father reports on the Adult Behavior Checklist (Achenbach & Rescorla, 2003) were used to measure their youths' internalizing and externalizing symptoms. Emerging adults also completed a measure of their internalizing and externalizing symptoms on the ASR (Achenbach & Rescorla, 2003). The ASR and Adult Behavior Checklist are each rated on 3-point Likert scales (0 = "never true," 1 = "sometimes true," 2 = "very often true") and have consistently demonstrated adequate reliability and validity. The means (in *T*-score form) of mother and father self-report on the Externalizing ($r_s = .45-.69$, $p_s < .05$) and Internalizing ($r_s = .27-.52$, $p_s < .05$) subscales were significantly correlated and were thus combined to reduce the number of potential analyses.

Substance Use

The Problem Behavior Scale (Farrell, Danish, & Howard, 1992) was used to measure substance use. Emerging adults reported how often within the past 30 days they had (1) drank beer, wine/wine coolers, or liquor (more than a sip or taste) and (2) smoked cigarettes using a 6-point scale (1 = "Never," 2 = "1-2 times," 3 = "3-5 times," 4 = "6-9 times," 5 = "10-19 times," 6 = "20 or more times"). These two items were used in regression analyses. This scale has previously been used with emerging adults with and without SB (Murray et al., 2014).

Data Analyses

All data analyses were conducted using the Statistical Package for the Social Sciences (SPSS Statistics, Version 21). Parenting-based predictors of emerging adulthood adjustment were examined using logistic and linear regression techniques. Group status (i.e., SB vs. TD) was examined as a moderator of relations between predictor variables and emerging adulthood outcomes. Models included Time 1 demographic covariates (SES and verbal IQ) in the first step, three Time 1 macro- (i.e., behavioral control, psychological control, and acceptance) or micro-level (i.e., undermining autonomy, undermining relatedness, and autonomy-relatedness) parenting behaviors and group in the second step (main effects), and Group \times Parenting predictor interaction effects in the third step. Logistic regression was used for the three discrete outcomes (i.e., attending college, ever been in a romantic relationship, and ever had sexual intercourse), and multiple regression was used for the five continuous outcomes (i.e., number of friends, internalizing and externalizing symptoms, smoking and alcohol frequency). Thus, a total of 16 models were run; micro and macro variables were run separately for each of the eight outcomes. These

Table II. Macro-Level Observed Parenting Behaviors as Predictors of Emerging Adulthood Outcomes

T6 dichotomous outcomes	T1 independent variables	b	Exp (b)	Wald
College attendance (yes/no) ^a	SES	0.13	1.14	17.96**
	Verbal IQ	0.06	1.06	7.20**
	Behavioral control	1.65	5.21	3.62*
Ever been in a romantic relationship (yes/no)	Group	0.99	2.37	2.69
	Behavioral control	-1.02	0.36	1.76
	Behavioral control × group	3.82	45.37	6.00*
Ever had sexual intercourse (yes/no)	Group	1.9	6.7	15.39**
	Behavioral control	-0.72	0.49	1.59
	Behavioral control × group	3.52	33.92	6.12*
T6 continuous outcomes	T1 independent variables	b	SE b	β
Total number of close friends	SES	0.01	0.01	0.21*
Internalizing	SES	-0.29	0.08	-0.33**
Externalizing	SES	-0.2	0.08	-0.25*
	Psychological control	5.82	2.72	0.21*
Frequency cigarette use (past 30 days)	SES	-0.05	0.02	-0.26**
Frequency alcohol use (past 30 days)	Verbal IQ	0.01	0.01	0.20*
	Group	0.62	0.24	0.27*

Note. Group was dummy coded as 0 for the SB group and 1 for the TD group; college attendance was coded as 1 for not currently attending college and as 2 for currently attending college; romantic relationship was coded as 1 for never having been in a romantic relationship and as 2 for ever having been in a romantic relationship; sexual intercourse was coded as 1 for never had sexual intercourse and as 2 for had sexual intercourse. For the undermining autonomy variable, only maternal undermining of autonomy of their child was used; all other micro- and macro-level parenting variables combined mother and father data. Models were trimmed by eliminating nonsignificant predictors.

^aFor this outcome, analyses were run ONLY on participants who graduated from high school.

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

models were trimmed by eliminating nonsignificant predictors as depicted in Tables II and III. With regard to the two (macro- and micro-level) logistic regressions that involved college attendance, analyses were run with a subsample of emerging adults with and without SB who completed high school by age 18/19 ($n = 89$) to examine this outcome for youth who were actually able to achieve this outcome (i.e., college attendance is precluded by being in high school).

None of the study variables were skewed. Micro- and macro-observational parenting variables were centered before conducting analyses to facilitate the interpretation of interaction effects (Holmbeck, 2002). When significant Group × Parenting interaction effects were observed, post hoc probing of significant effects was conducted according to the procedure described by Holmbeck (2002). Post hoc probing of interactions was conducted while controlling for significant covariates.

Results

Preliminary Analyses

Power analyses were conducted to determine whether our sample size was adequate to detect medium effect sizes for the proposed regression analyses. For analyses with five predictors and a single dependent variable, a sample of

42 is required to detect large effect sizes ($R^2 = .35$) and a sample size of 91 is required to detect medium effect sizes ($R^2 = .15$), assuming a power of .80 and an alpha of .05 (Cohen, 1992). Thus, our Time 6 sample size of 110 was sufficient to detect medium to large effect sizes. The Time 6 sample size of emerging adults who graduated from high school ($n = 89$) was sufficient to detect large effect sizes for regression analyses involving college attendance as the outcome variable.

Regarding correlations among macro- and micro-level parenting variables, parental behavioral control was positively associated with parental acceptance and autonomy-relatedness and negatively associated with parental psychological control in both samples ($ps < .05$; Table IV). Parental psychological control was negatively associated with acceptance and autonomy-relatedness in both samples and positively associated with undermining autonomy and undermining relatedness for the TD sample ($ps < .05$). Interestingly, parental autonomy-relatedness was positively associated with undermining autonomy for the TD sample ($p < .05$). Further, parental undermining of autonomy was positively associated with undermining relatedness for the TD sample ($p < .05$). For further details on correlations between parenting constructs, please see Table IV. Information regarding group differences in

Table III. Micro-Level Observed Parenting Behaviors as Predictors of Emerging Adulthood Outcomes

T6 dichotomous outcomes	T1 independent variables	b	Exp (b)	Wald
College attendance (yes/no) ^a	SES	0.13	1.14	15.31**
	Verbal IQ	0.06	1.05	7.20**
	Group	-0.27	0.77	0.12
	Autonomy-relatedness	0.42	1.52	5.25*
	Undermining relatedness	0.81	1.84	1.49
	Undermining relatedness × group	-2.2	0.11	3.80*
Ever been in a romantic relationship (yes/no)	Verbal IQ	0.03	1.03	4.89*
Ever had sexual intercourse (yes/no)	Group	1.84	6.27	17.19**
	Undermining relatedness	0.17	1.19	0.09
	Undermining relatedness × group	-2.43	0.09	9.06**
T6 continuous outcomes	T1 independent variables	b	SE b	β
Total number of close friends	SES	0.01	0.01	0.20*
	Group	0.01	0.11	0.01
	Undermining autonomy	0.08	0.05	0.04
	Undermining autonomy × group	-0.24	0.1	-0.34*
Internalizing	SES	-0.29	0.08	-0.33**
Externalizing	SES	-0.21	0.07	-0.28**
Frequency cigarette use (past 30 days)	SES	-0.05	0.02	-0.26**
	Group	0.11	0.38	0.03
	Autonomy-relatedness	0.29	0.16	0.28
	Autonomy-relatedness × group	-0.45	0.21	-0.35*
Frequency alcohol use (past 30 days)	Verbal IQ	0.01	0.01	0.19*
	Group	0.63	0.23	0.27*
	Undermining relatedness	0.63	0.28	0.21*

Note. Group was dummy coded as 0 for the SB group and 1 for the TD group; college attendance was coded as 1 for not currently attending college and as 2 for currently attending college; romantic relationship was coded as 1 for never having been in a romantic relationship and as 2 for ever having been in a romantic relationship; sexual intercourse was coded as 1 for never had sexual intercourse and as 2 for had sexual intercourse. For the undermining autonomy variable, only maternal undermining of autonomy of their child was used; all other micro- and macro-level parenting variables combined mother and father data. Models were trimmed by eliminating nonsignificant predictors.

^aFor this outcome, analyses were run ONLY on participants who graduated from high school.

* $p < .05$. ** $p < .01$.

micro- and macro-level parenting variables is reported in previous studies using the same samples (Holmbeck, Shapera et al., 2002; Holmbeck, Johnson et al., 2002).

Academic Attainment

With regard to college attendance, there was a significant main effect of autonomy-relatedness, such that greater autonomy-relatedness in preadolescence increased the odds of college attendance in emerging adults with and without SB (Wald = 5.25, $p < .05$). There was also a significant main effect of behavioral control on college attendance, such that increased behavioral control predicted increased odds of attending college for both samples (Wald = 3.62, $p < .05$). In addition, a significant Undermining Relatedness × Group interaction effect was found. Interestingly, post hoc analyses revealed that greater undermining of relatedness increased the likelihood of college attendance in the SB group ($b = 2.30$, $p < .05$), but not in TD emerging adults ($b = -0.38$, $p > .05$).

Peer and Romantic Relationships

In terms of number of friends, a significant Undermining Autonomy × Group interaction effect emerged, such that greater undermining of autonomy predicted increased total number of friends in emerging adulthood with SB only ($b = 0.20$, $p < .05$); this relation was not significant for the TD group ($b = -0.04$, $p > .05$; Figure 1). This finding was contrary to hypotheses.

With regard to romantic relationships and sexual intercourse, analyses revealed two significant Behavioral Control × Group interactions. Contrary to hypotheses, post hoc analyses indicated that for emerging adults with SB, high behavioral control was associated with decreased odds of ever having a romantic relationship ($b = -2.98$, $p < .05$); this relation was not significant in the TD group ($b = 0.85$, $p > .05$). Specifically, for SB youth who experienced low levels of preadolescent parental behavioral control, 83.3% reported being in a current romantic relationship, compared with 53.3% of SB youth who

Table IV. Correlations Between Micro- and Macro-Level Observational Parenting Variables

Parenting variable	1	2	3	4	5	6
1. Behavioral control	1					
SB group		-0.37**	0.54**	0.55**	0.13	-0.07
TD group		-0.26*	0.43**	0.49**	0.14	-0.30*
2. Psychological control		1				
SB group			-0.76**	-0.44**	-0.06	0.13
TD group			-0.79**	-0.24*	0.27*	0.27*
3. Parental acceptance			1			
SB group				0.49**	-0.04	-0.2
TD group				0.29*	-0.13	-0.17
4. Autonomy-relatedness				1		
SB group					0.04	0.01
TD group					0.29*	-0.03
5. Undermining autonomy					1	
SB group						-0.04
TD group						0.31**
6. Undermining relatedness						1
SB group						
TD group						

Note. For the undermining autonomy variable, only maternal undermining of autonomy of their child was used; all other micro- and macro-level parenting variables combined mother and father data.

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

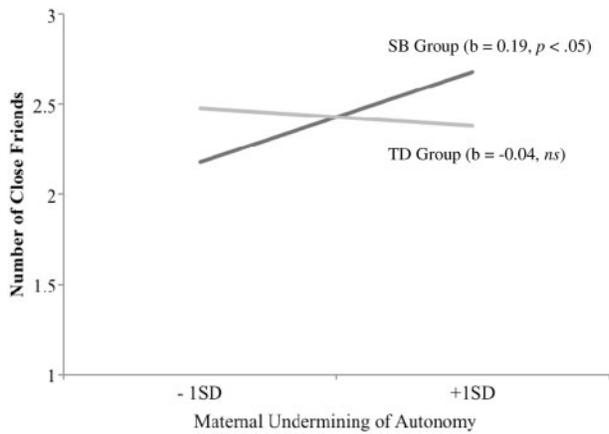


Figure 1. Regression lines for relations between maternal undermining of autonomy and number of close friends as moderated by group status

Note. b = unstandardized regression coefficient; SD = standard deviation; SB = spina bifida; TD = typically developing.

experienced *high* levels of parental behavioral control (Figure 2). Post hoc analyses also revealed that high behavioral control was associated with decreased odds of ever having had sexual intercourse for emerging adults with SB only; this relation reached significance for emerging adults with SB ($b = -3.38, p < .05$) but not TD emerging adults ($b = 0.15, p < .05$). Further, a significant Undermining Relatedness \times Group interaction effect was found, such

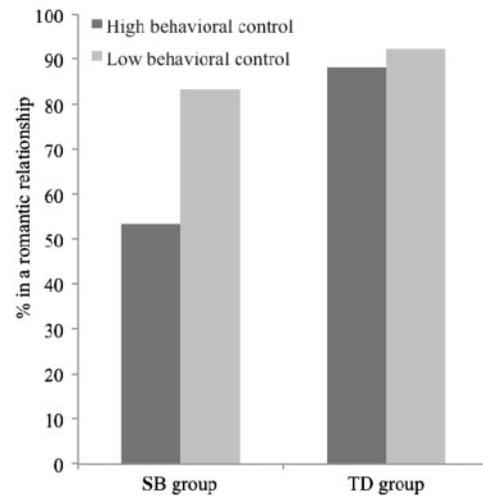


Figure 2. Relations between parental behavioral control and romantic relationship status (% yes) as moderated by group status

Note. SB = spina bifida; TD = typically developing.

that greater undermining of relatedness *increased* the likelihood of ever having had sex in the SB group ($b = 1.90, p < .05$). However, this relation was not significant in the TD group ($b = -0.54, p > .05$).

Internalizing and Externalizing Symptoms

There was a significant main effect of psychological control on externalizing behavior, such that increased

psychological control predicted increased externalizing behavior in all emerging adults ($\beta = 0.21, p < .05$). No other parenting behavior predicted internalizing and externalizing symptoms, and none of the interaction terms were significant for these two outcomes ($p > .05$).

Substance Use

Results indicated that greater undermining of relatedness predicted more frequent alcohol use in the past 30 days ($\beta = 0.20, p < .05$) in emerging adults with and without SB. While there was a significant Autonomy-relatedness \times Group interaction effect for smoking frequency, post hoc analyses revealed that slopes were nonsignificant for both the SB group ($b = 0.29, p > .05$) and the TD group ($b = -0.16, p > .05$).

Finally, there were no significant main effects of parental undermining of autonomy on any dichotomous or continuous emerging adulthood outcome. Parental acceptance did not predict any dichotomous or continuous outcome measures as a main effect ($ps > .05$), and none of the interaction terms that included this parenting behavior were significant ($ps > .05$).

Discussion

The purpose of this longitudinal study was to examine macro- and micro-level observed parenting behaviors during late childhood in relation to adjustment (including the obtainment of emerging adult milestones) in young adults with and without SB 10 years later. Results revealed that several macro- and micro-level autonomy-promoting parenting behaviors predicted educational, social, emotional, and health-related adjustment outcomes in both groups. Moreover, findings indicated that some parenting variables were associated with outcomes only in the SB group, some of which were contrary to hypothesized relations.

Consistent with past research in TD populations (Barber, 1996; Barber, Olsen, & Shagle 1994; Best et al., 1997; Gray & Steinberg, 1999), preadolescent parental behavioral control and autonomy-relatedness increased the likelihood that emerging adults would attend college. Also, high parental psychological control during preadolescence predicted increased externalizing behaviors in both groups. In a previous report looking at baseline data for this sample (i.e., ages 8/9), observed parental psychological control was concurrently associated with externalizing symptoms (Holmbeck, Shapera et al., 2002). In this earlier effort, we speculated that this finding may have been a consequence of age, such that externalizing behaviors represented attempts to assert independence and that

internalizing symptoms might emerge later, when attempts to defy parents through behavioral means were ineffective (Holmbeck, Shapera et al., 2002). Yet, the current longitudinal results suggest that the impact of psychologically controlling parenting behaviors on externalizing behaviors extends into emerging adulthood, when youth are ages 18-19. Thus, parental psychological control may play a larger role in the emergence and continuation of problem behaviors in both pediatric and TD populations.

Further, higher parental undermining of relatedness predicted increased alcohol use in the past 30 days for all emerging adults. Difficulties establishing a positive parent-child relationship (i.e., decreased relatedness) may make it more likely for youth to become dependent on their peers and influenced by the larger peer groups' alcohol consumption behaviors (Allen, Chango, Szewedo, Schad, & Marston, 2012). Relatedness in parenting, such as providing validation of a child's thoughts and ideas and positive engagement, may be a critical predictor of future substance use in emerging adults with and without SB, as they become less reliant on their family for emotional support and more susceptible to peer pressure.

While some parenting behaviors, such as those described earlier, appear to have a universal impact on emerging adulthood adjustment, the pattern of significant interaction effects supports the notion that some parenting behaviors may be especially important for youth with SB. However, the interaction results were not always consistent with hypotheses. For example, high observed parental behavioral control during preadolescence predicted a decreased likelihood of being in a romantic relationship and having sexual intercourse in emerging adults with SB. Behavioral control has been associated with several adjustment outcomes, including academic achievement (Barber, 1996; Steinberg, 1990). Indeed, behavioral control predicted an increased likelihood for college attendance in emerging adults with and without SB in the current study. However, because emerging adults with SB must already overcome and navigate behavioral limitations by virtue of their condition, close parental monitoring and rule enforcement that may benefit TD adolescents may be detrimental for youth with SB with respect to building and nurturing romantic relationships. On the other hand, parents may be more likely to exert more behavioral control on youth who have more severe forms of SB or youth with lower verbal intelligence (and, as a consequence, more profound social difficulties). Also, some parents may be concerned that their children with SB are vulnerable to exploitative intimate relationships.

Also unexpectedly, higher levels of parental undermining of relatedness predicted a greater likelihood

of attending college and ever having had sexual intercourse in emerging adults with SB. In addition, higher levels of parental undermining of autonomy predicted greater numbers of close friendships in this population. Two observational codes make up the *undermining relatedness* parenting construct: (1) distracting, ignoring, or cutting off the child and (2) expressed hostility toward the child. Some investigators have termed parenting verbalizations that undermine relatedness, “parental ‘constraining behavior’” (Best et al., 1997). Thus, it is possible that the parental constraining and hostile behavior captured during observed interactions in families of youth with SB may more accurately represent a “tough love” (rather than “hostile”) parenting approach that may be required to motivate typically passive SB youth to seek behavioral and emotional independence (Holmbeck et al., 2003). In other words, more motivational, “tough love” parenting may be required for these youth to separate from parents and seek independence, stability, and emotional satisfaction through educational pursuits and the strengthening of social-emotional relationships, and this may be especially true for youth with SB with greater disease severity and lower IQ. Alternately, an unpleasant or hostile relationship with parents may motivate youth to seek close relationships outside their family, and may increase their desire to separate from their family to attend college. This may also help explain why undermining of relatedness was related to greater alcohol use.

There were several other noteworthy trends in the current study. Given that the majority of observed parenting behaviors had an impact on educational and social outcomes (rather than emotional and health-related outcomes), it seems that parenting behaviors that promote/inhibit autonomy particularly affect child independence and the building of close relationships outside of the home. None of the parenting behaviors measured in this study predicted internalizing symptoms. It is possible that autonomy-inhibiting parenting behaviors that continue into emerging adulthood, rather than those only occurring during the preadolescent stage, may be more salient for internalizing symptoms in emerging adulthood. In addition, parental acceptance did not predict any of the emerging adulthood outcomes. In our previous cross-sectional report looking at baseline data for this sample, results revealed that higher levels of preadolescent parental acceptance were concurrently associated with positive adjustment across several outcomes, and a large proportion of the significant findings was for school grades (Holmbeck & Shapera, 2002). Thus, nonsignificant results may be owing to using academic *attainment* (i.e., college matriculation) rather than *achievement* (i.e., grades) as an outcome.

Finally, results revealed that parenting behaviors had less of an impact on health-related behaviors, particularly substance use behaviors, relative to other adjustment outcomes. This may indicate that parenting has an indirect, rather than direct, influence on health risk behaviors for emerging adults; peers and social adjustment may have a more significant influence on smoking and drinking behavior during this developmental period (Prinstein, Choukas-Bradley, Helms, Brechwald, & Rancourt, 2011).

Although the current study has notable strengths in terms of methodological vigor and research design, including the use of multiple informants (and the inclusion of father data), the use of both macro- and micro-level observational measures, the collection of longitudinal data during a specific development period, and the use of a matched comparison sample, there are also several limitations. The small sample size reduced statistical power and increased the possibility of type II error (i.e., the inability to detect significant main and interaction effects). In addition, the sample used in this study included 18–19-year-olds, which represents only the beginning of the emerging adulthood developmental period (typically considered to be ages 18–25; Arnett, 2000).

The current study findings suggest several avenues for future research. This study focused on parenting behaviors during preadolescence; future research should examine changes in parenting behaviors over the course of adolescence to determine whether increases or decreases in various types of parenting behaviors influence emerging adult adjustment outcomes. Specifically, although it was a strength of the study to examine the predictive power of parenting behaviors 10 years before the emerging adulthood outcomes, we did not measure parenting behaviors during emerging adulthood, and it is likely that such behaviors would concurrently influence adjustment. Future research may also examine whether more specific measures of autonomy (e.g., behavioral and emotional autonomy) help to explain associations between parenting behaviors and adjustment outcomes (e.g., attainment of adolescent and emerging adulthood milestones; Holmbeck, Johnson et al., 2002). In addition, future research should further explore the relationship between parenting behaviors like behavioral control and autonomy-relatedness and individual differences such as disease severity and verbal intelligence. It is possible that parents may tailor their interactions to the preadolescent’s intellectual and physical functioning, and that parents may be less likely to encourage autonomy in lower-functioning preadolescents.

Further, measures of parenting behaviors were averaged across mothers and fathers to facilitate data analyses, but examination of the differential impact of mother versus

father parenting behaviors on child adjustment may be an important area for future work. This study also raises other important possibilities regarding gender interactions within the parent–child dyad. For example, it is possible that “tough love” parenting behaviors (i.e., undermining of relatedness) may be adaptive for father–male preadolescent dyads, but maladaptive for father–female preadolescent dyads. Parenting is a dynamic, interactive process; while the current study only investigated the impact of a parent’s behaviors toward the child, another avenue of research might focus on the child’s reactions and behaviors toward the parents that foster or inhibit subsequent parenting behaviors. Because children with SB vary in terms of intellectual and physical functioning, special attention should also be given to disease characteristics that affect autonomy development and parenting styles.

In conclusion, this is one of the first studies to examine the relationship between observed parenting behaviors and adjustment outcomes in emerging adults with and without SB. While observed parenting behaviors predicted a number of adjustment outcomes in all emerging adults, the current study also revealed that certain parenting behaviors are particularly influential in promoting (or discouraging) positive adjustment and independence in youth with SB. Interventions to reduce the negative impact of high psychological control should be a priority via parent-focused interventions. Because certain parenting behaviors typically believed to be beneficial for youth adjustment (i.e., high behavioral control) may actually be detrimental to youth with SB in certain circumstances, further examination of the differential impact of different types of parenting behaviors on particular adjustment outcomes (i.e., romantic relationship experience) as well as moderators of this relationship (e.g., SB severity, child gender) is needed. Such findings will help clinicians serve this population, as these youth navigate the challenges of adolescent and emerging adulthood development, and their parents attempt to encourage independence while at the same time managing their child’s complex medical needs.

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