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Do Family Dynamics Mediate the Relationshp Between Early Pubertal Development and Depression for Girls With and Without Spina Bifida?

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DO FAMILY DYNAMICS MEDIATE THE RELATIONSHP BETWEEN EARLY PUBERTAL DEVELOPMENT AND DEPRESSIVE SYMPTOMS FOR GIRLS WITH AND WITHOUT SPINA BIFIDA?

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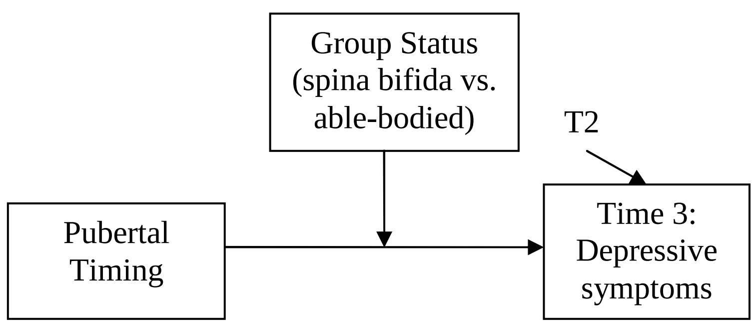
CHAPTER ONE

INTRODUCTION

The purpose of this study was to examine the relationship between early pubertal maturation and depressive symptoms in adolescent girls, by focusing on youth with and without spina bifida (a congenital birth defect that produces orthopedic, neurological, urinary, and psychological difficulties). Previous research has found a direct relationship between early pubertal timing in females and higher levels of depressive symptoms compared to their on-time peers (Conley & Rudolph, 2009; Ge, Conger, & Elder, 2001; Graber, Seeley, Brooks-Gunn, & Lewinsohn, 2004; Lam et al., 2004; Lewinsohn, Rhode, & Seeley, 1998; Negriff, Fung, & Trickett, 2008; Stice, Presnell, & Bearman, 2001). These higher rates of depressive symptoms are found to continue through middle-adolescence and adulthood (Graber et al., 2004; Petersen, Sarigiani, & Kennedy, 1991). While it is well understood that this relationship exists, there are still uncertainties as to what factors contribute to higher rates of depressive symptoms in early maturing girls. This issue is particularly relevant for children with spina bifida, as precocious puberty is somewhat more common in this population than among their able-bodied peers (Hubbard, 1996; McLone & Ito, 1998). As well, the psychosocial changes that typically occur during puberty could be different for children with spina bifida.

The link between early pubertal maturation and depressive symptoms in girls is not well understood. Puberty in girls marks a time of psychosocial as well as physical changes. As the child appears more mature, adults and peers may modify how they behave toward this child. However, this change may not be as noticeable in a child with physical impairments. In fact, Coakley, Holmbeck, Friedman, Greenley, and Thill (2002) suggest that pubertal development may not have as much of a psychosocial impact on children with spina bifida as it is does on typically developing peers. Thus, it was expected that the link between early puberty in girls and depressive symptoms would depend on whether the child has spina bifida. In other words, it was expected that early pubertal girls with spina bifida would not show the same increase in depressive symptoms as early maturing females without spina bifida (see Figure 1).

Figure 1: Model for Depressive Symptoms in Early Pubertal Girls: Moderation

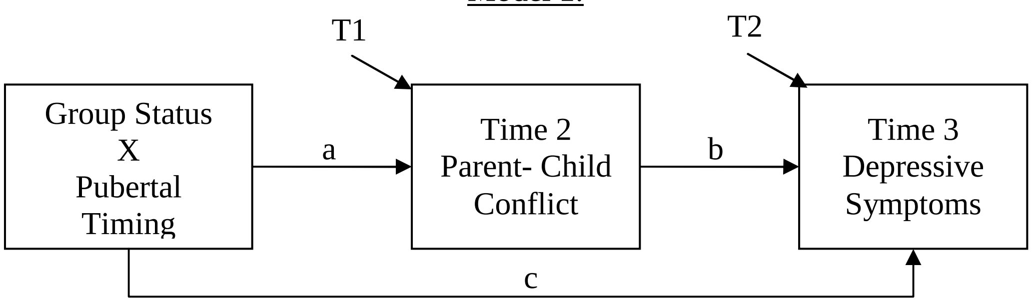


In addition to group status moderating the association between early pubertal development and depressive symptoms, two potential mechanisms for this moderation were tested in a mediated moderation model. Both mother-daughter conflict and emotional distancing were examined as possible mediators to begin to explain a mechanism by which the association between early menarche and increased depressive symptoms is more salient for one group than the other (see Figure 2 on the next page). Family variables were chosen as potential mediators in this study as research suggests that families tend to respond to the child's pubertal change and family relationships play an important role in how depressive symptoms develop through adolescence (Crawford, Cohen, Midlarsky, & Brook, 2001; Feng et al., 2009; Herman-Stahl & Petersen, 1999; Petersen et al., 1991). As well, there is a dearth of research on how the family environment influences depressive symptoms in early maturing females, as most research has focused on peer relationships and social factors (Conley & Rudolph, 2009; Hayward, Gotlieb, Schraedley, & Litt, 1999).

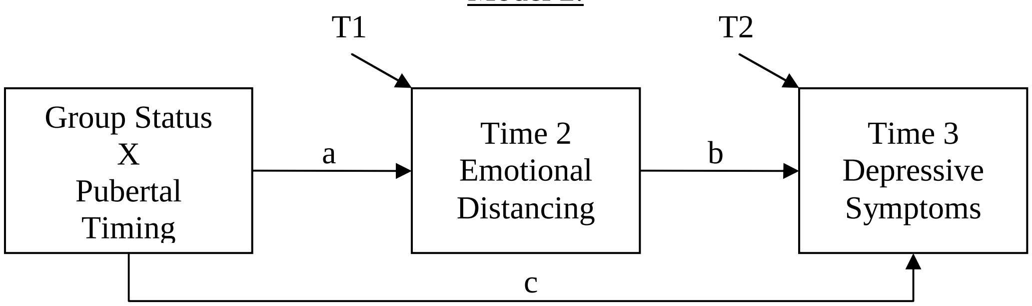
Parent-child relations often change through the process of the child's pubertal maturation. During this development, there is usually a period of emotional distancing, and a higher level of conflict between parent and child (Holmbeck & Hill, 1991; Paikoff & Brooks-Gunn, 1991; Sessa & Steinberg, 1991). Thus, it was predicted that early pubertal development would be associated with early increases in parent-child conflict. However, it has been shown that families of children with spina bifida experience less conflict over time than their typically developing peers (Jandasek, Holmbeck, DeLucia, Zebracki, & Friedman, 2009). As well, Coakley and colleagues (2002) found that early maturation in girls was associated with increased parent-child conflict only for typically developing girls, and not for girls with spina bifida. Thus, group status may also moderate the relationship between early menarche and parent-child conflict. Hence, it was expected that, among early maturing girls, those in the comparison group would exhibit an increase in parent-child conflict and thus increased depressive symptoms, whereas those with spina bifida will exhibit less conflict with parents and thus less increase in depressive symptoms (see Figure 2, model 1).

Figure 2: Models for Depressive symptoms in Early Pubertal Girls: Mediated Moderations

Model 1:



Model 2:



Emotional distancing is also thought to occur around the time of puberty as a child begins to rely more on peers for emotional support than his/her parent. But, children with spina bifida are usually more reliant on their parents for advice and support (Holmbeck et al., 2003), so they may not disengage from their parents to the same extent, even if they are early maturing. Such past findings suggest that the more cohesive parent-child relationship could lessen the influence of early pubertal timing on depressive symptoms for girls with spina bifida. In this study it was expected that among early pubertal girls: those in the comparison group would display increased emotional distancing from their parents and thus increased depressive symptoms, but those with spina bifida would exhibit lower levels of emotional distancing and less change in depressive symptoms (see Figure 2, model 2). This study proposed to use a mediated moderation model to examine whether increased emotional distancing and parent-child conflict are mediators that explain, at least in part, why the connection between early menarche and increased depressive symptoms is more robust for typically developing girls, than for girls with spina bifida.

The methodology of the current study aimed to address several limitations in the literature. First, most studies of pubertal timing effects are cross-sectional or retrospective. The current study examined the effects of pubertal timing longitudinally, following the same sample of early and on time or late maturing females through early adolescence. The longitudinal design makes it possible to investigate mechanisms that underlie links between early pubertal timing and depressive symptoms. Additionally, this study measured pubertal timing by assessing age of menarche as well as parental perceptions of pubertal development. Moreover, this researcher examined familial mechanisms for the relationship between early maturity in females and depressive symptoms, whereas most of the current literature has focused on peer and social factors as potential pathways to depressive symptoms.

The following sections will include a review of the current literature pertaining to the hypotheses of this study. As well, methods will be discussed including descriptions of the data collection process and measures used.. Finally, results will be reported and conclusions, clinical implications, and future directions will be discussed.

CHAPTER TWO

REVIEW OF THE RELEVANT LITERATURE

Female Pubertal Development and Depressive Symptoms

Background

Major and minor depressive symptoms occur in about 25% of children and adolescents by the time they are between the ages of 15 and 18 (Kessler & Walters, 1998). Depressive symptoms in adolescents have been shown to predict co-morbid substance abuse, anxiety disorders, and personality disorders (Hammen & Rudolph 2003); increased negativity in beliefs about peers, family, and self (Rudolph, Hammen, & Burge, 1997); and suicidal ideation (Lewinsohn et al., 1998). Adolescent girls are at increased risk for developing depressive symptoms, as prevalence rates are higher for females than for males (Nolen-Hoeksema & Girgus, 1994). In a longitudinal study of 1,709 high school students, about 35% of females, as opposed to 19% of males, experienced an episode of major depressive disorder by the age of 19 (Lewinsohn et al., 1998). However, this difference between genders is not apparent before puberty (see Lewinsohn et al., 1998 for a review), indicating that puberty could be a contributing factor to depressive symptoms in female adolescents (Patton et al., 2008; APA, 2007). More specifically, early pubertal timing, or advanced development of primary and secondary sexual characteristics relative to one's peers, is associated with depressive symptoms for females (Conley & Rudolph, 2009; Ge et al., 2001; Graber et al., 2004;

Lam et al., 2004; Lewinsohn et al., 1998; Negriff et al., 2008; Stice et al., 2001). Thus, girls who experience puberty earlier than their peers are at the greatest risk for developing depressive symptoms in adolescence.

Why Puberty Might Influence Depressive Symptoms in Females

Puberty is a major developmental milestone in adolescence, not only physically and biologically, but also socially and psychologically. Because puberty is an outward, physical indication of the adolescent's level of maturity, it may affect how peers and family members interact with the adolescent. Much of the research on the association between early pubertal maturity and depressive symptoms has focused on changes in peer relationships (see Conley & Rudolph, 2009, for a recent review). Family dynamics are not as frequently investigated in the literature on pubertal timing and depressive symptoms. However, family dynamics have consistently been associated with depressive symptoms in adolescents (see Sheeber, Hops, & Davis, 2001 for a review), thus this particular study and the literature review will focus on changes in family relationships during pubertal development.

Some changes in the parent-child relationship typically occur around the time of the child's pubertal development. For instance, during adolescence, there is usually a shift in social support, where the child withdraws from her family (mother, father, etc.) and begins to rely more on peers (Steinberg, 1988). As well, pubertal development can lead to increases in conflict between parent and child (Kashy, Donnellan, Burt, & McGue, 2008). Some researchers argue that the increased conflict is a normative maturational progression that is related to the process of separating from one's parents and negotiating more responsibility and autonomous behavior (see Holmbeck, 1996 for a review). But, it is also likely that how well the family negotiates the changes brought about by pubertal maturation could affect the child's level of adjustment.

One possible theory, the early timing hypothesis, attempts to explain the association between early pubertal timing and depressive symptoms by suggesting that the psychosocial changes that occur during puberty come too soon for the child to cope with them successfully (Peskin, 1973). Specifically, Ge, Conger, and Elder (1996) suggested that girls who mature earlier are at greater risk for depressive symptoms because they do not have the coping skills necessary to deal with possible social and family stressors brought about by their pubertal development. Indeed, these researchers found supporting evidence that early maturing females are more vulnerable to family stressors, such as father's hostility, than their on-time and late maturing peers (Ge et al., 1996). Consequently, it could be that the child's inability to cope with the psychosocial changes of puberty, rather than the puberty itself, produces higher rates of depressive symptoms.

Possible mechanisms that may explain associations between pubertal maturity and depressive symptoms have been identified in previous research, including: non-intact family structure (Capron, Therond, & Duyme, 2007), family conflict (Resnick et al., 1997), cognitions of life stress (Hammen, 1992), and stressful-life events (Nolen-Hoeksema & Girgus, 1994). However, most of these studies have found associations for post-pubertal females and have not focused on pubertal timing as an independent variable. This is surprising considering that previous research has found the highest levels of depressive symptoms in early-maturing females rather than simply post-pubertal females.

Pubertal Development and Depressive Symptoms in Youth with Spina Bifida

Spina Bifida and Pubertal Development

Spina bifida is a birth defect occurring in approximately 18 in every 100,000 live births (Centers for Disease Control and Prevention [CDC], 2008). For children with spina bifida, the spine does not completely close during gestation, which produces a spinal lesion. This condition is treated at birth, however irreversible damage can occur to the neural tissue (lipomeningocele), spinal coverings (meningocele), and the spinal cord (myelomeningocele). Due to this damage, children with spina bifida often have urological and bowel difficulties that cause them to need to use a catheter, establish a bowel program, and maintain a specific diet. As well, the physical ability of the child depends on the location of the lesion: the higher the lesion, the more pervasive the physical disability. Many children with spina bifida need the aid of braces, crutches, or a wheelchair to ambulate.

In addition to health complications of spina bifida due to the spinal lesion, hydrocephalus (excess fluid in the ventricles of the brain) is also common for these children and can cause neurological difficulties with tasks requiring shifts in attention, non-verbal reasoning (i.e. math), or executive functioning (Iddon et al., 2003; Mataro, Junque, Poca, & Sahuquillo, 2001). While precocious puberty is still rare, girls with hydrocephalus and spina bifida experience early menarche more often than their typically developing peers (McLone & Ito, 1998). In fact, one study found that girls with spina bifida reached menarche significantly earlier (two years earlier on average) than their typically developing peers (Hubbard, 1996). Thus, the issue of early menarche is especially pertinent for girls with spina bifida as they exhibit higher rates of early maturation than their typically developing peers.

Spina Bifida Status as a Moderator (see Figure 1)

Because more females with spina bifida begin puberty early and because higher rates of depressive symptoms are usually more common for early-maturing girls, depressive symptoms should be a concern in this population. However, findings from one study suggest the opposite: early maturation may not be associated with higher rates of depressive symptoms in girls with spina bifida. One study found that typically developing children had higher rates of depressive symptoms associated with more mature pubertal development, but this was not true for children with spina bifida (Hubbard, 1996). Again, this study examined the level of pubertal maturation instead of timing of maturation, but it is interesting that the connection between pubertal development and depressive symptoms was not as robust for children with spina bifida. Overall, findings of past work suggest that early pubertal development may not be as strongly associated with depressive symptoms for girls with spina bifida as it is for typically developing females (see Figure 1).

Why the Relationship between Puberty and Depressive Symptoms Might Differ for Children with Spina Bifida

According to the “early timing hypothesis” the association between early pubertal maturation in females and depressive symptoms is likely due to a lack of coping skills for psychosocial changes that take place during puberty (Caspi, Lynam, Moffitt, & Silva, 1993; Ge et al., 1996; Natsuaki et al., 2009). But, the psychosocial changes during pubertal development are often different for children with spina bifida than for typically developing children. For instance, family cohesion was shown to decrease during adolescence for typically developing children, but increased during the adolescence for children with spina bifida (Coakley et al., 2002). As well, family conflict increased during puberty for typically developing adolescents who were early-maturing, but not for early-maturing adolescents with spina bifida (Coakley et al., 2002). Jandasek and colleagues (2009) also found that the changes in family conflict and cohesion during adolescence were less dramatic for families of children with spina bifida than in families with typically developing children. While these studies did examine pubertal maturation and changes in family relations, they did not address depressive symptoms as a possible outcome of pubertal timing or changes in family relations.

Based on their findings, Coakley and colleagues (2002) suggest that the family’s reaction to pubertal development may be less dramatic for children with spina bifida. As previously mentioned, the outward indication of physical maturation associated with puberty may initiate changes in the parent-child relationship (i.e. higher conflict and less cohesion). However, these physical changes may not be as noticeable in children with spina bifida who are already physically different from their peers. Children with spina bifida are often confined to a wheelchair and are at greater risk for orthopedic abnormalities (i.e. scoliosis, hip displacement, short stature etc.) and obesity (Mitchell et al., 2004). These physiological differences might conceal physical changes associated with pubertal development. Thus, for children with spina bifida, pubertal development may not be an obvious indication of the child's maturation. As well, parents may have a greater motivation to maintain the nature of the parent-child relationship to better manage the child's medical tasks. Thus, it was expected that the association between early pubertal timing and depressive symptoms may not be as robust for girls with spina bifida because the parent-child relationship may not change as dramatically during puberty in this population as it does for typically developing children.

Mediated Moderation Model

If spina bifida status did moderate the association between early pubertal development and depressive symptoms, then potential mediators of this interaction were to be tested within a mediated moderation model. This model was used to assess changes in parent-child relationships as potential mechanisms by which the association between early puberty and depressive symptoms was more robust for typically developing children than for children with spina bifida. Two family variables, parent-child conflict and emotional distancing, would be tested as mediators of the early pubertal timing X spina bifida status interaction effect (see Figure 2).

Hill, Holmbeck, Marlow, Green, and Lynch (1985) found that the mother-daughter dyad (as opposed to other parent-child dyads) had the most significant changes during adolescence and these differences lasted longer for early-maturing girls than their peers. Hill (1988) also suggested that the mother-daughter dyad experiences the most emotional difficulties (i.e. conflict) of all parent-child dyads, especially during early adolescence. As well, in a review of the literature, Russell and Saebel (1997) found the mother-daughter dyad to be more volatile than the father-daughter dyad in relation to measures of closeness/cohesion and affective reactions. As such, the current study focused primarily on the mother-daughter relationship.

Parent-Child Conflict as a Potential Mediator

Pubertal Development and Parent-Child Conflict for Children with and without Spina Bifida (see Figure 2, Model 1, Pathway a)

Parent-child conflict has been shown to escalate during the child's pubertal development for typically developing adolescents (Kashy, Donnellan, Burt, & McGue, 2008; see Laursen, Coy, & Collins, 1998 for a review). Parent-child disagreements can occur when a child's request for greater independence is not granted by his/her parent. These disagreements may lead to conflict during adolescence as parent and child negotiate previously set roles and expectations (Hill, 1998; Smetana, Campione-Barr, & Metzger, 2006; see Holmbeck, 1996 for a review). While the conflict can bring about temporary strain on the relationship, it also can lead to greater independence for the adolescent.

However, families of children with spina bifida have not demonstrated this increase in parent-child conflict during puberty (Coakley et al. 2002; Jandasek et al., 2009). Thus, previous research suggests that, among early maturing girls, girls without spina bifida may experience increases in mother-daughter conflict during puberty, while girls with spina bifida may not.

Parent-Child Conflict and Depressive Symptoms (see Figure 2, Model 1, Pathway b)

Previous research suggests that there may be a direct relationship between parent-child conflict and increased child depressive symptoms. Studies have found children's depressive symptoms to be associated with various types of family conflict such as parental distress and discord (Crawford et al., 2001), unsupportive family relationships (Herman-Stahl & Pertersen, 1999), and interpersonal conflict with parents (Lewinsohn et al., 1998). As well, one study found that the connection between family conflict and depressive symptoms was stronger for females with advanced pubertal status (Patton et al., 2008). These findings suggest that parent-child conflict could be associated with depressive symptoms, especially if the child has reached advanced pubertal status.

The current study examined the relationship between parent-child conflict and a child's increased depressive symptoms in the context of a larger model (see Figure 2, Model 1). Because parent-child conflict has been associated with depressive symptoms and because its escalation during puberty appears to be different for children with or without spina bifida, it could be that the increased conflict during early pubertal development is contributing to increased depressive symptoms in girls with and without spina bifida.

Emotional Distancing as a Potential Mediator

Pubertal Development and Emotional Distancing in Children with and without Spina Bifida (Figure 2, Model 2, Pathway a)

Emotional distancing, or the decline in the level of reliance on one's parents for emotional support, is also a common response for children and adolescents during puberty. Montemayor (1983) suggests that adolescents often deal with conflict during puberty by distancing or disengaging from parents. Indeed, studies have found that pubertal maturity is associated with a lessening of attachments with parents and family (Papini, Roggman, & Anderson, 1991; Patton et al., 2008). In particular, one study found that females who had reached early pubertal maturity displayed greater striving for separation from their mothers than their peers (Weichold, Buttig, & Silbereisen, 2008). Thus, past research suggests that girls who are early maturing might exhibit increased emotional distancing from parents earlier than their on-time or late-maturing peers.

However, it appears that children with spina bifida do not experience the same process of emotional distancing during puberty. Previous studies have shown that among families of children with spina bifida, levels of family cohesion remain constant during the pubertal transition (Coakley et al., 2002; Jandasek et al., 2009). According to these findings, it was predicted that typically developing youth would experience increased emotional distancing from their parents as a result of early pubertal development, while children with spina bifida would not.

Emotional Distancing and Depressive Symptoms (Figure 2, Model 2, Pathway b)

Emotional distancing has also been found to predict depressive symptoms in typically developing adolescents. One longitudinal study found that poor family relationships, in terms of intimacy, self-disclosure, and satisfaction, were predictive of depressive symptoms (Herman-Stahl & Petersen, 1999). Another study found that stronger emotional attachment with parents was associated with lower levels of depressive symptoms across pubertal development (Papini et al., 1991). These findings indicate that increases in emotional distancing could predict increases in depressive symptoms.

The current study examined the relationship between emotional distancing and depressive symptoms in the context of a larger model (see Figure 2, Model 2). Because emotional distancing has been associated with depressive symptoms and because its escalation during puberty is different for children with and without spina bifida, it was hypothesized that increases in emotional distancing may be associated with increased depressive symptoms, thus explaining the difference in depressive symptoms for girls with and without spina bifida. In fact, Papini and colleagues (1991) found that emotional attachment was a better predictor of depressive symptoms than pubertal status alone. However, Papini and colleagues (1991) did not include pubertal timing in their study (i.e. they only examined pubertal status). Regardless, this finding suggests that emotional distancing could be a mediator of the interaction between spina bifida status and pubertal timing on increased depressive symptoms.

The Current Study

While early pubertal maturation has been found to be a risk factor for depressive symptoms in females, this association has not been examined in a pediatric population and previous research suggests that pubertal maturation may have different psychosocial implications for children with spina bifida. Only female adolescents were included in this study, as they are at greater risk than males for developing depressive symptoms during pubertal development (Nolen-Hoeksema & Girgus, 1994). Additionally, female pubertal development was assessed objectively, using age of first menarche, which is one of the most reliable ways of assessing self-reported pubertal development (Smolak, Krieg, Hayward, Shisslak, & Taylor, 2007) and there is no such distinctive event to mark a male's pubertal development. Furthermore, the mother-child dyad seems to express the most affect, encounter the most conflict, and experience the most dramatic changes during early adolescence, so the current study will focus exclusively on the mother-daughter relationship when possible.

This study examined the relationship between pubertal timing and depressive symptoms in girls with and without spina bifida. As early pubertal timing is most often associated with depressive symptoms, girls were divided into two groups: "early" and "on-time or late". Some of the previous studies have used similar categories, so the findings for this study should be easily compared to previous research (Stice et al., 2001; Coakley et al., 2002).

In an attempt to clarify the mechanisms that underlie the association between a group (spina bifida) status X pubertal timing interaction and increased depressive symptoms, this study examined the constructs longitudinally. Family variables, such as parent-child conflict and emotional distancing, have been found to escalate during pubertal development for typically developing adolescents, but not for adolescents with spina bifida. As well, these family variables have been associated with depressive symptoms. Thus, previous research suggests that the family variables could mediate associations between the group status X pubertal timing interaction and increased depressive symptoms. Specifically, the current study examined mother-daughter conflict and emotional distancing as potential mediational mechanisms in two mediated moderation models (see Figure 2). Few studies have examined family variables in relation to pubertal development and depressive symptoms and those that have did not examine early pubertal timing. This gap in the literature is surprising, as early pubertal timing in girls is more often associated with depressive symptoms than is pubertal status.

As previously discussed, the child's pubertal development could indicate a greater level of maturity to the parent and thus invoke changes in parent-child interpersonal relations (i.e. greater conflict and emotional distancing). Past researchers (Coakley et al., 2002) suggest that parents may overlook physical pubertal development in a child with spina bifida and thus typical changes in the parent-child relationship may not take place. This study examined both subjective (mother report of perceived timing compared to peers) and objective (age of first menstruation, as reported by parents) measures of the child's pubertal timing. The subjective measure provided information about how the mother viewed her daughter's overall pubertal development in comparison to her peers, whereas the objective measure assessed a concrete physical milestone in the child's pubertal development. By including both assessments of pubertal timing, the current study investigated the possibility that effects might be found with one measurement and not the other. If only one measurement of pubertal timing was a significant predictor, then the study would help to clarify whether a subjective or objective measure of pubertal development is more strongly associated with changes in the parent-child relationship and depressive symptoms.

In addition, some researchers have suggested that girls who reach pubertal maturity earlier than their peers may be more sensitive to interpersonal stressors. One study in particular found that among early developing females, heightened sensitivity to interpersonal stress was at least partially responsible for greater depressive/anxiety symptoms (Natsuaki et al., 2009). Therefore, the amount of mother-daughter conflict reported by the child could be inflated if the child is more sensitive to the conflict. In the current study, this construct was evaluated from three different perspectives: mother report of conflict with child, child report of conflict with parents, and outside observers' evaluations of level of mother-daughter conflict during video-taped family tasks. These varying perspectives allowed for a better understanding of subjective vs. objective evaluations of parent-child conflict and which of these might better predict the child's depressive symptoms. This strategy expands on the previous literature as few studies have examined family conflict from multiple reporters (Coakley et al., 2002).

Study Hypotheses

Hypothesis I The relationship between pubertal timing and depressive symptoms was expected to depend on group status (whether they have spina bifida). Also, the relationship was expected to be non-significant for those with spina bifida, but early pubertal development was expected to be associated with an increase in depressive symptoms for typically developing girls (see Figure 1).

Hypothesis II Parent-child conflict was expected to mediate associations between the group status X pubertal timing interaction and depressive symptoms (see Figure 2, model 1). For typically developing girls, it was expected that early pubertal timing would be associated with an increase in parent-child conflict and that conflict would be associated with an increase in depressive symptoms. However, for girls with spina bifida, it was expected that early pubertal timing would not be associated with increased parent-child conflict.

Hypothesis III Emotional distancing was expected to mediate associations between the group status X pubertal timing interaction and depressive symptoms (see Figure 2, model 2). For typically developing girls, it was expected that early pubertal development would be associated with an increase in emotional distancing and that distancing would be associated with an increase in depressive symptoms. However, for girls with spina bifida, it was expected that early pubertal development will not be associated with increased emotional distancing.

CHAPTER THREE

METHODS

Participants

The focus of the current study was on the mothers and daughters from a larger, longitudinal study on family processes during the adolescent transition for children with spina bifida (Holmbeck, Coakley, Hommeyer, Shapera, & Westhoven, 2002; Holmbeck et al., 2003). Families of children with spina bifida, ages 8 or 9, were recruited from four main sources: a children's hospital, a children's hospital that exclusively serves children with physical disabilities, a university-based medical center, and a statewide spina bifida association. These organizations produced a list of 310 nonoverlapping names. Letters were sent and calls were made to each family. Of the original 310 families with a child with spina bifida, 72 lived over 120 miles from the laboratory, 64 declined participation, 56 were inaccessible (due to incorrect contact information), 16 did not speak English, 14 children turned 10 years old before baseline, 11 children did not have spina bifida, and 8 were excluded for other reasons. Children of families who declined participation (n=64) did not differ from those who did participate (n=70) with respect to lesion level ($\chi^2(2, N=116) = 0.62, p>.05$, or type of spina bifida (myelomeningocele vs. lipomeningocele), $\chi^2(1, N=119) = 1.63, p>.05$). A matched comparison sample was attained by recruiting typically developing children from schools where the first 42 children with spina bifida were enrolled. The comparison group was matched on several demographic variables (assessed from parent report): child age, child gender, birth order, child ethnicity, mother age, father age, family structure (parents married or divorced), mother income, father income, and socioeconomic status. The participants were matched at the group level rather than individually. In the original sample participants in the spina bifida group (n=70) were significantly different from participants in the comparison group (n=72) on the following variables: child age, SES, and child ethnicity. To obtain matched groups for these demographics, families that were the furthest from the mean of child age, SES, and child ethnicity were dropped from the study until the two groups did not differ significantly on any demographic variables. The final participants included 68 families of children with spina bifida (37 males, 31 females; M age = 8.34) and 68 families with typically developing children (37 males, 31 females; M = 8.49). The 10 demographic variables were successfully matched for the spina bifida and typically developing groups (for more demographic information see Table 1, on the next page). While the original study included all family members, the current study focused only on mothers and daughters and thus included only the 62 families with daughters (31 with spina bifida, 31 typically developing).

For children with spina bifida, medical information about their physical status was gathered from the mother's questionnaire and from the child's medical chart (medical chart release was acquired during the home visit). Of the current, 31 participants with spina bifida, medical chart reviews indicated that 84% had a diagnosis of myelomeningocele and 16% had lipomeningocele. As well, over half of the children had spinal legions in the lumbosacral or lumbar level (64%), 29% were sacral and 7%

thoracic. Mother report indicated that most of the children had a shunt (68%) and most of the children needed assistance with ambulation either in the form of braces (58%) or a wheelchair (13%).

Table 1: Demographic Variables for Original Sample at Time 1

Demographic characteristics	Spina bifida	Able-bodied	Statistical test
Child age in years, *M (SD)*	8.34 (0.48)	8.49 (0.50)	*t*(134) = -1.75
Maternal age in years, *M (SD)*	37.74 (5.19)	37.74 (4.84)	*t*(134) = 0.00
Paternal age in years, *M (SD)*	41.02 (5.45)	40.63 (6.50)	*t*(105) = 0.33
Child gender			
Male, *% (n)*	54.41 (37)	54.41 (37)	$\chi^2(1) = 0.00$
Female, *% (n)*	45.59 (31)	45.59 (31)	
Child ethnicity			
White, *% (n)*	82.35 (56)	91.18 (62)	$\chi^2(1) = 2.30$
Other, *% (n)*	17.65 (12)	8.82 (6)	
Child birth order, *M (SD)*	2.12 (1.38)	2.06 (1.29)	*t*(129) = 0.27
Marital status			
Two-parent intact, *% (n)*	80.88 (55)	69.12 (47)	$\chi^2(1) = 2.51$
Nonintact, *% (n)*	19.12 (13)	30.88 (21)	
Maternal income, *M (SD)*	5.75 (2.57)	5.73 (2.45)	*t*(130) = 0.05
Paternal income, *M (SD)*	6.24 (2.50)	6.35 (2.22)	*t*(105) = -0.24
Hollingshead SES, *M (SD)*	43.12 (10.57)	46.46 (10.89)	*t*(131) = -1.80

Note. n = 68 for each sample. Family income is rated on a scale from 1 to 11 on which 1 < *$10,000*, 5 = *$40,000-49,000*, 10 = *90,000-99,999*, and 11 > *$100,000*. The Hollingshead (1975) Four Factor Index of socioeconomic status (SES) is based on a composite of maternal education, paternal education, maternal occupational status, and paternal occupational status. All statistics were nonsignificant.

Data were collected from families every two years. The current study will use data from the first three time points (Time 1 through Time 3), when the children were ages 8-13 (8 or 9 at Time 1, 10 or 11 at Time 2, and 12 or 13 at Time 3). Not all of the original 62 families participated at every time point but retention rates were still satisfactory: at Time 2, 29 spina bifida (SB) and 30 comparison (C) families participated and at Time 3, 28 SB and 30 C families participated. For the comparison group, families that dropped from the study by Time 3 did not differ on any basic demographic variables (child age, child ethnicity, and family SES) from families that remained in the study. For the spina bifida group, families that dropped from the study by Time 3 had significantly older children (M= 9.00, SD= 0.00) than families that remained in the study (M= 8.32, SD= 0.48) ($t[29]= 2.43$, $p<.05$).

Design and Procedure

Trained graduate and undergraduate research assistants collected data from participants during home visits that lasted about 3 hours. Families were compensated at each visit: $50 for Time 1 and $75 for Times 2 and 3. After obtaining consent from the parents and assent from the child, families were asked to complete several questionnaires and participate in one hour of semi-structured interaction tasks that were audiotaped and videotaped. To maintain confidentiality, family members were asked to fill out the questionnaires independently. As well, to ensure that the child understood the questionnaires, research assistants read each question aloud and any Likert scale responses were displayed on a laminated card for the child to choose from.

Families also participated in audio-taped and video-taped interaction tasks: a warm-up task, an unfamiliar board game task (designed specifically for this study), a conflict task (Smetana, Yau, Restrepo, & Braeges, 1991), and the structured family interaction task (Ferreira, 1963). Only the last three tasks were used in the current study and they were counterbalanced for each family.

For the unfamiliar board game task, the family was presented with a game that they had never seen before. The game was purchased from a catalog and was not available in common retail stores. The family was requested to create rules for the game and to play the game for 10 minutes.

Prior to the conflict task, families were asked to complete part of their questionnaires, including the Parent-Adolescent Conflict Scale (PAC; Robin & Foster, 1989). The questionnaires were examined and coded by a research assistant. Scores were computed for each item by multiplying discussion frequency by conflict intensity. Items with the five highest scores across respondents were selected for the conflict task. The family then participated in the conflict task, as described by Smetana and colleagues (1991): a 10 minute session in which the family discusses three of five issues that they endorsed as being "hot" topics.

For the structured family interaction task (SFIT; Ferreira, 1963), each family member first completed an SFIT form as part of their questionnaire packet. The form consisted of five 5 questions, asking about common family issues (i.e. what type of restaurant to go to for dinner). For each question, the respondent was instructed to choose his or her first and second choice of five possible answers. During the interaction task, the family was provided with a blank SFIT form and was asked to discuss each question and come to an agreement, as a family, on their first and second choices.

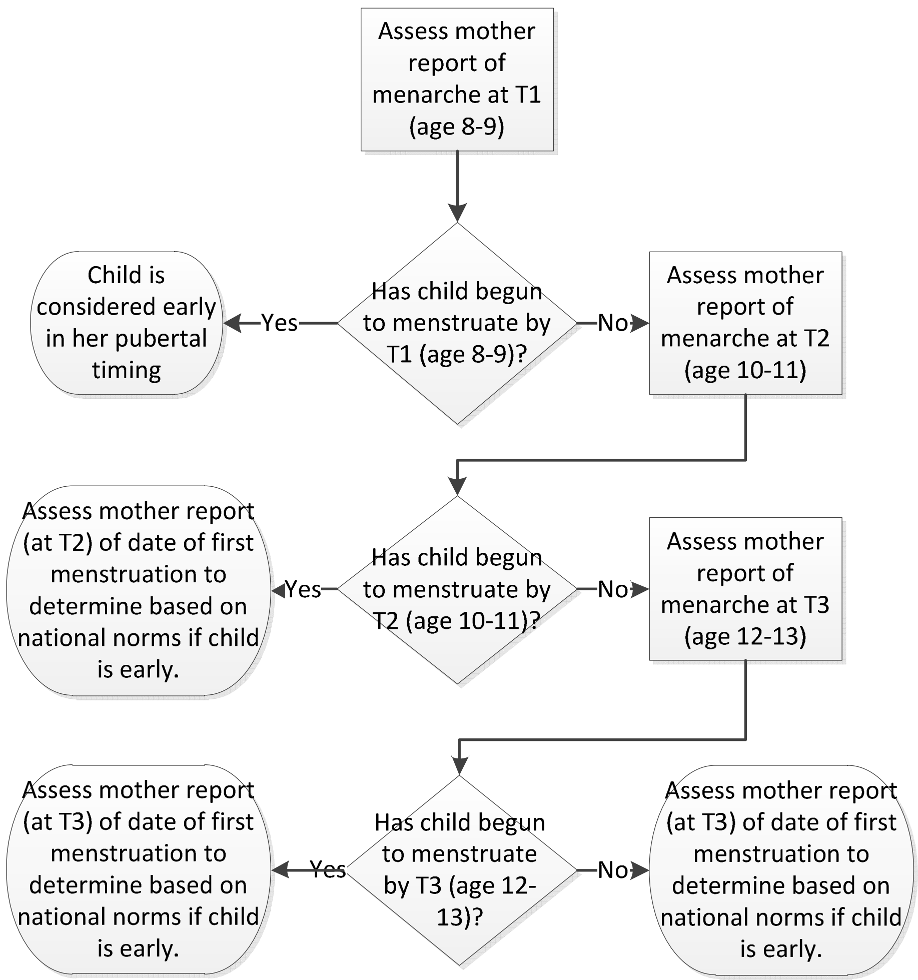
Measures

Pubertal Timing

Questionnaire data were used to assess pubertal timing in two ways: subjectively and objectively. Subjective and objective reports of pubertal timing were significantly correlated for both the spina bifida group ($\chi^2 = 4.50$, $p = 0.03$) and the typically developing group ($\chi^2 = 7.87$, $p = 0.01$). However, there were differences in each group. In the spina bifida group, four participants were "early" according to their pubertal timing, but they were "on-time or late" as reported by their mother. Four participants, who were "on-time or late" according to their pubertal timing, were described as "early" by their mother. In the typically developing group, three participants were "early" according to their pubertal timing, but they were "on-time or late" as reported by their mother. Two participants, who were "on-time or late" according to their pubertal timing, were described as "early" by their mother. Because these differences existed and because it was of particular interest in this study, subjective and objective pubertal timing measures were kept separate for all analyses.

To assess pubertal timing objectively, the age of first reported menstruation was used to determine whether the child was "early" or "on-time or late". Because items about pubertal development were not included in the child's questionnaire until Time 3, mother report was used (see Figure 3 for a detailed description of this process). If the family had participated, but the mother did not complete this item, then father report was used. If both mother and father report were missing, than the child report of age of first menstruation was used at Time 3. In all cases, early pubertal timing was determined based on what age the child began menstruation.

Figure 3: Process used to Determine Pubertal Timing



A recent study of 17,077 American girls was used to determine means and standard deviations for average age of first menstruation (Herman-Giddens, Slora, Wasserman, Bourdony, Bhapkar, Koch, & Hasemeier, 1997). This study has been approved by the American Academy of Pediatrics as an appropriate resource for age norms of female pubertal development (Kaplowitz et al., 1999). One standard deviation below the mean age of menarche was used as a cut off for determining "early" status. The average age of menarche as reported by Herman-Giddens and colleagues (1997) was 12.88 with a standard deviation of 1.20, so if the girl was younger than 11.68 (11 years and 8.2 months old) when menarche was first reported, then she was considered "early." Any participant older than 11.68 years old at menarche was considered "on-time or late." Herman-Giddens and colleagues (1997) found different norms for African American girls. Thus these norms were used to determine early pubertal timing for African American girls in this study. For African American girls, the average age of menarche was found to be 12.16 with a standard deviation of 1.21, so if the girl was younger than 10.95 (10 years and 11.4 months old) when menarche was first reported, she was considered "early". Self-report of menarcheal timing has been found to be sufficiently reliable and possibly more so than using other self-report measures such as the Pubertal Development Scale (see Smolak et al., 2007 for a review).

Subjective reports of pubertal timing were also assessed. Questionnaire data were used to determine if parents perceived their daughter's physical development to be earlier or later than most other girls her age. Answers were provided on a Likert scale: 1 = much earlier, 2 = somewhat earlier, 3 = about the same, 4 = somewhat later, 5 = much later. For this study, we used mothers' report of subjective pubertal timing at Time 2 (ages 10-11) because we wanted to observe how the mother views her child at the same time that conflict and emotional distancing was reported. As well, since the "early" group reached menarche around Time 2, they should have enough physical development for the mother to determine whether her daughter is physically mature for her age. If the mother answered 1 or 2, the perception of her child's development was considered "early", if she answered 3, 4, or 5, it was "on-time or late".

Depressive symptoms

Using data from Time 2 and Time 3 (ages 10-11 and 12-13), child depressive symptoms were measured in two ways: child and mother report. Child report was included as internalizing symptoms are often more accurately reported by children then by their parents (Klein, Dougherty, & Olino, 2005). However, in the original sample, participants with spina bifida had a significantly lower mean IQ than the typically developing group (Holmbeck et al., 2002). Thus, mother report of child depressive symptoms was also included because of the possibility that mother report may be more valid for younger children with spina bifida.

Child report of depressive symptoms was assessed using the Child Depression Inventory (CDI; Kovacs, 1992). The CDI is a 27-item measure that provides three possible choices, ranging in degree of depressive symptomatology, for each item. This measure was found to have acceptable alphas in the current study (α =.77 for spina bifida sample and α = .85 for comparison group). As well, the mean score for each group was in the average range (m = 1.29, SD = .23 for spina bifida sample and m = 1.25, SD = .22 for the comparison group).

Using data from Time 2 and Time 3 (ages 10-11 and 12-13), mother report of the child's depressive symptoms was based on the mother's responses to the Child Behavior

Checklist (CBCL). The CBCL is a 113-item parent based report of the child's internalizing and externalizing symptoms. For each item, parents were asked to determine if the statement is "not true," "somewhat or sometimes true," or "very true or often true" for their children. As a whole, the CBCL has demonstrated excellent reliability and validity (Achenbach, 1991). To measure child depressive symptoms, a depression subscale of the CBCL was used. The depression scale (CBCL-D) was adapted from original subscales (i.e. "Anxious-Depressed" subscale) of the CBCL to focus particularly on depressive symptoms rather than more broadly focusing on internalizing symptoms (Clarke et al, 1992). The CBCL-D is composed of 15 items, such as "cries a lot," "doesn't eat well," or "worries." For a complete list of items on the CBCL-D, see the highlighted items on the CBCL measure in Appendix A. The depression subscale showed satisfactory reliability for both groups in this study (α = .81 for spina bifida group; α = .85 for typically developing group).

Parent-child Conflict (Questionnaire data)

Using data from Time 1 and Time 2 (ages 8-9 and 10-11) parent-child conflict was assessed in two ways: using questionnaire data and data from coded video interactions between child and parent. Because the mother-daughter dyad was the focus of this study, questionnaire-based parent-child conflict was assessed using only mother and child reporters.

The Parent-Adolescent Conflict Scale (PAC), a brief version of the Issues Checklist (IC; Robin & Foster, 1989), was completed by mothers and daughters, separately. The PAC measures family conflict by asking for information about 15 issues commonly discussed in adolescence (i.e. whether I do chores around the house). For each issue, the respondent was asked whether the issue was discussed in the past 2 weeks and if so, how many times the issue was discussed and how intense the discussions were (reported on a 5-point Likert scale from “calm” to “angry”). The intensity scores were averaged to yield an overall measure of parent-child conflict for each reporter (mother and daughter). Alpha coefficients were not available for this measure, as each family answered only items that they have personally discussed (i.e. one family may argue about doing chores while another may family argue about how the child spends time after school). Thus, each respondent did not answer every item. As well, 5 additional items pertaining to medical tasks were not used, since families of typically developing children did not complete these items.

Parent-Child Conflict (Observational data)

The family interaction tasks, at Time 1 (age: 8-9) and Time 2 (age: 10-11), were employed in these analyses. Tasks were coded by trained research assistants, using a macro-coding scheme adapted for this project by Holmbeck, Belvedere, Gorey-Ferguson, & Schneider (1995) and based on a system developed by Smetana and colleagues (1991). Coders viewed one interaction task at a time and then rated the interaction on a variety of dimensions, scored on a 5-point Likert scale. Six dimensions are included in the full coding system, but this study only used the “conflict” dimension. Within the conflict dimension the level of conflict was assessed for each family dyad, individually (mother-child, father-child, and mother-father). Only data for the mother-child dyad was included in this study. Each task was rated by two coders and their ratings were averaged to obtain a conflict score for the mother-daughter dyad. The mother-daughter conflict score in each of three interaction tasks were added together to obtain an overall mother-daughter conflict dimension score for each participant.

Graduate and undergraduate students were provided a manual and trained for approximately 10 hours until they obtained at least 90% agreement with an expert coder. The coding manual included descriptions of each dimension and behavioral examples for each point on the Likert scale. None of the coders were aware of the hypotheses of this study, but they were aware of whether the child had spina bifida. Satisfactory interrater reliability was found between coders on the mother-child conflict item in this study (r= .73-.77)

Emotional Distancing

A composite score of three subscales of the Emotional Autonomy Scale, a self-report questionnaire measure, was used to assess emotional distancing at Time 1 (age: 8-9) and Time 2 (age: 10-11) (EA: Steinberg & Silverberg, 1986; subscales: Parental Deidealization, Nondependency on Parents, and Individuation). The EA was originally created to assess emotional autonomy, but it appears to actually assess emotional detachment, or distancing, rather than autonomy (Ryan & Lynch, 1989). For further discussion on this topic, please see Schmitz and Baer (2001). The EA was completed by each participant regarding her mother and father separately. Because this study focused on the mother-daughter dyad, only the EA pertaining to the child's mother was used in this study. The EA was found to have acceptable alphas in the current study: .69 for children with spina bifida and .72 for typically developing children.

Demographics

Mother questionnaire data were used to assess the child's age, gender, and ethnicity.

Statistical Treatment

Data Analyses

Regression analyses, or ANOVA analyses when appropriate, were used to test most of the hypotheses of this study, as a greater sample size is required to use Structural Equation Modeling (Cohen, Cohen, West, & Aiken, 2002). A power analysis was used to assess whether the sample size was appropriate for the following statistical analyses (Aiken & West, 1991; Cohen, 1992). Because this study focused only on female children and their mothers, power was computed based on the number of families with female children, n= 62 (31 spina bifida, 31 typically developing). Assuming a power of .80, an alpha of .05, and an estimated R^2 of .35 (a large effect size), a sample of 42 was required for the most complex analyses (5 predictors and a single outcome) (Cohen, 1992). Thus, the current study had the sample size necessary to detect a large effect size.

It is noted that pubertal timing was used as a predictor of parent-child conflict and emotional distancing at Time 2 (see Figure 2), even though it was assessed using data from Time 1 to Time 3. Thus, pubertal timing may not seem to be a true prospective predictor. However, all of the significant effects hypothesized for this study involved girls who were “early” in their pubertal development. “Early” pubertal development was determined using age of first menarche or subjective mother report. Menstruation is a late pubertal event and thus, even though “early” pubertal timing was determined at later time points,, physical development (i.e. height and secondary sexual characteristics) should have occurred about two years earlier and would precede any increase in conflict or emotional distancing from Time 1 to Time 2.

Hypothesis I

The relationship between pubertal timing and depressive symptoms was expected to depend on group status (whether the child has spina bifida). Also, the relationship was expected to be non-significant for those with spina bifida, but early pubertal development was expected to be associated with an increase in depressive symptoms for typically developing girls (see Figure 1).

To test the first hypothesis, I followed procedures outlined by Aiken and West (1991) for testing interactions using multiple regression. The predictors for the regression were pubertal timing (subjective and objective), group status (spina bifida or comparison), and the interaction term: pubertal timing X group status. The dependant variable was child depressive symptoms (mother and child report) at Time 3, controlling for depressive symptoms at Time 2. All regressions were run separately for each pubertal timing variable and each report of depressive symptoms, yielding a total of 4 equations. If a significant moderation effect was found for any of the 4 interaction equations, then post-hoc analyses were conducted to test the nature of the interaction (Holmbeck, 2002).

Hypothesis II

Parent-child conflict was expected to mediate associations between the group status X pubertal timing interaction and depressive symptoms (see Figure 2, model 1). For typically developing girls, it was expected that early pubertal timing would be associated with an increase in parent-child conflict and that conflict would be associated with an increase in depressive symptoms. However, for girls with spina bifida, it was expected that early pubertal timing would not be associated with increased parent-child conflict.

If an interaction effect was found for pubertal timing x group status on depressive symptoms, then parent-child conflict (mother and child report) was tested as a possible mediator of the interaction effects. A mediated moderation model is most easily conceptualized by replacing the predictor variable (a) with the interaction (see Figure 2, model 1). The regression approach to analyzing mediated effects, as described by Holmbeck (1997) and outlined by Baron and Kenny (1986), was used to test parent child conflict as a mediator of the moderation effect. Three steps were proposed to test this model: (1) assess whether the pubertal timing X group status interaction predicted mother-daughter conflict at Time 2, controlling for parent-child conflict at Time 1 and the main effects of pubertal timing and group status; (2) assess whether parent-child conflict at Time 2 predicted child depressive symptoms at Time 3, controlling for depressive symptoms at Time 2; and (3) assess whether the relationship between the pubertal timing X group status interaction and child depressive symptoms at Time 3 (controlling for depressive symptoms at Time 2 and the main effects of pubertal timing and group status) was significantly reduced when controlling for parent-child conflict at Time 2. All analyses were run separately for each pubertal timing variable, parent-child conflict variable, and each report of depressive symptoms, yielding a total of 12 equations.

Hypothesis III

Emotional distancing was expected to mediate associations between the group status X pubertal timing interaction and depressive symptoms (see Figure 2, model 2). For typically developing girls, it was expected that early pubertal development would be associated with an increase in emotional distancing and that distancing would be associated with an increase in depressive symptoms. However, for girls with spina bifida, it was expected that early pubertal development will not be associated with increased emotional distancing.

If an interaction effect was found for pubertal timing x group status on depressive symptoms, then emotional distancing (reported by child pertaining to relationship with mother) would be tested as a possible mediator of the interaction effects. The regression approach to analyzing mediated effects, as described by Holmbeck (1997) and outlined by Baron and Kenny (1986), would be used to test emotional distancing as a mediator of the interaction effect. The same three steps used for hypothesis II would be used to test this model, replacing the parent-child conflict variable with the emotional distancing variable. All analyses were run separately for each pubertal timing variable and each report of depressive symptoms, yielding a total of 4 equations.

CHAPTER FOUR

RESULTS

Preliminary Analyses

Demographics

As seen in Table 2, preliminary T-tests revealed that the spina bifida and typically developing groups did not differ significantly on age of the child or socio-economic status of the family. Two of the variables consisted of nominal data, thus requiring nonparametric analyses. Using a chi-square test, the two groups did not differ significantly with respect to race, objective pubertal timing, or subjective pubertal timing (see Table 2 on the next page).

Depressive Symptoms

Prior to examining the main hypotheses of the study, the relationship between child and parent report of depressive symptoms was examined. Child report (CDI) and parent report (CBCL) of depressive symptoms were significantly correlated at Time 2, $r = .27$, $p = .04$ and Time 3, $r = .37$, $p = .005$. Thus, mother and child report of depressive symptoms were combined to form a composite measure of child depressive symptoms. This composite score of child depressive symptoms was used in all of the following analyses.

Table 2: Demographic Variables for Current Sample at Time 1

Demographic characteristics	Spina bifida	Able-bodied	Statistical test
Child age in years, *M (SD)*	8.39 (0.50)	8.48 (0.51)	*t*(60) = -0.76
Child ethnicity			
White, *% (n)*	80.65 (25)	90.32 (28)	$\chi^2(1) = 1.17$
Other, *% (n)*	19.35 (6)	9.68 (3)	
Pubertal timing group (based on menarche)			
Early, % *(n)*	35.48 (11)	22.58 (7)	$\chi^2(1) = 1.25$
Other, % *(n)*	64.52 (20)	77.42 (24)	
Hollingshead SES, *M (SD)*	43.02 (12.32)	47.21 (11.70)	*t*(59) = -1.36

Note. n = 31 for each sample. The current sample only included females. The Hollingshead (1975) Four Factor Index of socioeconomic status (SES) is based on a composite of maternal education, paternal education, maternal occupational status, and paternal occupational status. All statistics were nonsignificant.

Skewness Analyses

Skewness analyses were conducted for all continuous variables, i.e. conflict, emotional distancing, and depressive symptoms. An equation from Tabachnick & Fidell (2007) was used to calculate the skewness magnitude for each measure. Any scale with a skewness value above 3.0 was transformed using a square-root transformation (Tabachnick & Fidell, 2007). Skewness analyses were conducted separately for each time point and for each group (spina bifida and comparison). If a scale was found to be skewed at one time point, then all other time points were adjusted as well. Two measures were found to be positively skewed at some time points: mother-child combined scores of depressive symptoms (Tabachnick & Fidell skewness statistic= .614-5.79) and child report of parent-child conflict (2.45-3.47). Both measures were corrected using square root transformations, which decreased the skewness statistic to appropriate levels.

Hypotheses Testing

Hypothesis I

It was hypothesized that the relationship between pubertal timing and depressive symptoms would depend on group status (whether they have spina bifida). Also, the relationship was expected to be non-significant for those with spina bifida, but early pubertal development was expected to be associated with an increase in depressive symptoms for typically developing girls (see Figure 1).

To test the first hypothesis (see Figure 1), procedures outlined by Aiken and West (1991) were followed for testing interactions, except that analyses of covariance (ANCOVAs) were used instead of regressions when applicable. Because both predictor variables (pubertal timing and group status) were dichotomous, a 2 (early vs. on-time or late) x 2 (spina bifida vs. typically developing) factorial ANCOVA was used to test the interaction. Specifically, the independent variables for the ANCOVA were pubertal timing (early [1] vs. on time/late [2]), group status (spina bifida [0] or comparison [1]), and the interaction term: pubertal timing X group status. The dependant variable was child depressive symptoms (mother and child composite score) at Time 3, controlling for depressive symptoms at Time 2. A separate ANCOVA was run for each measure of pubertal timing (subjective and objective).

Objective Pubertal Timing and Depressive Symptoms: For the objective measure of pubertal timing (age of first menarche), the main effects of pubertal timing ($F[1, 53] = 1.32$, $p = .26$) and group status ($F[1, 53] = .33$, $p = .57$) were non-significant, as was the interaction effect ($F[1, 53] = .02$, $p = .91$) (see Table 3).

Table 3: Analysis of Covariances (ANCOVAs) for Figure 1

Source of Variance	Adjusted SS	df	MS	*F*
DV= T3 depressive symptoms				
Covariate: T2 depressive symptoms	1.46	1	1.46	42.76**
Pubertal timing (objective)	0.05	1	0.05	1.32
Spina bifida status	0.01	1	0.01	0.33
Interaction	0.00	1	0.00	0.01
Error	1.80	53	0.03	
DV= T3 depressive symptoms				
Covariate: T2 depressive symptoms	1.08	1	1.08	32.08**
Pubertal timing (subjective)	0.08	1	0.08	2.47
Spina bifida status	0.01	1	0.01	0.25
Interaction	0.00	1	0.00	0.03
Error	1.72	51	0.30	

Note. *<.05, **<.01, two tailed test

Subjective Pubertal Timing and Depressive Symptoms: Similarly, for the subjective measure of pubertal timing (mother report), the main effects of pubertal timing (F[1, 51] = 2.47, p = .12) and group status (F[1, 51] = .25, p = .62) were non-significant, as was the interaction (F[1, 51] = .03, p = .86) (see Table 3). The first hypothesis was not supported for either objective or subjective pubertal timing.

Hypothesis II

It was hypothesized that early pubertal development would be associated with an increase in parent-child conflict and that conflict would be associated with increased depressive symptoms. However, for girls with spina bifida, it was expected that early pubertal development would not be associated with change in parent-child conflict (see

Figure 2, model 1). Because an interaction effect was not found for pubertal timing (subjective or objective) x group status on depressive symptoms, parent-child conflict (mother and child report) could not be tested as a possible mediator of the interaction. However, all other hypothesized pathways were still tested (see Figure 2, model 1, pathways a and b).

Pubertal Timing and Parent-Child Conflict: An ANCOVA was used to test the effects of pubertal timing and group status on level of parent-child conflict (Figure 2, model 1, pathway a). Because both predictor variables (pubertal timing and group status) were dichotomous, a 2 (early vs. on-time or late) x 2 (spina bifida vs. typically developing) factorial design, ANCOVA was used to test the interaction. The independent variables for the ANCOVA were pubertal timing (early [1] vs on-time/late [2]), group status (spina bifida [0] or comparison [1]), and the interaction term: pubertal timing X group status. The dependant variable was parent-child conflict at Time 2, controlling for parent-child conflict at Time 1. A separate ANCOVA was run for each combination of pubertal timing measure (subjective and objective) and parent-child conflict measure (mother report, child report, and observational data), resulting in a total of 6 equations.

Objective Pubertal Timing and Child Report of Conflict: For the objective measure of pubertal timing (age of first menarche) and child report of parent-child conflict, the main effects of pubertal timing (F[1, 48] = .02, p = .89) and group status (F[1, 48] = 1.25, p = .27) were non-significant, as was the interaction effect (F[1, 48] = .00, p = .97).

Subjective Pubertal Timing and Child Report of Conflict: When including the subjective measure of pubertal timing (mother report) and child report of parent-child conflict, the main effects of pubertal timing (F[1, 46] = .38, p = .54) and group status (F[1, 46] = 2.45, p = .12) were non-significant, as was the interaction effect (F[1, 46] = 1.19, p = .28).

Objective Pubertal Timing and Mother Report of Conflict: In testing the effects of objective pubertal timing (age of first menarche) and spina bifida status on mother report of parent-child conflict, the main effects of pubertal timing (F[1, 51] = 2.13, p = .15) and group status (F[1, 51] = 1.19, p = .28) were non-significant, as was the interaction effect (F[1, 51] = 1.03, p = .32).

Subjective Pubertal Timing and Mother Report of Conflict: For the subjective measure of pubertal timing (mother report) and mother report of parent-child conflict, the main effects of pubertal timing (F[1, 50] = .22, p = .64) and group status (F[1, 50] = .05, p = .82) were non-significant, as was the interaction effect (F[1, 50] = 1.25, p = .27).

In sum, the effects of pubertal timing and group status on reported conflict (using mother or child report) were nonsignificant (see Table 4 on the following page). These analyses failed to support the second hypothesis.

Table 4: Analysis of Covariances (ANCOVAs) for Model 1, Pathway a (Child and Mother Report)

Source of Variance	Adjusted SS	df	MS	*F*
DV= T2 parent-child conflict (child report)				
Covariate: T1 parent-child conflict (child report)	0.42	1	0.42	8.24**
Pubertal timing (objective)	0.00	1	0.00	0.02
Spina bifida status	0.06	1	0.06	1.25
Interaction	0.00	1	0.00	0.00
Error	2.46	48	0.05	
DV= T2 parent-child conflict (child report)				
Covariate: T1 parent-child conflict (child report)	0.40	1	0.40	7.87**
Pubertal timing (subjective)	0.02	1	0.02	0.38
Spina bifida status	0.13	1	0.13	2.45
Interaction	0.06	1	0.06	1.19
Error	2.35	46	0.05	
DV= T2 parent-child conflict (mother report)				
Covariate: T1 parent-child conflict (mother report)	2.69	1	2.69	10.35**
Pubertal timing (objective)	0.55	1	0.55	2.13
Spina bifida status	0.31	1	0.31	1.19
Interaction	0.27	1	0.27	1.03
Error	13.27	51	0.26	
DV= T2 parent-child conflict (mother report)				
Covariate: T1 parent-child conflict (mother report)	3.50	1	3.50	12.70**
Pubertal timing (subjective)	0.06	1	0.06	0.22
Spina bifida status	0.01	1	0.01	0.05
Interaction	0.34	1	0.34	1.25
Error	13.79	50	0.39	

Note. *<.05, **<.01, two tailed test

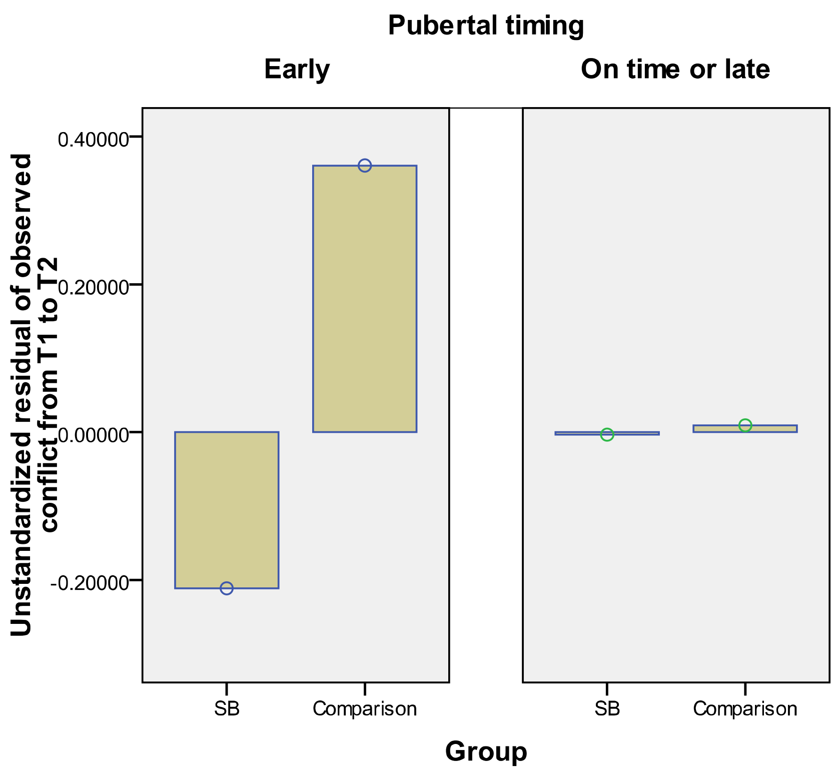
Objective Pubertal Timing and Observed Conflict: For the objective measure of pubertal timing (age of first menarche) and observed parent-child conflict, the main effect of pubertal timing (F[1, 51] = .31, p = .58) was non-significant, but the main effect of group status (*F*[1, 51] = 6.21, *p* = .02) and the interaction effect (*F*[1, 51] = 5.74, *p* = .02) were significant (see Table 5).

Table 5: Analysis of Covariances (ANCOVAs) for Model 1, Pathway a (Observed Conflict)

Source of Variance	Adjusted SS	df	MS	*F*
DV= T2 parent-child conflict (observed)				
Covariate: T1 parent-child conflict (observed)	0.43	1	0.43	2.62
Pubertal timing (objective)	0.05	1	0.05	0.31
Spina bifida status	1.01	1	1.01	6.21*
Interaction	0.94	1	0.94	5.74*
Error	8.33	51	0.16	
DV= T2 parent-child conflict (observed)				
Covariate: T1 parent-child conflict (observed)	0.13	1	0.13	0.76
Pubertal timing (subjective)	0.10	1	0.10	0.60
Spina bifida status	0.59	1	0.59	3.55
Interaction	0.70	1	0.70	4.15*
Error	8.37	50	0.17	
Note. *<.05, **<.01, two tailed test				

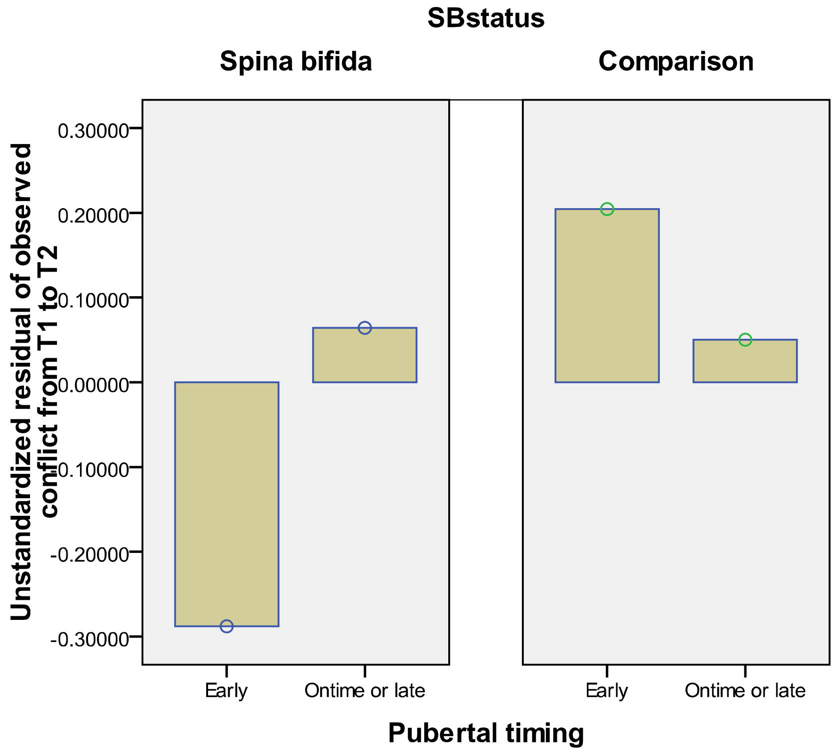
Follow-up one-way ANOVAs were used to interpret the interaction. The residual of observed conflict from Time 1 to Time 2 was used as the DV and spina bifida status or pubertal timing was used as the IV. The main effect of pubertal timing was nonsignificant for the spina bifida group (*F*[1, 26] = 2.63, *p* = .12) and for the comparison group (*F*[1, 28] = 2.77, *p* = .11). To further explore the significant interaction, spina bifida status was used as a predictor. The main effect of spina bifida status was significant for the early maturing group (*F*[1, 16] = 7.79, *p* = .01), but it was nonsignificant for the on time or late maturing group (*F*[1, 38] = .01, *p* = .92). This suggests that the association between spina bifida status and increased observed conflict depends on whether the participant is early maturing. For participants who are early maturing, those with spina bifida show less increase in observed conflict while typically developing girls show a larger increase in observed conflict (see Figure 4). These analyses supported the hypothesized interaction, but they did not support the hypothesized model in that the moderation term was not as predicted.

Figure 4: Interaction Between Objective Pubertal Timing X Group Status on Change in Observed Conflict



Subjective Pubertal Timing and Observed Conflict: For the subjective measure of pubertal timing (mother report) and observational data of parent-child conflict, the main effects of pubertal timing (*F*[1, 50] = .60, *p* = .44) and group status (*F*[1, 50] = 3.55, *p* = .07) were non-significant, but the interaction effect (*F*[1, 50] = 4.15, *p* = .05) was significant (see Table 5). Follow-up one-way ANOVAs were used to interpret the interaction. The residual of observed conflict from Time 1 to Time 2 was used as the DV and sbina bifida status or pubertal timing was used as the IV. The main effect of pubertal timing was significant for the spina bifida group (*F*[1, 25] = 8.74, *p* = .01), but it was nonsignificant for the comparison group (*F*[1, 28] = .49, *p* = .49). This suggests that the association between pubertal timing and increased observed conflict depended on whether the participant has spina bifida. For participants with spina bifida, those who are early maturing reported a decrease in observed conflict while on time or late maturing girls reported an increase in observed conflict (see Figure 5). In addition, among girls who are typically developing, early maturation predicted a greater increase in observed conflict than on time or late maturation. As before, these analyses supported the hypothesized interaction between pubertal timing and spina bifida status on increased observed conflict. However, the post-hoc analyses did not support the hypothesized association because girls with spina bifida, rather than typically developing girls, had a significant association between pubertal timing and observed conflict.

Figure 5: Interaction between Subjective Pubertal Timing X Group Status on Change in Observed Conflict



Parent-Child Conflict and Depressive Symptoms: Regressions were used to test the association between parent-child conflict and child depressive symptoms (Figure 2, model 1, pathway b). The independent variable for the regression was parent-child conflict at Time 2. The dependant variable was child depressive symptoms (combined mother and child report) at Time 3, controlling for child depressive symptoms at Time 2. A separate regression was run for each measure of parent-child conflict (child report, mother report, and observational data), resulting in a total of 3 equations. The effect of parent-child conflict on child depressive symptoms was not significant when child report of conflict was used (B= .17, *SE* B = .11, β= .16, *p*= .11), when mother report of conflict was used (B= .07, *SE* B = .04, β= .15, *p*= .11), nor when observed level of conflict was used (B= -.06, *SE* B = .06, β= -.09, *p*= .37) (see Table 6). These regression analyses failed to support hypothesis II.

Table 6: Regressions for Model 1, Pathway b

Predictors	*b*	*SE b*	*B*	R^2 & ΔR^2	*F* & *F*Δ
DV= T3 depressive symptoms					
Step 1				0.50	55.19**
T2 depressive symptoms	0.70	0.09	0.71**		
Step 2				0.02	-25.51
T2 depressive symptoms	0.64	0.10	0.65**		
T2 parent-child conflict (child report)	0.17	0.11	0.16		
DV= T3 depressive symptoms					
Step 1				0.52	59.23**
T2 depressive symptoms	0.73	0.09	0.72**		
Step 2				0.03	-27.44
T2 depressive symptoms	0.72	0.09	0.71**		
T2 parent-child conflict (mother report)	0.07	0.04	0.15		
DV= T3 depressive symptoms					
Step 1				0.50	53.35**
T2 depressive symptoms	0.73	0.10	0.71**		
Step 2				0.00	-26.37
T2 depressive symptoms	0.74	0.10	0.73**		
T2 parent-child conflict (observed)	-0.06	0.06	-0.09		
Note. *<.05, **<.01, two tailed test					

Hypothesis III

Third, it was hypothesized that early pubertal development would be associated with an increase in emotional distancing and that emotional distancing would be associated with increased depressive symptoms. However, for girls with spina bifida, it was expected that early pubertal development would not be associated with change in emotional distancing (see Figure 2, model 1). Because an interaction effect was not found for pubertal timing x group status on depressive symptoms, emotional distancing could not be tested as a possible mediator of the interaction. However, all other hypothesized pathways were still tested (see Figure 2, model 2, pathways a and b).

Pubertal Timing and Emotional Distancing: An ANCOVA was used to test the effects of pubertal timing and group status on level of emotional distancing (Figure 2, model 2, pathway a). Because both predictor variables (pubertal timing and group status) were dichotomous, a 2 (early vs. on-time or late) x 2 (spina bifida vs. typically developing) factorial design, ANCOVA was used to test the interaction. The independent variables for the ANCOVA were pubertal timing (early [1] vs on-time/late [2]), group status (spina bifida [0] or comparison [1]), and the interaction term: pubertal timing X group status. The dependant variable was emotional distancing at Time 2, controlling for emotional distancing at Time 1. A separate ANCOVA was run for each pubertal timing measure (subjective and objective), resulting in a total of 2 equations.

Objective Pubertal Timing and Emotional Distancing: For the objective measure of pubertal timing (age of first menarche), the main effects of emotional distancing (F[1, 55] = .41, p = .53) and group status (F[1, 55] = .03, p = .88) were non-significant, as was the interaction effect (F[1, 55] = .22, p = .64).

Subjective Pubertal Timing and Emotional Distancing: For the subjective measure of pubertal timing (mother report), the main effects of pubertal timing (F[1, 53]

= .16, *p* = .70) and group status (*F*[1, 53] = .70, *p* = .41) were non-significant, but the interaction effect (*F*[1, 53] = 4.93, *p* = .03) was significant (see Table 7).

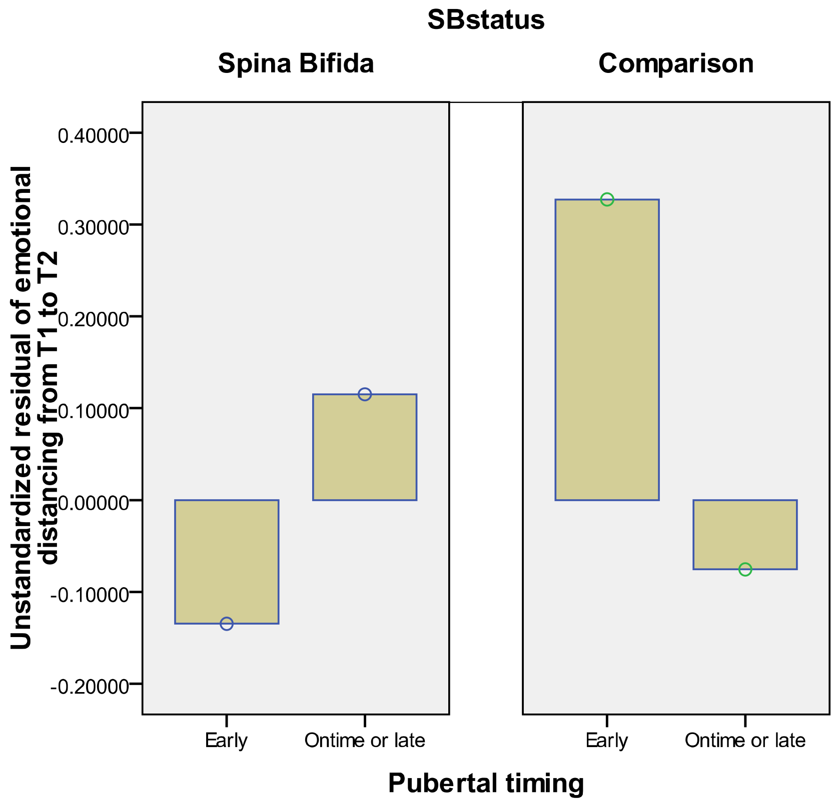
Table 7: Analysis of Covariances (ANCOVAs) for Model 2, Pathway a

Source of Variance	Adjusted SS	df	MS	*F*
DV= T2 emotional distancing				
Covariate: T1 emotional distancing	3.60	1	3.60	13.81**
Pubertal timing (objective)	0.11	1	0.11	0.41
Spina bifida status	0.01	1	0.01	0.03
Interaction	0.06	1	0.06	0.22
Error	14.34	55	0.26	
DV= T2 emotional distancing				
Covariate: T1 emotional distancing	3.46	1	3.46	14.65**
Pubertal timing (subjective)	0.04	1	0.04	0.16
Spina bifida status	0.16	1	0.16	0.70
Interaction	1.16	1	1.16	4.93*
Error	12.52	53	0.24	

Note. *<.05, **<.01, two tailed test

Follow-up one-way ANOVAs were used to interpret the interaction. The residual of observed conflict from Time 1 to Time 2 was used as the DV and spina bifida status or pubertal timing was used as the IV. The main effect of pubertal timing was nonsignificant for the spina bifida group (*F*[1, 27] = 2.41, *p* = .13) and for the comparison group (*F*[1, 29] = 2.71, *p* = .11). To further explore the significant interaction, spina bifida status was entered as a predictor and pubertal timing was entered as the moderator. The main effect of spina bifida status was nonsignificant for the early maturing group (*F*[1, 16] = 3.22, *p* = .09) and for the on time or late maturing group (*F*[1, 40] = 1.63, *p* = .21). Even though the differences were not significant, participants who are early maturing and have spina bifida show less increase in observed conflict; while participants who are early maturing and typically developing show are larger increase in observed conflict (see Figure 6,). These analyses supported the hypothesized interaction, but not the hypothesized associations between pubertal timing and emotional distancing.

Figure 6: Interaction between Subjective Pubertal Timing X Group Status on Change in Emotional Distancing



Emotional Distancing and Depressive Symptoms: A regression was used to test the association between emotional distancing and child depressive symptoms (Figure 2, model 2, pathway b). The independent variable for the regression was child report of emotional distancing at Time 2. The dependant variable was child depressive symptoms (combined mother and child report) at Time 3, controlling for child depressive symptoms at Time 2. The effect of emotional distancing on child depressive symptoms (B= -.04, *SE* B = .05, β= -.08, *p*= .44) was non-significant (see Table 8). These analyses failed to support the hypothesis that emotional distancing would significantly predict depressive symptoms.

Table 8: Regression for Model 2, Pathway b

Predictors	*b*	*SE b*	*B*	R^2 & ΔR^2	*F* & ΔF
DV= T3 depressive symptoms					
Step 1				0.51	57.05
T2 depressive symptoms	0.77	0.09	0.76**		
Step 2				0.00	-28.41
T2 depressive symptoms	0.73	0.10	0.74**		
T2 emotional distancing	-0.04	0.05	-0.08		

Note. *<.05, **<.01, two tailed test

CHAPTER FIVE

DISCUSSION

The purpose of this study was to explore associations between pubertal timing and mother-child conflict, emotional distancing, and depressive symptoms of girls with and without spina bifida. Specifically, this study examined group status (spina bifida vs. typically developing) as a moderator to determine if the effects of pubertal timing vary when considering whether the participant has spina bifida. It was predicted that the relationship between early pubertal timing and higher rates of depressive symptoms would be stronger for typically developing youth. Additionally, mother-daughter variables such as conflict and emotional distancing were examined as possible mediators of the proposed moderation. The results of this study suggest that the association between pubertal timing and depressive symptoms was not different based on whether the participant has spina bifida. Because the proposed moderation was not supported, the mediated moderation models could not be tested in their entirety. Instead, individual pathways of each mediational model were tested separately. Early pubertal timing was predicted to be associated with increased mother-daughter conflict and emotional distancing and it was hypothesized, in turn, that increased conflict and emotional distancing would be associated with increased depressive symptoms (see Figure 2).

This study built upon the current literature by exploring associations between pubertal timing and depressive symptoms in girls with spina bifida. Previous research has looked at family variables in relation to the association between early pubertal timing and depressive symptoms in girls. However, this association might differ in a pediatric population, particularly because girls with spina bifida have different psychosocial experiences during the period of pubertal maturation. This study explored family variables, such as conflict and emotional distancing, as possible mechanisms by which early maturing girls may develop higher rates of depressive symptoms. This study also involved a longitudinal multi-method, multi source design. This design allowed for examination of possible differences between two commonly used measures of pubertal timing (age of menarche and mother report). Moreover, few previous studies have examined family conflict from multiple reporters. The following section will include a review of the hypotheses, a description of the findings, and a discussion of possible explanations for the findings. Finally, suggestions for future directions and clinical implications based upon the study will be discussed.

Hypothesis I

The first hypothesis of the study was that the relationship between pubertal timing and increased depressive symptoms would depend on group status (whether the participants have spina bifida). It was predicted that the relationship between early pubertal timing and increased depressive symptoms would be nonsignificant for participants with spina bifida, but it would be significant for typically developing participants. Two measures of pubertal timing were included in these analyses: objective (age of menarche) and subjective (mother report). Contrary to the prediction, results indicated that the association between early pubertal timing (both subjective and objective) and depressive symptoms was nonsignificant for both groups. Past studies have suggested that girls who mature earlier than their peers tend to report higher rates of depressive symptoms (Conley & Rudolph, 2009; Ge et al., 2001; Graber et al., 2004; Lam et al., 2004; Lewinsohn et al., 1998; Negriff et al., 2008; Stice et al., 2001;). Because so much research has indicated a significant relationship between pubertal timing and depressive symptoms it is surprising that no significant associations were found.

There may be several reasons for the finding that pubertal timing and spina bifida status were not significant predictors of depressive symptoms. First, most of the previous studies have looked at the rate of depressive symptoms cross-sectionally (at one time point), rather than longitudinally (change over time). In the current study, we examined this relationship longitudinally by looking at the effect of early pubertal timing on subsequent change in reported depressive symptoms: from Time 2 (age 10-11) to Time 3 (age 12-13). The analyses were conservative in that we controlled for the level of depressive symptoms at the previous time point. If there was little change between the time points (T2 and T3), the reduced variance remaining in the outcome could cause the lack of significant findings. It is also possible that the change in depressive symptoms occurred at an earlier age, rather than between T2 and T3. Second, the current study included non-psychiatric participants and both groups had mean CDI scores in the average range. Depressive symptoms, as measured by the CDI (child report) and CBCL (mother report), remained low across all participants (CDI: SB m*(sd)* = 1.29 (*.23)* to 1.32 (*.25)* and C m*(sd)* = 1.25 (*.22)* to 1.30 (*.25);* CBCL: SB m*(sd)* = 0.25 (*.24)* to 0.26 (*.21*) and C m*(sd)* = 0.16 (*.16)* to 0.10 (*.15*). Because depressive symptoms were low for most participants, differences between groups were limited. Third, the depressive symptoms measure was adjusted for its skewness, thereby limiting the variability in the measure and weakening the potential association with pubertal timing. A similar discussion of the results of the second and third hypotheses will follow.

Hypothesis II

The second hypothesis proposed that parent-child conflict would mediate associations between the group status X pubertal timing interaction and depressive symptoms. Because the interaction effect was found to be nonsignificant, parent-child conflict could not be tested as a mediator of this effect. All other pathways in the mediated moderation model were examined (see pathways a and b in Figure 2).

The first pathway proposed that the association between pubertal timing and increased parent-child conflict would depend on whether the participant has spina bifida. More specifically, it was expected that early pubertal timing would predict higher levels of conflict for typically developing girls, but not for girls with spina bifida. Pubertal timing was measured in two ways (objectively and subjectively) and parent-child conflict was measured using three different reporters (child, mother, and RA observer). For mother report and child report of conflict, analyses revealed that the association between early pubertal timing (both subjective and objective) and increased conflict was nonsignificant for both groups. However, for increased observed conflict, the interaction of early pubertal timing (both subjective and objective) and group status was significant. In addition, when using the objective measure of pubertal timing, spina bifida status significantly predicted observed conflict. The finding that both subjective and objective measures of pubertal timing had a similar result suggests that this interaction with spina bifida status is robust.

As stated above, it was predicted that spina bifida status would moderate the relationship between early pubertal timing and increased parent-child conflict. However, the association between pubertal timing and increased conflict was found to be nonsignificant for both groups (spina bifida and comparison). To continue to explore the significant interaction, analyses were conducted as if pubertal timing was the moderator of the association between spina bifida status and increased conflict. These analyses revealed that the association between spina bifida status and increased, observed conflict depended on whether the participant is early maturing. More specifically, comparison group status predicted a greater increase in mother-daughter conflict only for the early maturing group. Contrary to the hypothesis, these follow-up analyses suggest that pubertal timing is a moderator of the association between spina bifida status and observed conflict. Still, the level of conflict was in the predicted direction in that early maturing girls who are typically developing showed a greater increase in observed conflict than early maturing girls with spina bifida. These results are consistent with previous research which indicates that typically developing children, and not children with spina bifida, display increased family conflict associated with pubertal maturity (Coakley et al., 2002; Jandasek et al, 2009). It is noteworthy that the main effect of SB status and the interaction between SB status and pubertal timing was significant only for observed levels of conflict, not for mother or child report. However, child report of conflict was adjusted for its skewness, which could limit the variability of the scale and thus weaken the potential association.

The second pathway in this model predicted that parent-child conflict would be positively associated with increases in child depressive symptoms. Three separate methods of reporting parent-child conflict (child report, mother report, and observed interaction) were used to test this association. Contrary to the hypothesis and the previous literature, the relationship between conflict and increased depressive symptoms was found to be nonsignificant for all measures of parent-child conflict. Previous researchers have found associations between family conflict variables and depressive symptoms in children (Crawford et al., 2001; Herman-Stahl & Pertersen, 1999; Lewinsohn et al., 1998). However, this relationship also has been found to differ depending on gender and pubertal status (Patton et al., 2008). The expectation in this study was that conflict would be directly associated with increased depressive symptoms; thus, no potential moderators were explored. It is possible that conflict does not always predict increased depressive symptoms. Particularly because children with spina bifida tend to be more passive, they may avoid conflicts with their parents and still show greater depressive symptoms. Conversely, researchers have suggested that parent-child conflict can eventually lead to positive outcomes such as increased independence (Hill, 1998; Holmbeck, 1996; Smetana, Campione-Barr, & Metzger, 2006). This finding, or lack thereof, also could be attributed to methodological factors that were discussed above regarding the measure of child depressive symptoms.

Hypothesis III

The third hypothesis of this study explored the role of emotional distancing as a potential mediator of the relationship between the group status X pubertal timing interaction and increased depressive symptoms. However, the interaction effect was found to be nonsignificant; thus, emotional distancing could not be tested as a mediator of this effect. Even though the entire model was not supported, other pathways proposed in the mediated moderation model were examined.

The first pathway predicted that the association between pubertal timing and increased emotional distancing would depend on whether the participant has spina bifida. Specifically, it was expected that early pubertal timing and emotional distancing would be positively related for typically developing girls, but would be unrelated for girls with spina bifida. Additionally, pubertal timing was measured in two ways (objectively and subjectively). Results differed based on which measure of pubertal timing was used. When using the objective measure of pubertal timing, analyses revealed that the association between early pubertal timing and increased emotional distancing was nonsignificant for both groups. But for subjective pubertal timing, the interaction of early pubertal timing and group status was significant. These analyses suggested that the association between subjective pubertal timing and subsequent increased emotional distancing differs, depending on whether the child has spina bifida.

Contrary to the proposed model, follow up analyses revealed that there was no clear moderator in this interaction. The main effects of pubertal timing on increased emotional distancing were nonsignificant for both groups. However, the direction of the association between pubertal timing and increased emotional distancing depended on whether the participants had spina bifida. Specifically, girls who were early maturing reported an increase in emotional distancing if they were typically developing and a decrease in emotional distancing if they had spina bifida. Conversely, girls who were on-time or late reported decreased emotional distancing if they were typically developing and increased emotional distancing if they had spina bifida. Still, the early maturing, typically developing group reported the greatest increase in emotional distancing (see Figure 6). This crossed interaction suggests that early pubertal timing affects girls differently, depending on whether they have spina bifida. Researchers have suggested that early maturing girls may experience greater social stress because others expect them to act more socially mature than their same-aged peers. Furthermore, researchers have found that early maturing girls tend to engage in more delinquent behaviors, i.e. drinking and smoking (Ge et al., 1996; Haynie, 2003). Thus, it is possible that early maturing, typically developing girls engage in more delinquent behaviors with older peers and subsequently distance themselves from their parents. However, children with spina bifida tend to have fewer friends and social opportunities outside of school (Holmbeck et al., 2003). Therefore, it is possible that early maturing girls with spina bifida rely more on their parents for social and emotional support, engaging in more mature relationships with their parents instead of their peers.

It is interesting to note that the interaction between spina bifida status and pubertal timing on emotional distancing was significant only when including subjective pubertal timing (measured by mother report). It is possible that a mother's perception of her daughter's pubertal timing affects the closeness of their relationship more strongly than the actual physical development.

The second pathway in this model predicted that emotional distancing would be positively associated with increased child depressive symptoms. Contrary to the hypothesis and the previous literature, the relationship between emotional distancing and depressive symptoms was found to be nonsignificant. Previous researchers have found an association between greater emotional attachment and fewer depressive symptoms in children (Papini et al., 1991). However, the findings of this study did not support a similar relationship between increased emotional distancing and greater depressive symptoms. Some researchers have suggested that emotional distancing is a normative process in adolescent development that occurs as the child begins to rely more on peers than parents for emotional support (Holmbeck & Hill, 1991). It is possible that participants in this study had positive peer relationships and social support that buffered any negative effects of emotional distancing. Alternatively, it is possible that girls with lower levels of emotional distancing were engaged with their parents because they had poorer peer relationships and subsequently greater depressive symptoms.

Additionally, no research to date has examined the association emotional distancing and increased depressive symptoms in a pediatric population. Based on research with typically developing children, it was expected that emotional distancing would positively predict increased depressive symptoms; thus, no potential moderators were explored. However, it is possible that this association depends on other factors, such as level of peer support or spina bifida status. In addition, the limited variability of the depressive symptoms measure, as previously discussed, could have contributed to the lack of significant findings.

In sum, this study provided support for an interaction between pubertal timing and spina bifida status on levels of observed mother-daughter conflict and emotional distancing. More specifically, typically developing girls who are early maturing showed the greatest increase in observed mother-daughter conflict and emotional distancing. Because an increase in parent-child conflict coincided with an increase in emotional distancing for the same group, it is possible that there is some association between the two constructs. For example, as parent-child conflict increases, the child may distance herself from the parent. However, when looking at simple correlations, there is no significant correlation between emotional distancing and observed conflict. Unfortunately, the relationship between these two constructs was not further explored in this study. Thus, no conclusions can be made about the relationship between observed conflict and emotional distancing. The findings of this study did not succeed in deepening our understanding of what might predict increases in depressive symptoms in children with and without spina bifida. Nonetheless, several factors were identified that suggest that the psychosocial implications of early pubertal maturation differ for girls with and without spina bifida. The findings of this study were particularly noteworthy, because the significant influences of pubertal timing and spina bifida status on mother-daughter dynamics were found across reporters, methods, and time points.

Study Limitations and Future Directions

There are several limitations in the current study that could be improved upon in future research on pubertal timing, parent-child conflict, emotional distancing, and depressive symptoms in children with and without spina bifida. First, the study's small sample size limited the statistical power. Thus, the analyses in this study could detect only large effects. Because the study was longitudinal in nature and all outcome variables were controlled for at the previous time point, it is possible that the effect sizes were small. Future researchers could benefit from a larger sample size that would allow them to detect smaller effects. While it is difficult to obtain a large sample size in a pediatric population, this could be achieved by collaborating across multiple sites.

Another limitation of the current study was the failure to recruit more diverse participants, as the majority of participants were Caucasian. This is especially important for future research of children with spina bifida considering the high rate of spina bifida in Hispanic populations (Lary & Edmonds, 1996). Thus, the findings of this study may not generalize to the larger population of children with spina bifida. As well, the psychosocial implications of spina bifida are unique to this population and the findings of this study may not generalize to other pediatric populations.

While this study did incorporate longitudinal analyses, the time frame was limited to early adolescence (ages 8-13). This earlier time period was chosen because of its relevance to pubertal development. However, depressive symptoms in people with spina bifida have been shown to escalate over the course of adolescence and into adulthood (Bellin, Zabel, Dicianno, Levey, Garver, Linroth, & Braun, 2010). Thus, it is important for future research in this area to explore depressive symptoms over a larger period of time. As researchers move forward in evaluating the longitudinal relationship between pubertal development and depressive symptoms, it is important to explore whether this relationship is more relevant to one group than another (moderators) and what other factors might underlie this relationship (mediators).

Future research also could improve upon the standardization of the measurement of pubertal timing. In the current literature, different pubertal timing measures are used across studies. The current study found differing results for two measures of pubertal timing: age of first menarche and mother report of pubertal timing. Because different measurements of pubertal timing can elicit different results, it is difficult to compare findings across studies. Thus, it is important for future research in this area to move toward a more standardized way of defining and measuring pubertal timing.

In addition, the results of this study did not support any findings for predictors of increased depressive symptoms. While it is often found in the literature that the rate of depression increases over the course of adolescence (Costello, Erkanli, & Angold, 2006; Kessler & Walters, 1998; Lewinsohn et al., 1998), it is not well understood what causes this increase. Thus, future studies could improve the current literature by using longitudinal designs to determine what factors might predict an increase in depressive symptoms.

Clinical Implications

There are several suggestions for working with this population that can be made based on the current findings. Results suggest that typically developing girls who are early maturing experience the greatest increase in mother-child conflict and emotional distancing over the course of late childhood (age 8-11). Thus, clinicians working with girls who are early in their pubertal development should screen for these issues in the mother-daughter relationship. Interventions for early maturing girls and their parents could focus on preserving the parent-child relationship and effective communication skills. Conley & Rudolph (2009) found that early maturation was a predictor of depressive symptoms, particularly in the context of stressful peer relationships. If the parent-child relationship remains positive, then stressful peer relationships may not have such a significant effect on depressive symptoms.

Several suggestions also can be made for clinicians working with girls with spina bifida. First, findings suggest that early pubertal timing does not have the same negative implications for girls with spina bifida as it does for typically developing girls. Early maturing girls with spina bifida exhibit less increases in mother-daughter conflict and emotional distancing than their typically developing peers. Perhaps clinicians can utilize this secure mother-daughter relationship in working with children with spina bifida. This secure relationship may be particularly useful in encouraging the dyad to work together in managing medical issues associated with spina bifida.

On the other hand, some researchers have suggested that increased conflict can result in positive outcomes like increased autonomy. If children with spina bifida are not engaging in conflict to promote their independence, then it is important for clinicians to evaluate how/if the child is becoming independent. Emotional distancing also can have some positive implications such as closer peer relationships. In the current study, early maturing girls with spina bifida reported the lowest increase in emotional distancing. While this finding suggests that girls with spina bifida maintain a close relationship with their parents, it also is possible that peer relationships are consequently less well developed. Thus, clinicians should monitor peer relationships as a possible area of intervention.

APPENDIX A:

QUESTIONNIARE MEASURES,

IN ALPHABETICAL ORDER

Child Behavior Checklist:

Below is a list of items that describe children and youth. For each item that describes your child **now or within the past 6 months**, please circle the **2** if the item is **very true** or **often true** of your child. Circle the **1** if the item is **somewhat** or **sometimes true** of your child. If the item is **not true** of your child, circle the **0**. Please answer all items as well as you can, even if some do not seem to apply to your child.

0 = Not True (as far as you know) 1 = Somewhat or Sometimes True 2 = Very True or Often True

0 1 2 1. Acts too young for his/her age
0 1 2 2. Allergy (describe): ______
0 1 2 3. Argues a lot
0 1 2 4. Asthma
0 1 2 5. Behaves like opposite sex
0 1 2 6. Bowel movements outside toilet
0 1 2 7. Bragging, boasting
0 1 2 8. Can't concentrate, can't pay attention for long
0 1 2 9. Can't get his/her mind off certain thoughts; obsessions (describe): ______
0 1 2 10. Can't sit still, restless, or hyperactive
0 1 2 11. Clings to adults or too dependent
0 1 2 12. Complains of loneliness
0 1 2 13. Confused or seems to be in a fog
0 1 2 14. Cries a lot
0 1 2 15. Cruel to animals
0 1 2 16. Cruelty, bullying, or meanness to others
0 1 2 17. Day-dreams or gets lost in his/her thoughts
0 1 2 18. Deliberately harms self or attempts suicide
0 1 2 19. Demands a lot of attention
0 1 2 20. Destroys his/her own things
0 1 2 21. Destroys things belonging to his/her family or others
0 1 2 22. Disobedient at home
0 1 2 23. Disobedient at school
0 1 2 24. Doesn't eat well
0 1 2 25. Doesn't get along with other kids
0 1 2 26. Doesn't seem to feel guilty after misbehaving
0 1 2 27. Easily jealous
0 1 2 28. Eats or drinks things that are not food—*don't* include sweets (describe): ______
0 1 2 29. Fears certain animals, situations, or places, other than school (describe): ______
0 1 2 30. Fears going to school

0 1 2 31. Fears he/she might think or do something bad
0 1 2 32. Feels he/she has to be perfect
0 1 2 33. Feels or complains that no one loves him/her
0 1 2 34. Feels others are out to get him/her
0 1 2 35. Feels worthless or inferior
0 1 2 36. Gets hurt a lot, accident-prone
0 1 2 37. Gets in many fights
0 1 2 38. Gets teased a lot
0 1 2 39. Hangs around with others who get in trouble
0 1 2 40. Hears sounds or voices that aren't there (describe): ______
0 1 2 41. Impulsive or acts without thinking
0 1 2 42. Would rather be alone than with others
0 1 2 43. Lying or cheating
0 1 2 44. Bites fingernails
0 1 2 45. Nervous, highstrung, or tense
0 1 2 46. Nervous movements or twitching (describe): ______
0 1 2 47. Nightmares
0 1 2 48. Not liked by other kids
0 1 2 49. Constipated, doesn't move bowels
0 1 2 50. Too fearful or anxious
0 1 2 51. Feels dizzy
0 1 2 52. Feels too guilty
0 1 2 53. Overeating
0 1 2 54. Overtired
0 1 2 55. Overweight

56. Physical problems without known medical cause:
0 1 2 a. Aches or pains (*not* headaches)
0 1 2 b. Headaches
0 1 2 c. Nausea, feels sick
0 1 2 d. Problems with eyes (describe): ______
0 1 2 e. Rashes or other skin problems
0 1 2 f. Stomachaches or cramps
0 1 2 g. Vomiting, throwing up
0 1 2 h. Other (describe): ______

0 = Not True (as far as you know) 1 = Somewhat or Sometimes True 2 = Very True or Often True

0 1 2 57. Physically attacks people

0 1 2 58. Picks nose, skin, or other parts of body (describe): ______

0 1 2 59. Plays with own sex parts in public

0 1 2 60. Plays with own sex parts too much

0 1 2 61. Poor school work

0 1 2 62. Poorly coordinated or clumsy

0 1 2 63. Prefers being with older kids

0 1 2 64. Prefers being with younger kids

0 1 2 65. Refuses to talk

0 1 2 66. Repeats certain acts over and over; compulsions (describe): ______

0 1 2 67. Runs away from home

0 1 2 68. Screams a lot

0 1 2 69. Secretive, keeps things to self

0 1 2 70. Sees things that aren't there (describe): ______

0 1 2 71. Self-conscious or easily embarrassed

0 1 2 72. Sets fires

0 1 2 73. Sexual problems (describe): ______

0 1 2 74. Showing off or clowning

0 1 2 75. Shy or timid

0 1 2 76. Sleeps less than most kids

0 1 2 77. Sleeps more than most kids during day and/or night (describe): ______

0 1 2 78. Smears or plays with bowel movements

0 1 2 79. Speech problem (describe): ______

0 1 2 80. Stares blankly

0 1 2 81. Steals at home

0 1 2 82. Steals outside the home

0 1 2 83. Stores up things he/she doesn't need (describe): ______

0 1 2 84. Strange behavior (describe): ______

0 1 2 85. Strange ideas (describe): ______

0 1 2 86. Stubborn, sullen, or irritable

0 1 2 87. Sudden changes in mood or feelings

0 1 2 88. Sulks a lot

0 1 2 89. Suspicious

0 1 2 90. Swearing or obscene language

0 1 2 91. Talks about killing self

0 1 2 92. Talks or walks in sleep (describe): ______

0 1 2 93. Talks too much

0 1 2 94. Teases a lot

0 1 2 95. Temper tantrums or hot temper

0 1 2 96. Thinks about sex too much

0 1 2 97. Threatens people

0 1 2 98. Thumb-sucking

0 1 2 99. Too concerned with neatness or cleanliness

0 1 2 100. Trouble sleeping (describe): ______

0 1 2 101. Truancy, skips school

0 1 2 102. Underactive, slow moving, or lacks energy

0 1 2 103. Unhappy, sad, or depressed

0 1 2 104. Unusually loud

0 1 2 105. Uses alcohol or drugs for nonmedical purposes (describe): ______

0 1 2 106. Vandalism

0 1 2 107. Wets self during the day

0 1 2 108. Wets the bed

0 1 2 109. Whining

0 1 2 110. Wishes to be of opposite sex

0 1 2 111. Withdrawn, doesn't get involved with others

0 1 2 112. Worries

113. Please write in any problems your child has that were not listed above:

0 1 2 ______

0 1 2 ______

0 1 2 ______

PLEASE BE SURE YOU HAVE ANSWERED ALL ITEMS. UNDERLINE ANY YOU ARE CONCERNED ABOUT.

Child Depression Inventory:

CD INVENTORY

KIDS SOMETIMES HAVE DIFFERENT FEELINGS AND IDEAS.

THIS FORM LISTS THE FEELINGS AND IDEAS IN GROUPS. FROM EACH GROUP, PICK ONE SENTENCE THAT DESCRIBES YOU BEST FOR THE PAST TWO WEEKS. AFTER YOU PICK A SENTENCE FROM THE FIRST GROUP, GO ON THE THE NEXT GROUP.

THERE IS NO RIGHT ANSWER OR WRONG ANSWER. JUST PICK THE SENTENCE THAT BEST DESCRIBES THE WAY YOU HAVE BEEN RECENTLY. PUT A MARK LIKE THIS "X" NEXT TO YOUR ANSWER. PUT THE MARK ON THE LINE NEXT TO THE SENTENCE THAT YOU PICK.

HERE IS AN EXAMPLE OF HOW THIS FORM WORKS. TRY IT. PUT A MARK NEXT TO THE SENTENCE THAT DESCRIBES YOU BEST.

EXAMPLE:

_____ I READ BOOKS ALL THE TIME

_____ I READ BOOKS ONCE IN A WHILE

_____ I NEVER READ BOOKS

REMEMBER, PICK OUT THE SENTENCES THAT DESCRIBE YOUR FEELINGS AND IDEAS IN THE PAST TWO WEEKS.

1. ____ I AM SAD ONCE IN A WHILE
   ____ I AM SAD MANY TIMES
   ____ I AM SAD ALL THE TIME

2. ____ NOTHING WILL EVER WORK OUT FOR ME
   ____ I AM NOT SURE IF THINGS WILL WORK OUT FOR ME
   ____ THINGS WILL WORK OUT FOR ME O.K.

3. ____ I DO MOST THINGS O.K.
   ____ I DO MANY THINGS WRONG
   ____ I DO EVERYTHING WRONG

4. ____ I HAVE FUN IN MANY THINGS
   ____ I HAVE FUN IN SOME THINGS
   ____ NOTHING IS FUN AT ALL

5. ____ I AM BAD ALL THE TIME
   ____ I AM BAD MANY TIMES
   ____ I AM BAD ONCE IN A WHILE

6. ____ I THINK ABOUT BAD THINGS HAPPENING TO ME ONCE IN A WHILE
   ____ I WORRY THAT BAD THINGS WILL HAPPEN TO ME
   ____ I AM SURE THAT TERRIBLE THINGS WILL HAPPEN TO ME

REMEMBER, PICK OUT THE SENTENCES THAT DESCRIBE YOUR FEELINGS AND IDEAS IN THE PAST TWO WEEKS.

7. ____ I HATE MYSELF
   ____ I DO NOT LIKE MYSELF
   ____ I LIKE MYSELF

8. ____ ALL BAD THINGS ARE MY FAULT
   ____ MANY BAD THINGS ARE MY FAULT
   ____ BAD THINGS ARE NOT USUALLY MY FAULT

9. ____ I DO NOT THINK ABOUT KILLING MYSELF
   ____ I THINK ABOUT KILLING MYSELF BUT I WOULD NOT DO IT
   ____ I WANT TO KILL MYSELF

10. ____ I FEEL LIKE CRYING EVERYDAY
    ____ I FEEL LIKE CRYING MANY DAYS
    ____ I FEEL LIKE CRYING ONCE IN A WHILE

11. ____ THINGS BOTHER ME ALL THE TIME
    ____ THINGS BOTHER ME MANY TIMES
    ____ THINGS BOTHER ME ONCE IN A WHILE

12. ____ I LIKE BEING WITH PEOPLE
    ____ I DO NOT LIKE BEING WITH PEOPLE MANY TIMES
    ____ I DO NOT WANT TO BE WITH PEOPLE AT ALL

REMEMBER, PICK OUT THE SENTENCES THAT DESCRIBE YOUR FEELINGS AND IDEAS IN THE PAST TWO WEEKS.

13.____I CANNOT MAKE UP MY MIND ABOUT THINGS
____IT IS HARD TO MAKE UP MY MIND ABOUT THINGS
____I MAKE UP MY MIND ABOUT THINGS EASILY

14.____I LOOK O.K.
____THERE ARE SOME BAD THINGS ABOUT MY LOOKS
____I LOOK UGLY

15.____I HAVE TO PUSH MYSELF ALL THE TIME TO DO MY SCHOOLWORK
____I HAVE TO PUSH MYSELF MANY TIMES TO DO MY SCHOOLWORK
____DOING SCHOOLWORK IS NOT A BIG PROBLEM

16.____I HAVE TROUBLE SLEEPING EVERY NIGHT
____I HAVE TROUBLE SLEEPING MANY NIGHTS
____I SLEEP PRETTY WELL

17.____I AM TIRED ONCE IN A WHILE
____I AM TIRED MANY DAYS
____I AM TIRED ALL THE TIME

18.____MOST DAYS I DO NOT FEEL LIKE EATING
____MANY DAYS I DO NOT FEEL LIKE EATING
____I EAT PRETTY WELL

REMEMBER, PICK OUT THE SENTENCES THAT DESCRIBE YOUR FEELINGS AND IDEAS IN THE PAST TWO WEEKS.

19.____I DO NOT WORRY ABOUT ACHES AND PAINS
____I WORRY ABOUT ACHES AND PAINS MANY TIMES
____I WORRY ABOUT ACHES AND PAINS ALL THE TIME

20.____I DO NOT FEEL ALONE
____I FEEL ALONE MANY TIMES
____I FEEL ALONE ALL THE TIME

21.____I NEVER HAVE FUN AT SCHOOL
____I HAVE FUN AT SCHOOL ONLY ONCE IN A WHILE
____I HAVE FUN AT SCHOOL MANY TIMES

22.____I HAVE PLENTY OF FRIENDS
____I HAVE SOME FRIENDS BUT I WISH I HAD MORE
____I DO NOT HAVE ANY FRIENDS

23.____MY SCHOOLWORK IS ALL RIGHT
____MY SCHOOLWORK IS NOT AS GOOD AS BEFORE
____I DO VERY BADLY IN SUBJECTS I USED TO BE GOOD IN

24.____I CAN NEVER BE AS GOOD AS OTHER KIDS
____I CAN BE AS GOOD AS OTHER KIDS IF I WANT TO
____I AM JUST AS GOOD AS OTHER KIDS

REMEMBER, PICK OUT THE SENTENCES THAT DESCRIBE YOUR FEELINGS AND IDEAS IN THE PAST TWO WEEKS.

25.____ NOBODY REALLY LOVES ME

____ I AM NOT SURE IF ANYBODY LOVES ME

____ I AM SURE THAT SOMEBODY LOVES ME

26.____ I USUALLY DO WHAT I AM TOLD

____ I DO NOT DO WHAT I AM TOLD MOST TIMES

____ I NEVER DO WHAT I AM TOLD

27.____ I GET ALONG WITH PEOPLE

____ I GET INTO FIGHTS MANY TIMES

____ I GET INTO FIGHTS ALL THE TIME

Emotional Autonomy Scale:

EA-M

Please read each of these statements about your MOTHER. Indicate how much you agree with each statement by using the scale below.

Strongly Agree	Agree Somewhat	Disagree Somewhat	Strongly Disagree
1	2	3	4

1................2..................3..................4

______ I wish my mother would understand who I really am.

______ My mother hardly ever makes mistakes.

______ My mother and I agree on everything.

______ I go to my mother for help before trying to solve a problem myself.

______ Even when my mother and I disagree, my mother is always right.

______ It's better for kids to go to their best friend than to their mother for advice.

______ Whenever I've done something wrong, I depend on my mother to straighten things out for me.

______ There are some things about me that my mother doesn't know.

______ My mother knows everything there is to know about me.

______ I try to have the same opinions as my mother.

______ If I was having a problem with one of my friends, I would discuss it with my mother before deciding what to do about it.

______ My mother would be surprised to know what I'm like when I'm not with her.

______ When I become a parent, I'm going to treat my children in exactly the same way that my mother has treated me.

______ There are things that I will do differently from my mother when I become a parent.

Parent Adolescent Conflict Scale:

PAC-C

Below is a list of things that sometimes get talked about at home. We would like you to look carefully at each topic on the left-hand side of the page and decide whether you and one of your parents have talked together about that topic at all during the last 2 weeks. If you have discussed the topic, then tell us how many times you discussed the topic and how HOT the discussions were.

	Did you and a parent discuss this topic in the last 2 weeks? (CIRCLE ONE)		If YES, how many times did you discuss it?	If YES, how HOT were these discussions? Calm		A little angry		Angry
1. Whether I do chores around the house.	YES	NO	________	1	2	3	4	5
2. When I have to do my homework.	YES	NO	________	1	2	3	4	5
3. How much time I have to spend on homework each day.	YES	NO	________	1	2	3	4	5
4. What time I have to be home.	YES	NO	________	1	2	3	4	5
5. How I spend my own money.	YES	NO	________	1	2	3	4	5
6. What sorts of clothes I wear to school.	YES	NO	________	1	2	3	4	5
7. Which friends I spend time with.	YES	NO	________	1	2	3	4	5
8. What time I have to go to sleep on school nights.	YES	NO	________	1	2	3	4	5
9. How I spend my time after school.	YES	NO	________	1	2	3	4	5
10. Whether I have to let my parents know where I am when I go out.	YES	NO	________	1	2	3	4	5
11. Whether I can have friends over when my parents aren't home.	YES	NO	________	1	2	3	4	5
12. Whether I have to go on family visits or outings.	YES	NO	________	1	2	3	4	5
13. What I can watch on television.	YES	NO	________	1	2	3	4	5
14. How much time I spend with my friends.	YES	NO	________	1	2	3	4	5
15. What clubs or hobbies I am involved with.	YES	NO	________	1	2	3	4	5

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The final copies have been examined by the director of the thesis and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the thesis is now given final approval by the committee with reference to content and form.

The thesis is therefore accepted in partial fulfillment of the requirements for the degree of Master of Arts.

10-21-10

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