Brief Report: Hope, Perceived Maternal Empathy, Medical Regimen Adherence, and Glycemic Control in Adolescents with Type 1 Diabetes

Sarah M. Lloyd,1 BSc, Marja Cantell,2,3,4 PhD, Danièle Pacaud,3 MD, Susan Crawford,2 MSc, and Deborah Dewey2,3,4 PhD

1Department of Psychology, University of Calgary, 2Behavioural Research Unit, Alberta Children's Hospital, 3Department of Pediatrics, University of Calgary and 4Department of Community Health Sciences, University of Calgary

Objective The relationships among hope, perceived maternal empathy, medical regimen adherence, and glycemic control in adolescents with type 1 diabetes were examined. Method Twenty-nine girls and 21 boys with type 1 diabetes completed measures of hope, perceived maternal empathy, and medical regimen adherence. Each participant’s most recent hemoglobin A1c, a measure of glycemic control, was obtained from the diabetes clinic database. Results Significant correlations were found among hope, perceived maternal empathy, and medical regimen adherence. Significant correlations were also found among hope, perceived maternal empathy, and glycemic control. Adolescents’ perceptions of maternal empathy were positively correlated with level of hope. Hope appeared to mediate the relationship between perceived maternal empathy and adherence, as well as between perceived maternal empathy and glycemic control. Conclusions The results of this study affirm the need for longitudinal research that examines the associations among hope, perceived maternal empathy, medical regimen adherence, and glycemic control.

Key words adherence; adolescents; glycemic control; hope; perceived maternal empathy; type 1 diabetes.

Type 1 diabetes is a metabolic disorder characterized by beta cell failure leading to insulin deficiency. Its management involves multiple daily finger pokes for blood glucose monitoring, multiple daily insulin injections or use of continuous insulin pumps, plus careful monitoring of food intake and physical activity. Pediatric diabetes expert groups such as the International Society for Pediatric and Adolescent Diabetes, the American Diabetes Association, and the Canadian Diabetes Association have recommended aggressive attempts to achieve better glycemic control in order to prevent or delay the onset of acute and chronic complications (American Diabetes Association, 2008; Canadian Diabetes Association Clinical Practice Guidelines Expert Committee, 2008; Rewers et al., 2007). Adolescence is a challenging period for maintaining optimal glycemic control due to physiological changes and a decline in diabetes treatment adherence secondary to various psychosocial factors (Hamilton & Daneman, 2002).

Empathy involves the process of taking on the perspective of another (i.e., cognitive component), an emotional reaction similar to that of the other person (i.e., affective component), and the subsequent precise demonstration of this understanding (i.e., motivational component). Parents’ empathic responses have been found to facilitate children’s adjustment and positive psychological development (Feshbach, 1987; Flory, 2004) and have been associated with higher adherence to treatment regimens for diabetes (Bobrow, Avruskin, & Siller, 1985). Continued parental support and monitoring have also been shown to be related to better outcomes and control among adolescents (Wysocki & Greco, 2006). To the best of our
knowledge, however, no research has explored mechanisms through which perceived maternal empathy influences adherence and glycemic control.

It has been suggested that empathic responses from parents foster the development of hope (Gillham & Reivich, 2004). Hope has been defined as "a positive motivational state that is based on an interactively derived sense of successful (a) agency (goal-directed energy) and (b) pathways (planning to meet goals)" (Snyder, Irving, & Anderson 1991, p. 287). Agency, the motivational component of hope, refers to a person’s belief that he or she can initiate and sustain actions necessary to meet a goal; agency is characterized by self statements such as, “I can do this.” Pathways, the planning component of hope, refers to a person’s perception that he or she has the ability to produce viable plans or strategies to meet desired goals; this component of hope is characterized by statements such as, “When I have a problem, I’ll find a way to solve it.” Hope is related to, but conceptually distinct from, the concept of self efficacy, which refers only to the individual's belief that he or she can meet a goal (i.e., agency component of hope) (Bandura, 1989).

With the rate of medical nonadherence approximating 50% in children and adolescents (Drotar, 2000; Lemanek, Kamps, & Chung, 2001), it is important to examine factors that foster adherence. Furthermore, given an established relationship between adherence and glycemic control (Anderson, 2004), it is also important to examine correlates of glycemic control. Parents significantly influence the behavior of their children with chronic health problems; their reactions to and degree of acceptance of their children’s illness, merge with their children’s personal resources and the specific nature of the illness to influence their children’s adjustment to the illness. Although studies in pediatric populations have found hope to be positively associated with better adherence and adjustment (Lewis & Kliwer, 1996; Maikranz, Steele, Dreyer, Stratman, & Bovair, 2007), no studies have investigated the relationships among hope, perceived maternal empathy, medical regimen adherence, and glycemic control in adolescents with diabetes. The purpose of this study was to investigate these relationships. Consistent with the previous literature, it was hypothesized that both hope and perceived maternal empathy would be associated with adherence and glycemic control. Specifically, adolescents with type 1 diabetes who reported higher levels of hope would evidence better adherence and glycemic control. Similarly, adolescents with diabetes who reported higher levels of perceived maternal empathy would demonstrate better adherence and glycemic control. It was also hypothesized that adolescent hope would mediate the effect of perceived maternal empathy on adherence and glycemic control.

**Method**

**Participants and Procedure**

Adolescents were recruited from a pediatric hospital diabetes clinic. The clinic population is 49.8% female and 50.2% male. The average age at diagnosis is 8.8 years (SD = 3.7), and the mean age of the adolescents seen in the clinic is 15.0 years (SD = 1.1). Approximately 90% of the clinic population is Caucasian and 10% are from other ethnic backgrounds. Twenty-nine adolescent girls and 21 adolescent boys with a mean age of 14.8 years (SD = 1.6), and a mean age at diagnosis of 8.7 years (SD = 3.6) participated in this study. Consistent with the general clinic population, 88% of the participants in the study were Caucasian and 12% were from other ethnic backgrounds. Each participant’s most recent hemoglobin A1c (HbA1c), a measure of glycemic control, was obtained from the diabetes clinic database. The average HbA1c of participants (M = 8.6%) was similar to the average HbA1c of the general clinic population with type 1 diabetes (M = 8.8%). The majority of participants (74.0%) resided with two parents, and had mothers (72.0%) and fathers (89.8%) who were employed. No significant differences were found between the general clinic population and the study participants for age, age at diagnosis, gender distribution, or HbA1c.

This study was approved by the appropriate institutional review board for the ethics of human research. Consent/assent forms and questionnaires were mailed to 220 families of adolescents 13–17 years of age who had been diagnosed for at least 1 year. No compensation was offered to participants. Parents provided informed consent; adolescents completed the assent form and the questionnaires independently. These were then returned to the investigators in a stamped, return envelope.

**Measures**

The *Children's Hope Scale* (CHS) (Snyder et al., 1997), a six-item self-report scale, was used to measure children’s level of hope in general. Three items reflect the agency component of hope (e.g., I think the things that I have done in the past will help me in the future) and three reflect the pathways component (e.g., When I have a problem, I come up with lots of ways to solve it). Responses on this Likert scale ranged from 1 (*none of the time*) to 6 (*all of the time*), resulting in a total score ranging from 6 to 36. This scale has an appropriate level of internal reliability and test-retest reliability, as well as documented discriminant, incremental, and convergent
validity (Snyder, 2002). Alpha reliability for the CHS in this study was .88.

Perceived maternal empathy was measured with the Child Empathy Questionnaire (CEQ) (Flory, 2004), a 16-item questionnaire that the adolescents completed regarding their mothers. It is a general measure of how empathic the mother is perceived to be (e.g., When things go badly for me, my mom understands how I feel). The adolescents rated each item on a scale from 1 (never) to 3 (always). The mothers’ perceived empathy scores were obtained by adding the scores on all 16 items, nine of which are reverse scored, for a possible total score ranging from 16–48. Alpha reliability for the CEQ in this study was .90.

Adolescents’ self-reports of adherence were obtained using the Self-Care Inventory (SCI) (La Greca, 1992). This questionnaire consists of 14 items that assess the degree to which an individual with diabetes complies with the recommendations for managing their illness. Adolescents rate the self-care activity items, labeled with simple statements such as “glucose testing,” from 1 (never do it) to 5 (always do this as recommended without fail), and an overall index of adherence is calculated by averaging the scores. Internal consistency, validity, and reliability of this measure have been demonstrated; the SCI has been shown to have a test-retest reliability of .77 for overall adherence and an internal consistency of .80 or higher (Delamater et al., 1997). Alpha reliability for the SCI in this study was .88.

HbA1c is a measure of the glycemic control and has been linked with the risk of developing long term complications from diabetes (Rewers et al., 2007). For this study, the adolescents’ most recent HbA1c value (upper limit of normal for local assay 6.1%) was obtained from the diabetes clinic database.

Results

Hope, Perceived Maternal Empathy, and Medical Regimen Adherence

No associations with age and no gender differences were found for hope, perceived maternal empathy, adherence, or glycemic control. Higher levels of hope were associated with better adherence on the SCI, \( r = 0.63, p < .001 \). Consistent with this finding, higher levels of hope were correlated with better glycemic control (i.e., lower HbA1c), \( r = -0.39, p = .007 \). The correlation between adolescents’ scores on the SCI and their most recent HbA1c was not significant, \( r = -0.21, p = .16 \). Perceived maternal empathy was correlated with adolescents’ self-reports of adherence, \( r = 0.30, p = .03 \), and with better glycemic control, \( r = -0.28, p = .05 \). Finally, the more empathic that the adolescents perceived their mothers to be, the higher their level of hope, \( r = 0.36, p = .01 \).

Mediator Analyses

Regression analyses were used to examine whether hope mediated the relationship between perceived maternal empathy and adherence. Results of these analyses revealed that hope was associated with perceived maternal empathy, \( R^2 = 0.13, F (1, 48) = 7.20, p = .01 \), and with adherence, \( R^2 = 0.40, F (1, 48) = 32.32, p < .001 \). Perceived maternal empathy was also associated with adherence, \( R^2 = 0.09, F (1, 48) = 4.89, p = .03 \). A regression analysis in which hope and perceived maternal empathy were used to predict medical regimen adherence was significant, \( R^2 = 0.41, F (2, 47) = 16.25, p < .001 \). Hope accounted for 41% of the variance; perceived maternal empathy was not found to be a significant predictor. Similar findings were noted when hope and perceived maternal empathy were used to predict glycemic control; hope was associated with glycemic control, \( R^2 = 0.15, F (1, 46) = 8.08, p = .007 \), as was perceived maternal empathy, \( R^2 = 0.08, F (1, 46) = 3.90, p = .05 \). A regression analysis in which hope and perceived maternal empathy were used to predict glycemic control was significant, \( R^2 = 0.17, F (2, 45) = 4.74, p = .01 \), with hope accounting for 17% of the variance; perceived maternal empathy was not found to be a significant predictor.

Discussion

This study is the first to explore the relationships among hope, perceived maternal empathy, medical regimen adherence, and glycemic control in adolescents with type 1 diabetes. It was hypothesized that both hope and perceived maternal empathy would be associated with adherence and glycemic control, and that hope would mediate the effect of perceived maternal empathy on adherence and glycemic control. Both hope and perceived maternal empathy were found to be positively related to adherence and glycemic control. These results are consistent with the findings reported in previous studies of pediatric populations with other chronic conditions (Lewis & Kliewer, 1996; Maikranz et al., 2007). As hypothesized, hope appeared to mediate the relationships between perceived maternal empathy, and adherence and glycemic control. Adolescents who reported high levels of perceived maternal empathy were likely to adhere to their medical regimen if they also reported high levels of hope. Similarly, adolescents who reported high levels of perceived maternal empathy were likely to obtain better glycemic control if they also
had high levels of hope. These findings add to the evidence that adherence is “an act of hope—a positive, empowered view of one’s ability to act so as to attain better tomorrows” (Snyder, Feldman, Taylor, Schroeder & Adams, 2000, p. 236).

Consistent with the suggestion of Gillham and Reivich (2004) that empathic responding by parents fosters the development of hope, our results indicated that perceived maternal empathy is associated with hope in adolescents with type 1 diabetes. Furthermore, both perceived maternal empathy and hope appeared to be important correlates of adherence and glycemic control. Due to the cross-sectional nature of the data, however, no inferences can be drawn regarding the causal and directional relationships among hope, perceived maternal empathy, adherence, and glycemic control.

In contrast to previous research in adults (Weinger, Butler, Welch, & La Greca, 2005), the present study did not find a relationship between adolescents’ self reports of adherence and their most recent HbA1c values. This finding is consistent with previous studies of children and adolescents that have shown that the relationship between reported compliance and glycemic control is weak (Johnson 1994; Johnson et al., 1992). The lack of an association between reported compliance and glycemic control could be due to adolescents’ reports of self care activities not accurately reflecting their actual behavior. However, as hope and maternal empathy were both linked to increased adherence and better glycemic control, the most likely reason for the lack of association would be our small sample size, which did not allow a weak association to reach significance.

Despite limitations, such as small sample size, the use of self-report measures, and the cross-sectional design, the findings of this study make a valuable contribution to the existing literature on correlates of adherence and glycemic control in adolescents with type 1 diabetes. This investigation provides support for the notion that the associations between perceived maternal empathy in adolescents with type 1 diabetes, and their medical regimen adherence and glycemic control are mediated through a direct association with hope. Prospective longitudinal research is needed, however, to clarify the associations among these variables.

Acknowledgment
We would like to thank the adolescents from our regional diabetes clinic who participated in this study.

Funding
This research was supported by funding from the Alberta Children’s Hospital Foundation.

Conflict of interest: None declared.

Received July 3, 2008; revisions received December 8, 2008; accepted December 10, 2008

References
Hope and Medical Regimen Adherence in Type 1 Diabetes


