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## Correlates of Problem Resolution during Parent-Child Discussions about Chronic Illness Management

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### Abstract

Families impacted by pediatric chronic illness must navigate treatment regimens that can present multiple problems and decisions to be addressed on a daily basis. The extent to which parents and children are able to solve such problems is likely to have implications for health behaviors and outcomes. The aims of this study were to examine correlates of problem resolution in families of children with a chronic illness. Participants were 167 children (ages 8-16) with type 1 diabetes or cystic fibrosis and a parent. Parent-child dyads recounted a recent discussion they had related to illness management and completed questionnaires. The research team coded the discussions for topic and outcome (i.e., did the dyad come up with a plan to address the problem). The results indicated that the majority of dyads in both illness groups came up with a plan during their discussions. Lack of problem resolution during the discussion was associated with higher parent coercion, more child resistance to the regimen, and worse adherence. Parent coercion and child resistance could be the targets of interventions to enhance problem solving and improve adherence.

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Parents and children impacted by pediatric chronic illnesses, such as type 1 diabetes (T1D) and cystic fibrosis (CF), must navigate complex treatment regimens and discuss decisions and problems that arise when managing the illness in everyday life. The treatment regimen for CF can include symptom monitoring, chest physiotherapy, aerosol breathing treatments, prophylactic antibiotics, pancreatic enzyme replacement, and increased caloric intake (Stark, Mackner, Patton, & Acton, 2003). The management of T1D requires children to monitor symptoms, test blood sugars, and adjust diet, physical activity and insulin doses to maintain optimal glucose levels (Seiffge-Krenke, 2002). Adequate adherence is necessary for effectively managing symptoms and preventing negative short- and long-term health consequences of each illness (DCCT Research Group, 1993, 1994). Potential barriers to adherence are many and include forgetfulness, lack of organization, peer issues (e.g., embarrassment, stigma), lack of support from parents, family conflict, desire to achieve normalcy, side effects of treatments, treatment complexity/burden, low perceived benefit of medications, and mood/anxiety problems (George et al., 2010; Hanghoj & Boisen, 2014;

Modi & Quittner, 2006). Challenges also can arise when treatment tasks conflict with other individual or family activities and responsibilities (e.g., when the child has a sleepover).

The ability to address barriers and solve problems related to illness management may be related to better adherence and improved health outcomes and may enhance children's perceptions that they can manage the illness independently as they mature (Holmes et al., 2006). Family problem solving is especially relevant in this context, because of the role that parents play in managing the illness; this role ideally shifts from primary responsibility when the child is younger to a supportive role when the child is older. Despite its potential relevance, only a handful of studies have examined family problem solving. For example, youth hospitalized for diabetic ketoacidosis (DKA) had less effective family problem solving according to youth report, compared to clinic controls (Liss et al., 1998). In an observed family problem solving task, decreased use of the steps of problem solving in an observed task was associated with worse metabolic control in youth with T1D (K. Carlson, Gesten, McIver, DeClue, & Malone, 1994). Furthermore, a study testing an intervention focused on family problem-solving and communication yielded promising results with respect to impact on glycemic control (Carpenter, Price, Cohen, Shoe, & Shroff Pendley, 2014). On the other hand, in one study of adolescents with CF, CF-related problem solving skill based on an observed family interaction was not associated with adherence after accounting for observed relationship quality (DeLambo, Ievers-Landis, Drotar, & Quittner, 2004). Lacking in prior research is an examination of factors that make it more or less likely that families will be able to resolve problems during discussions about illness management. An understanding of these factors could be useful in identifying families for which problem solving may be more difficult and developing strategies to increase the likelihood of successful problem resolution.

A number of factors may predict whether or not a dyad or family is able to resolve problems or certain decisions. For example, when family communication is positive and open, opportunities to spend time with one another and discuss important decisions are more frequent (Robin & Foster, 1989), and children may be more likely to seek help from their parents (Pianta & Harbers, 1996). In contrast, negative communication engenders strong affect and may disrupt the quality of family problem-solving, making it less likely that parents and children will interact together when a health-related decision needs to be made. Parenting style refers to the emotional climate within which child socialization occurs and may also be related to problem resolution. One aspect of parenting style is autonomy support, defined as parent encouragement of the child's initiatives and provision of relevant information and opportunities for choice (Gurland & Grolnick, 2003; Stefanou, Perencevich, DiCintio, & Turner, 2004). This style sets the stage for collaborative interactions (Beveridge & Berg, 2007) and may make problem resolution more likely. In contrast, parental coercion refers to punitive disciplinary strategies and pressure to elicit a favorable response. Patterson's coercion model of parent-child interactions, developed to explain the development of antisocial behavior, can be applied in this context, such that parental demands for compliance lead to an escalating cycle of behaviors, with the child refusing to comply and the parent eventually giving up (Duke, Geffken, Lewin, & et al, 2008; Granic & Patterson, 2006). Coercive parenting may decrease the child's motivation to engage in

effective illness management behaviors and lead to avoidance during parent-child interactions about treatment-related issues.

The child's involvement in the discussion is also potentially important in influencing effective problem solving. Decision making involvement refers to the way in which children contribute to decision making and problem solving, such as providing information, expressing an opinion, or soliciting advice or guidance from parents (Miller & Harris, 2012; Miller & Jawad, 2014). Parents may also engage children by seeking their opinion and providing information or advice related to the decision or problem. Qualitative research on health-related decision making suggests that children are more likely to express an opinion and parents are less likely to express an opinion as the child gets older (Geller, Tambor, Bernhardt, Fraser, & Wissow, 2003; Miller, Reynolds, & Nelson, 2008). More recent quantitative work with children and adolescents with T1D, CF, and asthma generally confirmed these findings (Miller & Harris, 2012). When children are actively engaged in problem-solving discussions, parents and children are more likely to be "on the same page" about illness-related issues, and parents will have the information they need to guide decisions (e.g., managing symptoms; addressing barriers to adherence) (Hafetz & Miller, 2010; Miller, 2009). Indeed, prior research suggests that a collaborative approach to illness management between parents and children is associated with better outcomes, such as less conflict, better adherence, and improved health status (Anderson, Brackett, Ho, & Laffel, 1999; Chisolm et al., 2010; Laffel et al., 2003; Wiebe et al., 2005) and that specific aspects of decision making involvement are associated with adherence (Miller & Jawad, 2014).

In the present study, we measured parent-child problem resolution related to illness management in children and adolescents (ages 8-16) with CF or T1D and their parents, who were enrolled in a longitudinal study about the transition to greater decision making independence during childhood and adolescence. These two illness groups were chosen because both are life-threatening, involve a burdensome and complex regimen, and can pose challenges to adherence and the transition to independence. Parents and children jointly identified a discussion they had about illness management in the last two weeks and described the topic of the discussion and what happened during and after the discussion. Parents and children then independently responded to questionnaires assessing decision making involvement, family communication, parenting style, self-efficacy, and treatment adherence. The primary objectives were to examine whether problem resolution is associated with (1) the child's involvement in the discussion and whether the child was resisting the treatment regimen during the discussion, (2) parent coercion, parent autonomy support, and family communication, and (3) child self-efficacy for illness management and treatment adherence. We hypothesized, a priori, that (1) there would be higher child involvement, less child resistance to the regimen, higher parent autonomy support, better family communication, and lower parent coercion in dyads that solved the problem, compared to dyads that did not solve the problem, and (2) child self-efficacy and adherence would be higher in dyads that solved the problem.

## Methods

### Recruitment

Participants were recruited from October 2011 through June 2013 at The Children's Hospital of Philadelphia as part of a longitudinal study about how families manage the transition to greater decision making independence during childhood and adolescence. The present study is an analysis of baseline data. Eligible participants included children and adolescents between the ages of 8 and 16 years, with a diagnosis of either cystic fibrosis (CF) or type 1 diabetes for at least 1 year, and their biological or adoptive parents. One parent and child per family were eligible to participate. Eligibility criteria also required that (1) the child live with the parent participant for at least 50% of the week (2) the child had never been diagnosed with moderate intellectual disability or pervasive developmental disorder, and (3) the child had not been hospitalized for psychiatric problems in the past year. The potential participants were identified from outpatient clinic lists and schedules. Families were sent letters, contacted by phone, given a study description, assessed for eligibility, and asked for their willingness to participate and schedule a baseline study visit.

A total of 243 parent-child dyads were contacted and assessed for eligibility. Of these, 29 (11.9%) were ineligible due to duration of illness ( $n = 4$ ); pervasive developmental disorder or intellectual disability ( $n = 4$ ); psychiatric hospitalization in the past year ( $n = 1$ ); child not capable of completing questionnaires for at least an hour ( $n = 1$ ); potential parent participant not a biological or adoptive parent ( $n = 4$ ); child not living with potential parent participant for more than 50% of the week ( $n = 2$ ); child had at least one other illness not related to CF or diabetes that required daily treatment for greater than six months of the last year ( $n = 8$ ); child was not English-speaking or had a parent who was not English-speaking ( $n = 4$ ); and child had a sibling who was already enrolled in the study ( $n = 6$ ). Of the 214 parent-child dyads who were eligible for the study, 210 (98%) agreed to participate. Of these, 13 (6.2%) could not be scheduled or reached again, 20 (9.5%) did not show up for their scheduled appointments, 4 (1.9%) declined in person, and 173 (82.4%) participated in the study. Of those who agreed to participate in the study, 4 (2.3%) dyads did not complete Visit 1 in its entirety. An additional two (1.2%) dyads were withdrawn from the database because they were later found to not meet eligibility criteria. The final sample for the analysis consisted of 167 participant dyads. A comparison of the final sample to those who were eligible but not included in the sample ( $n = 45$ ) showed that they did not differ with respect to child age, duration of diagnosis, sex, race, ethnicity, or illness group.

### Procedures

The institutional review board approved this study. Dyads were interviewed before or after a regularly scheduled clinic appointment, or on another day that was convenient for the family. Study personnel first explained the study to the parent and provided a developmentally appropriate explanation to the child. After obtaining parental permission and child assent, research personnel gave detailed instructions and described the questionnaires. Parents and children ages 11 and older independently completed the questionnaires while research personnel read questionnaires to children ages 8-10. Following the completion of the questionnaires, participants received \$20 each in appreciation for their time and effort. Study

data were managed using REDCap (Research Electronic Data Capture)(P. A. Harris et al., 2009). REDCap is a secure, web-based application designed to support data capture for research studies, providing 1) an intuitive interface for validated data entry; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for importing data from external sources.

## Measures

**Demographic Questionnaire**—Parents completed a demographic questionnaire that assessed characteristics of the child, parent and family. Child data included gender, age, race and ethnicity. Parent/family data included parent age, gender, race, ethnicity, highest level of education, current employment status, household income, current relationship status, highest level of education of spouse, current family structure, and how many children live in the home.

**Decision Making Involvement Scale (DMIS)**—The Decision Making Involvement Scale (DMIS) assesses a child's involvement in decision making and problem solving discussions with parents (Miller & Harris, 2012). Parent-child dyads were asked to identify a discussion related to a decision or problem they had about illness management in the last two weeks. They were asked to describe the nature of the discussion and what happened at the end of the discussion. Responses were paraphrased and recorded by study personnel on the first page of the questionnaire. The parent and child then independently responded to the DMIS items, which assess the child's involvement in the discussion (Miller & Harris, 2012). The questionnaire is comprised of five subscales: (1) Child express items assess child behaviors that reflect expressing an opinion or giving information to the parent, (2) Child seek items assess child behaviors that reflect asking for advice or information from the parent, (3) Parent express items assess parent behaviors that reflect expressing advice or an opinion or giving information to the child, (4) Parent seek items assess parent behaviors that reflect asking for an opinion or information from the child, and (5) Joint items assess negotiation and brainstorming between parent and child, as well as parental provision of options to the child. There are four response options for each item: not at all, a little bit, quite a bit, and a lot. Internal consistency, test-retest reliability, and preliminary validity of the DMIS are supported by prior research (Miller & Harris, 2012; Miller & Jawad, 2014). Cronbach's alphas ranged from .73 to .82 for the child report subscales and from .74 to .86 for the parent report subscales in the current sample.

**Parents as Social Context Questionnaire**—Children completed the 24-item Parents as Social Context Questionnaire (PASCQ)(Skinner, Johnson, & Snyder, 2005), which assesses children's perceptions of their parents (mothers or fathers) on six scales: autonomy support, coercion, structure, chaos, warmth, and rejection. The response format is not at all true, not very true, sort of true, and very true. Children were asked to refer to the parent who was participating with them in the study. We utilized the autonomy support and coercion subscales for the present analysis. Cronbach's alpha was .67 for autonomy support and .74 for coercion in the current sample.

**Flexibility and Cohesion Evaluation Scales-IV**—Parents completed the Flexibility and Cohesion Evaluation Scales (FACES-IV) (Gorall, Tiesel, & Olson, 2004), a 42-item self-report questionnaire that measures several domains of family functioning. Response options are strongly disagree, generally disagree, undecided, generally agree, and strongly agree. The validity of the FACES-IV was demonstrated through significant associations with measures of general family functioning and family satisfaction (Gorall, et al., 2004). We utilized the 10-item communication subscale in this analysis, and Cronbach's alpha for this subscale was .87 in our sample.

### **Adherence**

**Diabetes:** Parents and children with type 1 diabetes completed the 14-item Self Care Inventory (SCI) (Greco et al., 1990) to assess adherence to diabetes tasks over the past month. The items assess the extent to which multiple aspects of the treatment regimen were followed in the prior two weeks (never; sometimes, mostly not; 50% of the time; usually; always). Cronbach's alpha was .69 for child report and .70 for parent report in our sample. Parents and children together completed the 25-item Diabetes Self-Management Profile (DSMP) (M. A. Harris et al., 2000) to assess exercise, management of hypoglycemia, eating, blood glucose testing, and insulin administration and adjustment. Two forms are available, one for children on conventional regimens and one for children on flexible regimens. The DSMP is a structured interview, organized in such a way as to reduce socially desirable responding. A total adherence score is calculated as the sum of all items. Cronbach's alpha was .77 for the Conventional form and .74 for the Flexible form in our sample.

**Cystic fibrosis:** Children with CF and their parents completed the 16-item Treatment Adherence Rating Scale (TARS) (DeLambo, et al., 2004) to assess treatment adherence over the last two weeks. The response format is the same as for the SCI. Cronbach's alpha was .83 for both child and parent report in our sample. To obtain a more objective measure of adherence (Quittner, Modi, Lemanek, Ievers-Landis, & Rapoff, 2008), parents and children together completed the 24-Hour Phone Recall (Johnson, Silverstein, Rosenbloom, Carter, & Cunningham, 1986; Ricker, Delamater, & Hsu, 1998). The 24-Hour Recall utilizes a cued-recall procedure to track parents and children with CF through their activities over the past 24 hours. Data from the 24 Hour-Recall is paired with prescribed treatments recorded from the patient's medical record to determine the extent to which the patient performed the prescribed treatments, expressed as a percentage. When possible the 24-Hour Recall was administered on one weekend day and one weekday and an average across the two days was calculated. We utilized a composite adherence score for this analysis, which includes adherence to airway clearance frequency and duration, taking enzymes and enzyme dose, taking corticosteroids, and taking and finishing hypertonic saline and/or pulmozyme. Scores related to antibiotic and albuterol nebulizers, vitamins, and oral antibiotics had to be discarded due to incorrect documentation of the data related to these aspects of treatment.

### **Self-Efficacy**

**Diabetes:** Children with type 1 diabetes completed the 10-item Diabetes Self-Efficacy Scale (DSE) to assess the child's self-efficacy in managing illness-related emotions and tasks

associated with the diabetes treatment regimen (Iannotti et al., 2006). Cronbach's alpha was .80 in our sample.

**Cystic fibrosis:** Children with CF completed the 10-item CF Self-Efficacy Scale (CFSE), which was adapted by our team from the DSE. Items were adapted based on common treatment-related tasks for CF. Cronbach's alpha was .88 in our sample.

## Analytic Plan

For the DMIS open-ended responses, study personnel coded the responses for topic, child resistance, and problem resolution (i.e., did the dyad come up with a plan to address the problem during their discussion). Inter-rater reliability was calculated based on double coding of 37 discussions and yielded a kappa of 0.77 (81% agreement) for topic, 0.51 (78% agreement) for child resistance, and 0.59 (84% agreement) for problem resolution. Low kappas were likely due to high prevalence of certain coded categories (Feinstein & Cicchetti, 1990). As expected, percent agreement for the codes was much higher.

We first utilized frequencies to describe the topics and outcomes of parent-child illness management discussions. To address the three primary objectives related to problem resolution, we utilized the Wilcoxon two-sample test. The chi square test or Fisher's exact test (in the presence of small observed cell sizes) was used to test the relationship between problem resolution and child resistance. Because some of the hypotheses involved illness-specific variables, therefore, analyses were run separately by illness group. A p value of  $< .05$  was chosen to determine statistical significance. SAS (SAS Institute Inc., 2008) and SPSS (IBM Corp., Released 2011, Version 22.0) software were used for statistical analysis.

## Results

### Participants

The sample consisted of 167 children and adolescents, ages 8-16 years, with cystic fibrosis ( $n = 50$ ) or type 1 diabetes ( $n = 117$ ), and a parent. Demographics are presented in Table 1. Problem resolution was not associated with child age, child sex, or parent sex, so these variables were not considered further in the analysis.

### Description of Discussion Topics, Child Resistance and Problem Resolution

Overall, 6% ( $n = 10$ ; 6 w/ CF, 4 w/ T1D) of dyads were unable to identify a recent discussion about illness management. Reasons for not having a discussion included that illness management was routine ( $n = 7$ ), that behavioral issues were more important and therefore more frequently discussed ( $n = 1$ ), and that the child was healthy and therefore non-adherent ( $n = 1$ ). In one dyad, no reason was given.

Of those who identified a recent discussion, dyads in the T1D group most frequently discussed adjusting/taking insulin ( $n = 41$ , 36.28%), what/when to eat ( $n = 23$ , 20.35%) and testing and reporting blood glucose ( $n = 13$ , 11.50%)(Table 2). There was evidence of the child resisting the T1D treatment regimen in 24% ( $n = 27$ ) of discussions. Dyads in the CF group most frequently discussed timing ( $n = 14$ , 31.82%) and completion ( $n = 11$ , 25.00%)

of vest and/or nebulizer treatments (Table 3). There was evidence of the child resisting the CF treatment regimen in 30% ( $n = 13$ ) of discussions.

For dyads in the T1D group who identified a discussion, 82.30% ( $n = 93$ ) came up with a plan/implemented a plan, 16.81% ( $n = 19$ ) had no resolution, and 0.88% ( $n = 1$ ) reported there was an ongoing decision about whether to change the child's insulin regimen. For dyads in the CF group who identified a discussion, 86.36% ( $n = 38$ ) came up with a plan/implemented a plan, 11.36% ( $n = 5$ ) had no resolution, and 2.27% ( $n = 1$ ) reported there was an ongoing decision about whether or not to get a gastrostomy-jejunostomy tube. Dyads whose decision was ongoing were omitted from the following analyses.

### **Associations of Problem Resolution with Child Involvement and Child Resistance**

In the T1D group, only one of the DMIS subscales was associated with problem resolution (Table 4). Child report of Parent Express was higher in dyads with no resolution. In the CF group, none of the DMIS subscales were associated significantly with problem resolution (Table 5). However, the direction of scores for parent report of Parent Express was similar, such that scores were higher in dyads with no resolution.

Child resistance was associated with problem resolution in both groups, such that problem resolution was less likely when the child was resisting the regimen. In the T1D group, 62.96% of dyads came up with and/or implemented a plan when the child was resisting the regimen, versus 89.41% of dyads when the child was not resisting the regimen ( $\chi^2(1) = 10.18, p = .001$ ). In the CF group, 61.54% of dyads came up with and/or implemented a plan when the child was resisting the regimen, versus 100% of dyads when the child was not resisting the regimen ( $\chi^2(1) = 13.06, p < .0001$ ).

### **Associations of Problem Resolution with Parenting and Family Communication**

In both the T1D and CF groups, parent coercion scores were higher in dyads with no resolution (Tables 4 and 5). Problem resolution was not associated with family communication in either group.

### **Associations of Problem Resolution with Self-Efficacy and Adherence**

In the T1D group, problem resolution was not associated with self-efficacy in either group (Tables 4 and 5). In the T1D group, adherence was lower in dyads with no resolution, according to parent report on the SCI and DSMP scores. Problem resolution was not associated with child report on the SCI. In the CF group, adherence was lower in dyads with no resolution, according to child report on the TARS. The direction of scores was similar for parent report on the TARS, but the difference between groups did not reach statistical significance. Problem resolution was not associated with composite adherence scores from the 24-Hour Recall.

## **Discussion**

While family functioning has been the focus of much prior work related to pediatric adherence, especially in the context of T1D, the concept of family problem solving has been



less well-studied but may be particularly important for overcoming barriers to adherence and managing symptoms. The present study adds to the literature by identifying correlates of problem resolution in discussions between children with T1D or CF and their parents. Awareness of these factors may help providers identify families who are struggling with problem solving and inform the development of strategies to enhance problem solving in such families. We also examined a unique construct, decision making involvement, as it relates to problem resolution. Participants reported a range of different topics that were addressed during discussions about illness management, and the majority of dyads came up with and/or implemented a plan at the end of their discussions. Lack of problem resolution during discussions was associated with higher parent coercion, more child resistance to the regimen, and more parental expression of advice or information during the discussion. Consistent with prior research showing relationships between ineffective family problem solving and glycemic control (C. I. Carlson & Grotevant, 1987; Liss, et al., 1998), lack of problem resolution was also associated with worse adherence.

Not surprisingly, a subset of dyads ended their discussions with no resolution. It is important to identify families who are less likely to solve illness management problems because such patterns may persist and have a negative impact on the child's health. Higher scores on the DMIS subscale Parent Express were associated with the likelihood of ending the discussion with no resolution in the T1D group (the direction of scores was similar in the CF group, but not statistically significant) and were associated with worse adherence in prior research (Miller & Jawad, 2014). At first glance, this finding is counterintuitive, because parental provision of guidance and information would be expected to enhance problem-solving. However, one potential explanation is that parental guidance and information-giving signifies that the parent is "taking over" the discussion, which may be perceived as autonomy-limiting by children, especially when the child has not asked for guidance (Hafetz & Miller, 2010; Tilton-Weaver et al., 2010; Toki & Pe nik, 2010). This perception may lead children to withdraw from the discussion before the problem or decision has been adequately addressed. Consistent with this explanation is that in dyads with no resolution, parent coercion scores were higher. Parental coercion is characterized by punitive strategies and pressure to elicit the desired response. While parents may be encouraged to maintain their involvement in T1D care, the dynamics of such involvement are critical (Wiebe, et al., 2005). Parental efforts to guide the child with respect to managing the regimen (I.e., by providing advice and information during management discussions; pressuring the child to comply) may backfire if they are perceived as intrusive, unhelpful, or unnecessary.

The findings related to Parent Express and coercion are consistent with the notion of miscarried helping, which arose from the framework of social support and attempts to explain how social support can become disruptive (Coyne, Wortman, & Lehman, 1988) (Anderson & Coyne, 1991). Miscarried helping characterizes a process by which the parent is invested in being a good helper, in conjunction with the strong belief that helping will result in better health outcomes. When these efforts are unsuccessful, the parent escalates attempts to ensure adequate self-care by the child, resulting in a cycle of blame, resentment, and anger on the part of the parent and child. In the one study that we are aware of that examined the effects of miscarried helping on the management of childhood chronic illness, the authors found that higher levels of miscarried helping were associated with higher

conflict, lower youth adjustment to diabetes, and lower treatment adherence in a sample of adolescents with diabetes and their parents (M. A. Harris et al., 2008).

Parent Express was the only decision making involvement subscale that was associated with problem resolution. We expected that child behaviors during the discussion (Child Seek and Child Express) would enhance problem resolution, because children often have knowledge of symptoms and aspects of the treatment regimen that parents may not be aware of (Hafetz & Miller, 2010). However, the extent of child involvement was not associated with problem resolution in the present study. It is possible that child involvement impacts the quality of problem solving, which we did not measure in this study, but not problem resolution per se. Furthermore, the DMIS assesses positive behaviors related to child involvement. Negative behaviors (e.g., arguing; ignoring the parent), which were not measured here, may have more of an impact on problem solving. Indeed, the results demonstrated that child resistance to the regimen was associated with an increased likelihood of ending the discussion with no resolution. While resistance is normative to some extent, it may deprive children of the opportunity to learn effective problem solving and decision making skills (Grolnick & Apostoleris, 2002; Holmbeck et al., 2002) and lead to decreased adherence over time.

There was support for the hypothesis that adherence would be lower in dyads that did not come up with and/or implement a plan. Failure to solve problems (e.g., child refusing to comply; the dyad “giving up”) may be broadly reflective of conflict, poor communication, and/or challenges with illness management and adherence in the family. This pattern may also lead to worsening adherence and health outcomes over time. A pattern of not resolving problems is also likely to impact the child’s assumption of more responsibility during the transition to adolescence and adulthood, because children and adolescents likely learn illness management and decision making skills in the context of parent-child interactions (Beveridge & Berg, 2007). However, the data did not support the hypothesis that problem resolution would be associated with self-efficacy for illness management.

Limitations of this analysis include reliance on self-report measures for most variables and the small sample size, especially for children with CF. The cross-sectional nature of the data does not allow us to determine the direction of effect. For example, it is possible that when a discussion appears to be unproductive, parents respond by providing increased structure, guidance, and advice. Longitudinal research is needed to clarify the direction of relationships among parent-child interactions about illness management, problem resolution, and adherence. There are additional limitations specific to the DMIS, including that it relies on retrospective reports of discussions. Therefore, we do not know if problem resolution as described by dyads reflects what actually happened during the discussion or if behaviors and outcomes during the identified conversation are representative of other discussions. However, the test-retest reliability of the DMIS was supported in prior research (Miller & Harris, 2012), suggesting that parents and children responded similarly to items about the same discussion over time. Although this finding somewhat mitigates concerns about the reliance on retrospective reports, future research utilizing observational methods of actual discussions may be helpful to corroborate the present findings.

Future research is needed to understand the factors that predict ineffective problem solving over time and whether lack of problem resolution predicts worse adherence and health status. When follow-up visits for the study are complete, our longitudinal analyses will be able to address some of these questions. It will also be interesting to examine dyads that could not identify a discussion in more depth and to determine if this pattern persists over time. The inability to identify a discussion could reflect two distinct subgroups: families in which the regimen is going so well that management is automated and there are few barriers, and, in contrast, families in which there are high levels of conflict so parents and children have pulled away from one another and avoid discussing illness management. Finally, it is important to understand the mechanisms through which child resistance to the treatment regimen may influence parent-child problem solving interactions.

### Implications for Practice

Health care providers should be aware that when children demonstrate resistance to their illness and treatment regimen, they may be at risk for ineffective parent-child problem solving and diminished adherence. Although many children may express such resistance at one time or another, providers can ask families about it on a regular basis and intervene if the resistance persists (e.g., What happens when you tell [child's name] it is time to do the vest? What happens when you ask [child's name] if he/she tested?). Another option is for the provider to ask the child and parent to recall a recent problem or barrier related to illness management and describe how they addressed it, similar to the DMIS used in this study. The family's responses then provide the opportunity to give positive feedback or, in the case of ineffective problem solving, suggestions for improvement. It may also be helpful for providers to provide guidance to parents about strategies to encourage effective illness management behaviors without being overbearing or critical. Although parents are well intentioned in their efforts to ensure the child's health, certain strategies such as pressure, punishment, and excessive advice-giving may interfere with the likelihood of solving problems and overcoming challenges related to the treatment regimen. Instead, parents can be coached to solicit the child's opinion and ideas about how to manage illness-related issues (Miller & Jawad, 2014). One clinic-based intervention that has been effective in prior research is to teach parents and children how to be a team with respect to diabetes management (Anderson, et al., 1999; Laffel, et al., 2003). However, additional research is needed to understand how this intervention should change across development (Miller & Harris, 2012), especially during the transition from adolescence to adulthood, when a team approach may be less practical and appropriate.

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**Table 1**Participant Characteristics<sup>1</sup>

Variable, n (%) or Mean (SD), range	Cystic Fibrosis (n = 50)	Type 1 Diabetes (n = 117)
Child age	12.54 (2.45) 8.04-16.55	12.87 (2.53) 8.14-16.97
Parent age	41.73 (6.73) 28.0-56.0	43.04 (7.29) 26.0-60.0
Illness duration (years)	10.49 (4.16) 1.40-16.50	5.63 (3.53) 1.10-14.74
Child sex: Female	25 (50%)	66 (56%)
Parent sex: Female	44 (88%)	98 (84%)
Child race		
White	48 (96%)	70 (59.83%)
African-American	2 (4%)	29 (24.79%)
Asian	0	1 (0.85%)
Other	0	14 (11.97%)
Does child identify as Hispanic or Latino?		
No	46 (92%)	102 (87.18%)
Yes	4 (8%)	12 (10.26%)
Parent education		
Some high school	1 (2%)	1 (0.85%)
Completed high school	2 (4%)	15 (12.82%)
Some college or technical school after high school	16 (32%)	40 (34.19%)
College graduate	15 (30%)	34 (29.06%)
Some post-college graduate education	6 (12%)	11 (9.40%)
Masters, PhD., MD, law degree, etc., obtained	10 (20%)	11 (9.40%)
Family structure		
Two parent	38 (76%)	76 (64.96%)
Two parents- Step family	6 (12%)	14 (11.97%)
Single parent	6 (12%)	23 (19.66%)

<sup>1</sup>Percentages do not always add up to 100% because of missing responses.

**Table 2**

## Discussion Topics for Type 1 Diabetes

<b>Topic</b>	<b><i>n</i></b>	<b>% of Dyads</b>
Adjusting/taking insulin	41	36.28%
What/when to eat (including counting carbohydrates)	23	20.35%
Testing and reporting blood glucose	13	11.50%
Other	9	7.96%
Symptoms/being prepared for symptoms	7	6.19%
New treatments/meds/research	6	5.31%
Logistics	5	4.42%
Rotating injection sites	5	4.42%
Sneaking food	3	2.65%
Managing illness around others	1	0.88%

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**Table 3**

## Discussion Topics for Cystic Fibrosis

Topic	<i>n</i>	% of Dyads
Timing of vest treatments	14	31.82%
Doing vest treatments/nebs	11	25.00%
Symptoms/being prepared for symptoms	4	9.09%
Logistics	4	9.09%
Taking enzymes	3	6.82%
Increasing calories	2	4.55%
New treatments/meds/research	1	2.27%
What/when to eat	1	2.27%
Doing pancrease testing	1	2.27%
Doing tube feedings	1	2.27%
Taking meds and filling up pill box (not incl. nebs or enzymes)	1	2.27%
Other	1	2.27%

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**Table 4**

## Problem Resolution in Type 1 Diabetes

Variable <sup>1</sup>	Discussion Outcome		
	Came up with a plan (M)	No resolution (M)	Two-sided P value
Parent coercion	1.90	2.30	<b>.026</b>
Autonomy support	3.59	3.58	.903
Family communication	4.03	3.93	.302
Diabetes self-efficacy	7.81	7.97	.636
SCI (child report)	4.00	3.88	.340
SCI (parent report)	4.05	3.78	<b>.029</b>
DSMP	68.81	61.81	<b>.011</b>
Decision making involvement			
Child express (child report)	2.50	2.40	.624
Child express (parent report)	2.65	2.30	.126
Child seek (child report)	2.40	2.18	.319
Child seek (parent report)	2.13	1.89	.157
Parent express (child report)	2.76	3.17	<b>.031</b>
Parent express (parent report)	2.98	3.21	.310
Parent seek (child report)	2.67	2.58	.595
Parent seek (parent report)	2.90	2.72	.419
Joint (child report)	2.57	2.45	.441
Joint (parent report)	2.43	2.46	.907

<sup>1</sup>Statistical comparisons are based on the Wilcoxon two-sample test, which compares ranks. We present means for ease of interpretation.

**Table 5**

## Problem Resolution in Cystic Fibrosis

Variable <sup>I</sup>	Discussion Outcome		
	Came up with a plan (M)	No resolution (M)	Two-sided P value
Parent coercion	1.93	3.00	<b>.012</b>
Autonomy support	3.63	3.05	.076
Family communication	4.12	4.16	.805
CF self-efficacy	7.98	6.40	.099
TARS (child report)	4.21	3.33	<b>.017</b>
TARS (parent report)	4.33	3.81	.070
Adherence score from 24-Hour Recall	84.91	81.25	.499
Decision making involvement			
Child express (child report)	2.17	2.46	.507
Child express (parent report)	2.29	2.73	.263
Child seek (child report)	2.07	2.60	.228
Child seek (parent report)	1.84	2.20	.542
Parent express (child report)	2.51	3.04	.101
Parent express (parent report)	2.70	3.36	.064
Parent seek (child report)	2.53	2.70	.806
Parent seek (parent report)	2.55	3.10	.149
Joint (child report)	2.31	2.48	.691
Joint (parent report)	2.15	2.52	.208

<sup>I</sup>Statistical comparisons are based on the Wilcoxon two-sample test, which compares ranks. We present means for ease of interpretation.