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## Examining the interaction of parental involvement and parenting style in predicting adherence in youth with type 1 diabetes

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### Abstract

**Introduction**—This study examined whether aspects of parenting style (specifically, warmth, autonomy support, and coercion) moderated the association between parental involvement and adherence in youth with type 1 diabetes.

**Methods**—Children ages 8–16 years with type 1 diabetes and a parent completed assessments of parental involvement, parenting style, and adherence.

**Results**—Parent autonomy support and coercion were associated with adherence but warmth was not. Child report of more parental involvement was associated with better adherence. Warmth, autonomy support, and coercion were not moderators.

**Discussion**—The findings underscore the importance of parental involvement, operationalized as responsibility for diabetes tasks, and parenting style, specifically coercion and autonomy support, for adherence in pediatric chronic illness management. Longitudinal research is needed to better understand how and why dimensions of involvement (e.g., responsibility, monitoring, support) vary over time and whether they impact outcomes differentially.

### Keywords

Adherence; chronic illness; diabetes; parental involvement; parenting style

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Youth with type 1 diabetes (T1D) face the daunting task of managing a complex medical regimen on a daily basis. A key factor in adhering to this regimen is parental involvement, a term used to capture behaviors such as physically assisting children with disease management tasks, supervising, and showing support. The prevailing notion amongst researchers is that children and adolescents benefit physically and emotionally from this involvement. In the T1D literature, numerous aspects of parental involvement, including performing blood glucose checks and administering insulin (Anderson, Ho, Brackett, Finkelstein & Laffel, 1997), monitoring illness-related tasks (Berg et al., 2008; Ellis et al., 2007; Palmer et al., 2011), and sharing responsibility for diabetes care (Ingerski et al., 2010; Vesco et al., 2010) have been associated with improved adherence in adolescents, while sharing responsibility has also been associated with improved adherence in studies including

both children and adolescents (Anderson et al., 2002). Prior research has demonstrated that parents are most involved when children are young, and that during the transition through adolescence, parental involvement (e.g., behavioral involvement; monitoring) declines while adherence worsens (King et al., 2014; Wu et al., 2014).

Despite the evidence presented, there are a myriad of findings that challenge the seemingly direct relationship between parental involvement and treatment adherence. One study that sampled young adolescents ages 10–14 years reported that greater parent responsibility for diabetes management was associated with worse adherence (Helgeson, Reynolds, Siminerio, Escobar, & Becker, 2008). Another study examined a slightly younger age group (ages 9–12 years) and found no significant relationship between paternal involvement, defined as assistance with T1D-related tasks, and blood glucose monitoring frequency (Hilliard et al., 2011). Wiebe et al. (2005) found no relationship between maternal responsibility for T1D-related tasks and adherence in a sample of youth ages 10–15 years. In a sample of young adolescents, Berg et al. (2011) found no association between parental frequency of help and adherence but significant positive associations between diabetes-related monitoring and adherence. When considering possible explanations for these mixed findings, researchers have pointed to several factors. Wiebe et al. (2014) suggest that the decline in parental involvement during adolescence may not necessarily *predict* a decline in adherence, though they often occur around the same time. The authors assert that the transfer of responsibility from parents to children can be problematic if it occurs before children are ready and that studies have not thoroughly explored when, how, and under what conditions that transfer should take place. A second insight comes from Palmer et al. (2011), who acknowledge the varied ways in which parental involvement has been measured. While some researchers operationalize involvement using singular constructs such as responsibility or monitoring, others use composite variables that capture numerous facets of involvement. Thus, the constructs being measured and the instruments measuring them differ from one study to the next, making it difficult to determine which aspects of involvement are related to adherence.

Although each of the factors described above may contribute to the mixed findings, it is also likely that the relationship between parental involvement and adherence is dependent upon parenting style. Skinner, Johnson, and Snyder (2005) posit that parenting styles are made up of a combination of the six core dimensions of warmth, rejection, structure, chaos, autonomy support, and coercion. While a parent's degree of involvement may vary from one situation to the next, parenting style tends to be consistent across domains and dictate the overarching tone of parent-child encounters (Darling & Steinberg, 1993). Thus, parenting style may positively or negatively affect the relationship between a parent's involvement and the child's illness management. Warm and accepting parenting has been correlated with more positive outcomes in children with T1D (Butler, Skinner, Gelfand, Berg, & Wiebe, 2007; Davis et al., 2001; Wiebe et al., 2005), while the use of coercive strategies, such as restrictive or punitive disciplinary measures to assert control over children's actions, has been identified as having a negative effect on health and well-being (Duke et al., 2008; Patton, Dolan, & Powers, 2006). Because coercive parenting can be so detrimental, it stands to reason that a coercive parent who is heavily involved in his or her child's illness management might have more of a negative effect on the child than one who is largely

hands-off. Therefore, it is possible that children with equally involved parents might have different illness management experiences based on specific factors related to parenting style.

The findings outlined above highlight the need for parents to stay involved in children's illness management in a supportive, developmentally-appropriate way that respects the child's increasing need for autonomy while ensuring the effective management of serious medical conditions. Information about the interaction between parental involvement and parenting style in predicting adherence may shed light on how best to approach this complex task. Anderson (2011) explicitly suggests considering parenting style as a moderator of the relationship between involvement and adherence, but to our knowledge, this interaction has not been tested. Young et al. (2014) provide a comprehensive review of the studies that have addressed the significance of both the quantity (e.g. degree of involvement) and quality (e.g. style) of parental participation in diabetes management, but the majority of these studies drew insights based on main effects rather than interactions between variables. Of the handful of studies that have addressed the possibility of an interaction between involvement and style, some have conflated the two variables (Ellis et al., 2007; Palmer et al., 2011; Wiebe et al., 2005), which makes it impossible to determine which factors are driving the interaction. Other studies have assessed aspects of both parenting style and parental involvement but did not examine the interaction between them (King et al., 2014; Wu et al., 2014). Although each of these studies provides support for the hypothesis that the context in which parental involvement occurs is important for effective illness management, none focus specifically on parsing out involvement from style and studying the interactions between them in predicting adherence. Since children's health and well-being can be heavily influenced by parents, it is essential to tease out these factors and explore their effect on adherence to identify the optimal form of parental involvement in diabetes management.

For the present study, we examined both main effects of parental involvement and aspects of parenting style on adherence, as well as the interaction of involvement and parenting style, in 8–16 year olds with T1D. We conceptualized parental involvement as the degree of responsibility for illness-related tasks, which is cited as a commonly used method of measuring involvement (Wiebe et al., 2005; Young et al., 2014) and is similar to the approach taken by Anderson et al. (1997) and Leonard, Garwick, and Adwan (2005). For the main effects we hypothesized that more parental involvement, warmth, and autonomy support and lower coercion would be associated with better adherence. We also hypothesized that parenting style would moderate the association between parental involvement and adherence, such that involvement would be most strongly associated with adherence when warmth and autonomy support were high and coercion was low.

## Methods

This paper represents a secondary analysis of baseline data from a longitudinal study examining how youth with either T1D or cystic fibrosis collaborate with their parents to manage the transition to greater decision making independence. For the T1D sample, families were recruited from an endocrinology clinic at a tertiary children's hospital in the Northeast from October 2011 to June 2013. Eligibility criteria stated that children must be between the ages of 8–16 years old, have a diagnosis of T1D for at least one year, and be

capable of completing questionnaires for at least one hour. Children were excluded if they had a history of a pervasive developmental disorder or intellectual disability, had a psychiatric hospitalization in the past year, had any other illnesses (not related to T1D) which required daily treatment for greater than six months of the last year, did not live with or stay in contact with a biological or adoptive parent for at least 50% of the week, or if they and/or their parent did not speak English. One parent and child per family were eligible to participate.

Of the 243 families contacted and assessed for eligibility (including youth with either T1D or cystic fibrosis), 214 parent-child dyads were eligible to participate in our study. Of these, 210 (98%) agreed to participate, but 13 (6.2%) could not be scheduled or reached again, 20 (9.5%) did not show up for their scheduled appointments, and four (1.9%) declined in person. Of the 173 (84.2%) dyads who agreed to participate in the study, four (2.3%) did not fully complete Visit 1 and an additional two dyads (1.2%) were withdrawn after finding they did not meet eligibility criteria. The final sample was comprised of 167 parent-child dyads (117 with T1D; 50 with CF) and did not differ from those who were eligible but not included in the sample ( $n = 45$ ) with respect to child age, sex, race, ethnicity, duration of diagnosis, or illness group. The 117 youth with T1D and their parents were the focus of the present analysis.

## Procedure

The study was approved by the institutional review board. Eligible families were met in conjunction with a scheduled clinic appointment or at another time of their choice. Research personnel provided a thorough overview of the study using developmentally appropriate language to ensure children's comprehension of study procedures. Once parental permission and child assent were obtained, researchers described the questionnaires and reviewed the instructions. Parents and children ages 11 and older independently completed the questionnaires, while researchers verbally administered questionnaires to children ages 8–10. After completing the questionnaires, each participant was given \$20 as compensation for their time and effort.

## Measures

**Parental Involvement**—Parents and children independently completed the 17-item Diabetes Family Responsibility Questionnaire (DFRQ; Anderson, Auslander, Jung, Miller, & Santiago, 1990), which assesses the extent to which parents and children take responsibility for various diabetes management tasks. The response options include: parent(s) take or initiate responsibility for a task almost all of the time, parent(s) and child share responsibility for the task about equally, or child takes or initiates responsibility for the task almost all the time. High scores indicate low parental involvement. The coefficient alpha was 0.78 for the child report and 0.80 for the parent report in our sample.

**Parenting Style**—Child participants completed the 24-item Parents as Social Context Questionnaire (PASCQ; Skinner, Johnson, & Snyder, 2005), which we used to assess how children perceived the parent who participated with them in the study with respect to six dimensions of parenting: autonomy support (e.g. “My parent lets me do the things I think are

important”), coercion (e.g. “My parent says ‘no’ to everything”), structure (e.g. “My parent explains the reasons for our family rules”), chaos (e.g. “My parent keeps changing the rules on me”), warmth (e.g. “My parent lets me know he/she loves me”), and rejection (e.g. “My parent makes me feel like I’m not wanted”). Participants could rate that each statement was 1= not at all true, 2= not very true, 3= sort of true, or 4= very true of the parent. We utilized the autonomy support, warmth, and coercion subscales for this analysis, because they are the more commonly studied aspects of parenting style in the context of pediatric T1D. Higher scores reflect more of the parenting behavior. Cronbach’s alpha was 0.61 for autonomy support, 0.75 for warmth, and 0.75 for coercion.

**Adherence**—Parents and children independently completed the 14-item Self Care Inventory (SCI; Greco et al., 1990), which evaluates the child’s adherence to various diabetes tasks over the past two weeks. The SCI is a well-established self-report measure of adherence that is applicable to youth on both pre-mixed and flexible insulin regimens (Lewin et al., 2009; Quittner et al., 2008). Participants were asked to rate the extent to which the child completed aspects of their treatment regimen (never; sometimes; mostly not; 50% of the time; usually; always) including glucose testing, administering insulin, carrying supplies, exercising, and ketone testing. Cronbach’s alpha was .69 for child report and .70 for parent report in our sample.

**Glycemic Control**—To characterize the sample, the study team conducted medical chart reviews within one week of the study visit to document HbA1C values, which measure average blood sugar control over three months.

## Data Analysis

We first examined the bivariate correlations among the primary variables to determine the strength of the associations among the pertinent variables. Hierarchical linear regression models were then used to test the hypotheses related to both main effects and moderation. To control for the potential multicollinearity between the interaction terms and other independent variables (i.e., the predictor and the moderator) in these models, the pertinent variables were centered prior to model fitting. In all regression models, the predictors were entered first as main effects, followed by the interaction term. The main effects were the tests of the hypothesis that greater parental involvement, more warmth, more autonomy support, and lower coercion would be associated with better adherence. The significance of the interaction term in each model was the test of the hypothesis that aspects of parenting style (warmth, autonomy support, and coercion) would moderate the relationship between parental involvement and adherence (Holmbeck, 2002). All analyses were run separately for the three potential moderators and for parent and child report of adherence. Furthermore, the reported results related to the final regression models were subjected to thorough examinations of the regression assumptions as well as model diagnoses, specifically multicollinearity. Two sided statistical tests with  $p < .05$  were considered significant.

## Results

### Participant Characteristics

Demographic and illness characteristics of the sample can be found in Table 1.

### Bivariate Correlations

As shown in Table 2, there was a strong association between child and parent report of parent involvement ( $r = .70, p < .0001$ ), suggesting that they would not provide unique information in predictive models. Furthermore, strong associations were found between youth age and both parent ( $r = .70, p < .0001$ ) and child ( $r = .67, p < .0001$ ) report of parent involvement. To avoid the potential of multicollinearity in our analysis, we focused on youth report of parent involvement and did not include youth age in the models.

### Regression Results

Results from the regression models predicting adherence are presented in Table 3 for parent report of adherence and in Table 4 for child report of adherence. Contrary to our hypothesis, none of the interaction terms testing warmth, autonomy support, and coercion as moderators were significant. As such, for each model the results of the prior step without the interaction terms are presented. Consistent with our hypothesis, higher coercion was associated with worse adherence according to both parent and child report. Higher autonomy support was associated with better adherence according to children but not parents. Contrary to our hypotheses, warmth was not associated with adherence in any of the models. Child report of more parental involvement was associated with better adherence according to parents, but parent report of their own involvement was not.

## Discussion

Our results highlight the significance of two aspects of parenting style, autonomy support and coercion, and parental involvement for adherence to treatment in children and adolescents with T1D. As expected, autonomy support was associated with higher child-reported adherence, and coercion was associated with worse adherence according to both children and parents. This is consistent with previous findings that overbearing, demanding parenting negatively affects children's health outcomes (Duke et al., 2008; Jaser and Grey, 2010). Other analyses based on the current dataset found that coercive parenting was higher in dyads that were unable to solve problems or make decisions about illness-related issues, in both T1D and cystic fibrosis (Friedrich, Jawad, & Miller, 2015). Coercive parenting strategies may decrease children's motivation or self-efficacy with respect to effective illness management, or parents may use such strategies in response to repeated instances of non-adherence. Regardless of the direction of effect, the use of coercive strategies could lead to an escalating cycle in which the child refuses to comply with parental demands and the parent eventually gives up (Duke et al., 2008; Granic & Patterson, 2006). In contrast, autonomy-supportive parenting, characterized by seeking children's opinions and offering choices, may enhance children's perception that they are capable of managing their regimen and increase the likelihood that they will complete T1D-related tasks in a timely manner. This style of parenting, which is likely to be especially receptive to increasing autonomy

needs during adolescence, may facilitate the effective transition to increased youth responsibility for illness management over time.

As expected, more parental involvement was associated with better adherence, similar to prior studies that have operationalized parental involvement as more responsibility for diabetes management tasks (Ingerski et al., 2010; Vesco et al., 2010; Anderson et al., 2002). Contrary to expectation, aspects of parenting style did not moderate this relationship. In other words, involvement and parenting style appear to have independent effects on adherence, such that parental responsibility for diabetes-related tasks is important regardless of the manner in which it occurs. It is also possible that other moderators are relevant but were not considered in the current analysis, such as self-efficacy for diabetes management. Palmer et al. (2009) found that more parental responsibility for diabetes tasks was associated with better glycemic control, but only when parents perceived their adolescents as low in self-efficacy.

Of note is that parental involvement, according to both parent and youth report, was highly correlated with age, which precluded inclusion of both variables in the predictive models of adherence. This finding is similar to prior research that has operationalized involvement as responsibility (Lancaster et al., 2015; Palmer et al., 2004; Palmer et al., 2009; Wiebe et al., 2005). Such a high correlation suggests that parents are gauging their level of involvement based primarily on the child's age. Reliance on age alone to determine the child's transition to greater responsibility may be problematic when the child does not have the appropriate skills or maturity to manage aspects of the regimen independently (Wysocki et al., 1996). Our longitudinal data, which includes measurement of variables such as cognitive development, psychosocial maturity, and diabetes self-efficacy, will be able to tease apart how parental involvement changes with these variables across development, similar to prior studies that have utilized longitudinal designs (e.g., Wiebe et al., 2014; Wu et al., 2014).

The limitations of this study include reliance on self-report measures, absence of data on blood glucose monitoring frequency, and the small sample size, especially for testing interactions. In addition, given the cross-sectional nature of the analysis, we cannot determine the direction of effects amongst the variables. The measure of parenting style we used was generic; we would expect the relationships between parenting style and adherence to be even stronger if a diabetes-specific parenting measure had been used. Furthermore, we operationalized parental involvement as responsibility for treatment-related tasks; we might have found different associations with adherence had we included measures of diabetes-related support or monitoring. Finally, the findings reported here reflect a secondary analysis of the baseline data for a longitudinal study addressing a different, albeit related, question. As such, the study was not designed (e.g., selection of measures) specifically to address the hypotheses related to parental involvement.

Although the clinical recommendation for parents to maintain their involvement in diabetes tasks is supported by the present study, this approach does not provide parents with specific ways to facilitate their child's management skills or manage instances of non-adherence, which are important for effective management in the long-term. It appears that aspects of parenting style, such as coercive strategies and autonomy support, play an important role in

ensuring adequate adherence in children with T1D. Clinically, it might be helpful for providers to ask parents and children about how they interact around illness-related issues and identify the use of coercive strategies. When there appears to be a reliance on such strategies, providers can assist parents with developing new strategies that support the child's growing autonomy and facilitate the assumption of effective management skills. For example, strategies such as asking for the child's opinion, validating the child's ideas, and giving reasons for one's own opinion characterize autonomy-supportive interactions (Beveridge and Berg, 2007) and were positively associated with adherence in the present study.

Future research should continue to flesh out dimensions of parental involvement (e.g., support, monitoring, responsibility) and determine if and how these dimensions of involvement are differentially associated with adherence over time. Longitudinal data are needed to identify trajectories of involvement, parenting style, and adherence and determine if there are bidirectional associations amongst them. When follow-up visits for this study are complete, we will be able to address some of these questions. Researchers should also strive towards standardizing terminology and measurement in the parental involvement literature. For example, it would be helpful to avoid using "parental involvement" as an umbrella term that encompasses a variety of different constructs. A consensus on both conceptualization and measurement would facilitate comparisons of findings across research studies and enhance the usefulness of empirical data for clinicians and parents, who utilize this literature to understand best practices in parenting in the context of T1D.

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**Table 1**

## Participant Characteristics

Variable	<i>n</i> (%) <sup>I</sup> or Mean ( <i>SD</i> ), range
Child age	12.87 (2.53) 8.14–16.97
Illness duration (years)	5.63 (3.53) 1.10–14.74
Child sex: Female	66 (56%)
Parent sex: Female	98 (84%)
Child race	
White	70 (59.83%)
African-American	29 (24.79%)
Asian	1 (0.85%)
Other	14 (11.97%)
Parent education	
Some high school	1 (0.85%)
Completed high school	15 (12.82%)
Some college or technical school after high school	40 (34.19%)
College graduate	34 (29.06%)
Some post-college graduate education	11 (9.40%)
Masters, PhD., MD, law degree, etc.	11 (9.40%)
Chart review data	
HbA1C	8.76 (1.49) 6.10–13.60

<sup>I</sup> Percentages do not always add up to 100% because of missing responses.

Table 2

## Bivariate Correlations among the Primary Variables

Variable	1	2	3	4	5	6	7
1. Youth age	-						
2. Autonomy support	-.07	-					
3. Coercion	.26**	-.50***	-				
4. Warmth	-.15	.51***	-.31**	-			
5. Parent involvement (child report)	.67***	-.02	.17	-.22*	-		
6. Parent involvement (parent report)	.70***	-.07	.20*	-.29**	.70***	-	
7. Adherence (child report)	-.22*	.24*	-.39***	.04	-.13	-.07	-
8. Adherence (parent report)	-.24**	.12	-.33**	.18	-.29**	-.12	.35***

Note. Correlations are based on Spearman-rho. For parent involvement, high scores indicate low involvement.

\*  $p < .05$ ,

\*\*  $p < .01$ ,

\*\*\*  $p < .0001$

**Table 3**

Multiple Regression Results for Parenting Style and Parental Involvement as Predictors of Parent Report of Adherence

Step and Variable	B	$\beta$	95% CI for B	
			Lower Bound	Upper Bound
Model 1 (Adj. $R^2 = .07$ ; $F(2) = 5.02^{**}$ )				
1. Autonomy support	.06	.03	-.13	-.25
2. Child report of parental involvement	-.40 <sup>**</sup>	-.12	-.65	-.13
Model 2 (Adj. $R^2 = .15$ ; $F(2) = 11.04^{***}$ )				
1. Coercion	-.19 <sup>**</sup>	-.13	-.30	-.08
2. Child report of parental involvement	-.33 <sup>**</sup>	-.10	-.58	-.09
Model 3 (Adj. $R^2 = .07$ ; $F(2) = 5.16^{**}$ )				
1. Warmth	.08	.03	-.11	.27
2. Child report of parental involvement	-.38 <sup>**</sup>	-.12	-.64	-.12

Note.

\*  $p < .05$ ,

\*\*  $p < .01$ ,

\*\*\*  $p < .0001$

**Table 4**

Multiple Regression Results for Parenting Style and Parental Involvement as Predictors of Child Report of Adherence

Step and Variable	B	$\beta$	95% CI for B	
			Lower Bound	Upper Bound
Model 1 (Adj. $R^2$ = .06; $F(2)$ = 4.39 <sup>*</sup> )				
1. Autonomy support	.25 <sup>*</sup>	.10	.05	.44
2. Child report of parental involvement	-.17	-.05	-.43	.09
Model 2 (Adj. $R^2$ = .17; $F(2)$ = 12.28 <sup>***</sup> )				
1. Coercion	-.26 <sup>***</sup>	-.18	-.37	-.15
2. Child report of parental involvement	-.11	-.04	-.36	.13
Model 3 (Adj. $R^2$ = .01; $F(2)$ = 1.45)				
1. Warmth	.07	.03	-.14	.27
2. Child report of parental involvement	-.19	-.06	-.46	.07

Note.

\*  $p < .05$ ,

\*\*  $p < .01$ ,

\*\*\*  $p < .0001$