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Relation of parent knowledge to glycemic control among emerging adults with type 1 diabetes: a mediational model

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Abstract The study goal was to examine the links of parent knowledge of children's behavior to diabetes outcomes and to test a mediational model that focused on psychological distress and self-care behavior. We recruited 132 adolescents (average age 12) and followed them to average age 23. At age 23 ($n = 107$), we conducted in-person interviews with these emerging adults to measure parent knowledge, psychological distress, self-care behavior and glycemic control. We used structural equation modeling to test our hypotheses with these cross-sectional data. Higher levels of parent knowledge were linked to better glycemic control, and this path was mediated by reduced psychological distress and enhanced self-care behavior. Parents remain an important influence in the lives of emerging adults with type 1 diabetes. When emerging adults have a relationship with their parents in which they share general information, psychological distress may be reduced which then facilitates self-care and, ultimately, glycemic control.

Keywords Parent knowledge · Emerging adults · Psychological distress · Type 1 diabetes · Self-care behavior

Introduction

Emerging adulthood is a relatively unexplored period in development that takes places after adolescence, typically between the ages of 18 and 25 (Arnett, 2000). It is a period of development characterized by exploration in a variety of life domains, and is referred to as "emerging" adulthood because it occurs prior to the assumption of many adult responsibilities, such as marriage, parenthood, and work. Emerging adulthood has become a focus of recent research as investigators recognize that this period of development poses risks to psychological and physical health. For example, depressive symptoms increase during adolescence and peak during emerging adulthood (Arnett, 2004), and emerging adults have the highest rate of alcohol usage (Substance Abuse and Mental Health Services Administration 2011). Lack of parental monitoring and freedom from the responsibilities of traditional adult roles provide opportunities to engage in risky behavior with few perceived consequences. Thus, the goal of the present study is to examine the link of parental involvement in the lives of emerging adults to psychological, behavioral, and physical health among an at-risk group—those with type 1 diabetes.

Emerging adulthood is an especially critical time for those with type 1 diabetes, as this is the time that youth with type 1 diabetes take on many responsibilities that were previously assumed by or shared with parents. In addition to managing insulin, blood glucose testing, and adjusting insulin based on diet and exercise, emerging adults now have to fill their own prescriptions and make their own clinic appointments. At some point, emerging adults also have to navigate the transition from the family-friendly pediatric health care system to the more independent adult health care system, a transition that has been associated with numerous difficulties (Allen & Gregory, 2009; Lyons et al., 2013, 2014; Monaghan et al.,

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2015). The increase in depression that is associated with emerging adulthood also may pose serious challenges for those with type 1 diabetes, as there is clear evidence that adults with diabetes are more depressed than those without diabetes (Gendelman et al., 2009).

The numerous transitions and challenges that emerging adults with type 1 diabetes face could lead to a decline in self-care behavior and a deterioration in glycemic control (Wolpert & Anderson, 2001). A relatively recent review of the literature showed that there is a clear decline in clinic attendance associated with the transfer from pediatric to adult care, but the findings for glycemic control are mixed—in part due to the fact that some of the people in the poorest control may not be seen by a physician to have glycemic control assessed (Lyons et al., 2014). One study of emerging adults ages 18–26 showed that less than one-third engaged in self-care consistent with recommendations (Hendricks et al., 2013). It is important to understand self-care behavior during the critical period of emerging adulthood, as this is the time during which behavioral patterns are established that persist into adulthood and may put one at risk for the development of secondary diseases. In addition, glycemic control during emerging adulthood may be important to examine, as early indicators of diabetes-related complications begin to appear and have consequences for subsequent complications in adulthood (Bryden et al., 2003).

A prominent explanation for the often cited difficulties that emerging adults with type 1 diabetes experience is increased autonomy/freedom and loss of parental involvement in diabetes care. As youth move through adolescence, they become increasingly independent from parents (Holmbeck et al., 2006), and parental involvement in childhood illness, including diabetes, declines (King et al., 2014; Helgeson et al., 2008a, b; Ingerski et al., 2010; Walders et al., 2000). There is a great deal of evidence from the adolescent literature that parental involvement in diabetes is associated with better diabetes outcomes (Berg et al., 2011; Helgeson et al., 2008a, b; Psihogios & Holmbeck, 2013; Vesco et al., 2010). Beneficial parental involvement is characterized by collaborative rather than controlling behavior (Wiebe et al., 2005; Wysocki et al., 2009) and decision-making that is shared rather than performed only by parents (Helgeson et al., 2008a, b). Longitudinal data show that this decline in parental involvement over adolescence is associated with a decline in self-care (King et al., 2014).

In the present paper, we examined whether parental involvement in the lives of youth continue to play a beneficial role in emerging adulthood. The aspect of parental involvement on which we focused is known in the literature as parental monitoring, but we refer to it as parent knowledge. Parental monitoring is typically construed as parent surveillance or parents making overt efforts to track their children's whereabouts and activities. However, parental monitoring is typically operationalized in the research literature as parent knowledge of children's whereabouts and activities (e.g., "How often do your parents know what you do during your free time?"; Kerr & Stattin, 2000; Kerr et al., 1999; Stattin & Kerr, 2000). There are multiple sources of parent knowledge, some of which stem from parent behavior (e.g., tracking children, asking questions), and some of which come from other people (e.g., friends, siblings), but a primary source of parent knowledge is the children themselves. Stattin and Kerr (2000) showed that parent knowledge is more strongly linked to child disclosure than to parental solicitation of information or parent controlling behavior. They also showed that parent knowledge that comes from child disclosure shows the strongest relations to good outcomes. For example, one study showed that children's disclosure of feelings and concerns and disclosure of daily activities to parents were each related to child reports of greater parental trust, whereas parent solicitation of information from children was not (Kerr et al., 1999).

Measures of parent knowledge have been linked to better self-care behavior and better glycemic control (Palmer et al., 2011) and have predicted improved self-care (King et al., 2014) and improved glycemic control over time (King et al., 2012) among youth with type 1 diabetes. Two cross-sectional studies of adolescents with type 1 diabetes showed that adolescent disclosure about diabetes management, adolescent secrecy about diabetes management, and adolescent reports of parent knowledge were all intercorrelated (Main et al., 2015; Osborn et al., 2013). In one, secrecy emerged as the most robust predictor of self-care and glycemic control (Main et al., 2015), and in the other secrecy moderated the relation of disclosure to diabetes outcomes (Osborn et al., 2013). Taken collectively, there is evidence that these disclosure and knowledge variables are linked to each other and to diabetes outcomes.

However, there is no research that has investigated whether parent knowledge continues to predict good diabetes outcomes among *emerging adults* with type 1 diabetes. There is reason to believe that parent knowledge and child disclosure of both feelings and activities to parents continue to have benefits among emerging adults. Emerging adults who share aspects of their daily lives and daily concerns with parents are likely to feel more comfortable drawing on parents as a resource during times of stress. Parents who are more knowledgeable about children's daily lives also may be more capable of providing appropriate forms of support. There is evidence that parents continue to remain an important influence in the lives of emerging adults with diabetes. An interview study of emerging adults with type 1 diabetes showed that parents continue to provide more assistance than romantic partners or peers during this period of development (Sparud-Lundin et al., 2008). Thus, the primary goal of the present study was to examine links of parent knowledge and the source of that knowledge—child disclosure to parents—to diabetes outcomes among emerging adults with type 1 diabetes.

A second goal of the study was to examine mediators of the link between parent knowledge and diabetes outcomes. One potential explanation is reduced psychological distress. Having a relationship with parents in which information is shared is likely to reflect a supportive relationship and one that reduces stress. There is some research on emerging adults that has connected parental support to reduced distress. One study showed that parent support during adolescence was associated with decreased depressive symptoms between the ages of 18 and 26 (Needham, 2008). Another study showed that higher quality relationships with parents during adolescence predicted fewer depressive symptoms in emerging adulthood for those with type 1 diabetes (Helgeson et al., 2014a). A later report on that same sample when they reached emerging adulthood showed that parent support was linked to a decrease in depressive symptoms over a 2-year period (Helgeson et al., 2014b). Psychological distress could be a critical mechanism linking parent knowledge to diabetes outcomes, as depressive symptoms have been linked to poor self-care behavior and poor glycemic control (Hislop et al., 2008; Lustman et al., 2000; Van Tilburg et al., 2001).

The two critical diabetes outcomes are self-care behavior and glycemic control. Although self-care behavior has been linked to glycemic control in numerous studies (Harris et al., 2000; Kristensen et al., 2012; Lewin et al., 2009), few studies test whether self-care behavior mediates relations between parent relationship variables and glycemic control. Thus, in the present study of emerging adults, we test a model that links indicators of parent knowledge to self-care behavior and glycemic control, that examines whether psychological distress mediates the relation of parent knowledge to self-care behavior, and that also examines whether self-care behavior mediates the relation of psychological distress to glycemic control.

Method

Participants

Participants were 107 youth with type 1 diabetes who were originally recruited from Children's Hospital of (Children's Hospital of Pittsburgh) in 2002–2004. At the time of initial recruitment, letters of invitation were sent to all adolescents with diabetes who were 11–13 years of age, had been diagnosed with type 1 diabetes for at least 1 year, and were attending Children's Hospital ($n = 307$). Families could return a postcard indicating that they did not want to be contacted by phone about the study. Twenty families returned these postcards, refusing contact about the study without us being able to determine eligibility. We reached 261 of the remaining 287 families by phone and determined that 90 were not eligible. Eligibility requirements included being in the 5th, 6th or 7th grade; diagnosed with type 1 diabetes for at least 1 year; and the absence of another severe chronic disease (e.g., heart disease). Of the 171 eligible families, 39 refused and 132 agreed. Thus, our effective response rate was 77%. These youth have been followed through adolescence and into emerging adulthood, and several articles relevant to parent–child relationships have been published (e.g., Helgeson et al., 2008a, b, 2009, 2014b).

When they were about 23 years old (approximately 11 years later; 2012–2015), we conducted interviews with 81% ($n = 107$) of them. These interviews are the subject of the present investigation. Of the 25 persons not interviewed, 12 dropped out of the study over the 11 years, 12 could not be reached to participate in the study, and 1 person died (unrelated to diabetes). We compared the final sample to the original sample on demographic variables (sex, race, household structure, parent social status) and found no differences. The demographic variables for the 107 participants in the present study are shown in Table 1. Note that slightly over half of the sample was living with their parents at the time of the interview, which is consistent with national survey data (Fry, 2013). There were no differences between those who did and did not live with parents on any of the study variables listed below.

Procedure

Participants were interviewed in person when possible (85%). Participants who had moved out of the area were interviewed by phone. All of the instruments listed below were administered aloud with the use of response scale cards (e.g., 1 = not at all, 2 = a little bit, 3 = somewhat, 4 = a lot). The one exception is the measure of depressive symptoms, which we asked respondents to complete privately due to the sensitive nature of the items. We used interviews rather than questionnaires to ensure that participants understood the questions and to maintain their attention for the duration of the battery of instruments. Descriptives for all instruments, including internal consistencies, are shown in Table 2.

Instruments

Parent knowledge

We employed three measures of general parent knowledge. These were taken from Kerr and Stattin (2000) and Kerr

Table 1 Demographic variables

Sex	56% female	
Race	98% Caucasian	
Age	$M = 22.89$ years	$SD = .55$
Child education	40% college graduates	
Current living situation	54% lived with parents	
HbA1c at age 12	$M = 8.14\%$	$SD = 1.22$
Current HbA1c	$M = 8.83\%$	$SD = 1.68$
Insulin delivery method	59% on insulin pump therapy	
Time since diagnosis	$M = 12.81$ years	$SD = 3.13$

Table 2 Scale descriptives

Scale	Mean (SD)	Minimum	Maximum	Alpha
Parental knowledge	3.48 (.75)	1.5	5	.73
Child disclosure feelings and concern	3.53 (.70)	1.71	5	.84
Child disclosure of daily activities	4.16 (.51)	2.6	5	.61
CES-D	13.91 (9.71)	0	46	.90
Life satisfaction	5.11 (1.16)	1.6	7	.89
Perceived stress	2.17 (.64)	1	4	.67
Self-care inventory	3.38 (.54)	2.14	4.71	.82

et al., (1999). Because these items were developed for use with adolescents, some of the items did not seem appropriate to use with emerging adults (e.g., Do your parents know how you do in different subjects at school?). Thus, we used 4 of the parental monitoring items (see Table 2). We also employed two scales that represent sources of parent knowledge: child disclosure of daily activities (5 items) and child disclosure of feelings and concern (7 items). Again, we made slight changes to some items from the original scale by replacing "school" with "work or school" (e.g., How often do you talk to your parents about how things are going at work or school?). Participants were asked to consider both parents when answering these questions or one parent if they only had one parent or were in contact with one parent. Note that the mode of communication was left unspecified, so participants were able to take into consideration face-to-face, phone, email, and text communication. These items are shown in Table 3.

Psychological distress

We administered three measures of psychological distress. First, we administered the Center for Epidemiological Depression Scale (Radloff, 1977) to measure depressive symptoms. Second, we used Diener's Life Satisfaction Scale (Diener et al., 1985). Third, we administered the 4-item abbreviated Perceived Stress Scale (Cohen et al., 1983).

Self-care behavior

We administered the 14-item Self-Care Inventory (La Greca et al., 1988; Lewin et al., 2009), which was updated by adding eight more contemporary items (Helgeson et al., 2008a, b). This scale asks respondents to indicate how well they followed their physicians' recommendations for glucose testing, insulin administration, diet, exercise, and other diabetes behaviors and reflects domains of self-care that have been regarded as important by the American Diabetes Association. The scale has been associated with glycemic control among adolescents (Delamater et al., 1998; Greco et al., 1990; La Greca et al., 1988).

Glycemic control

We used the DCA Vantage Analyzer to measure glycemic control. Participants who moved out of the area ($n = 16$) were instructed to go to a Quest lab to have glycemic control measured. Half ($n = 8$) complied with this request.

Results

First, we used confirmatory factor analysis with Mplus to test whether we could develop latent variables to reflect parent knowledge and psychological distress. We had three indicators of parent knowledge: child disclosure of daily

Table 3 Items on parent knowledge and child disclosure scales

Parent knowledge
How often do your parents know what you do with your free time?
How often do your parents know what you spend your money on?
How often do your parents know when you have an important project at work or school?
How often do your parents know when you're having problems?
Child disclosure of feelings and concerns
How often do you tell your parents how you really feel about things?
How often do you talk to one of your parents when you're worried about something?
How often do you talk to your parents about personal matters?
How often do you talk to your parents about the things that are important to you?
How often do you tell your parents when something is bothering you?
How often do you talk to your parents as freely as you talk to your friends?
How often, if something happens that you're embarrassed about, are you afraid to tell your parents about it?
Child disclosure of daily activities
How often do you talk to your parents about how things are going at work or school?
How often do you talk to your parents about work or school?
How often do you keep secrets from your parents about what you do during your free time?
How often do you hide a lot from your parents about what you do during nights and weekends?
How often do you keep your parents away from your friends?

activities, child disclosure of feelings and concerns, and parental monitoring. We had three indicators of psychological distress: depressive symptoms, perceived stress, and life satisfaction. To test this model, we allowed the factors to correlate. As shown in Fig. 1, the model fit the data well ($X^2 = 10.68$, $p = .22$; CFI = .99; TLI = .99; RMSEA = .04; SRMR = .04). All three indicators of psychological distress were statistically significant at $p < .001$. In addition, all three indicators of parent knowledge were statistically significant at $p < .001$. The parent knowledge latent variable also was significantly related to the psychological distress latent variable. Thus, based on these results, we used the latent variables for parent knowledge and psychological distress in our structural equation model, described below.

Next, we tested the structural model as to whether psychological distress mediated the relation of parental involvement to self-care behavior and whether self-care behavior then mediated the relation of psychological distress to glycemic control. We did not control for living situation (with parents or not), illness duration or insulin delivery method as they were not related to any of the predictor variables in the model; only insulin delivery method was related to glycemic control (i.e., pumps better

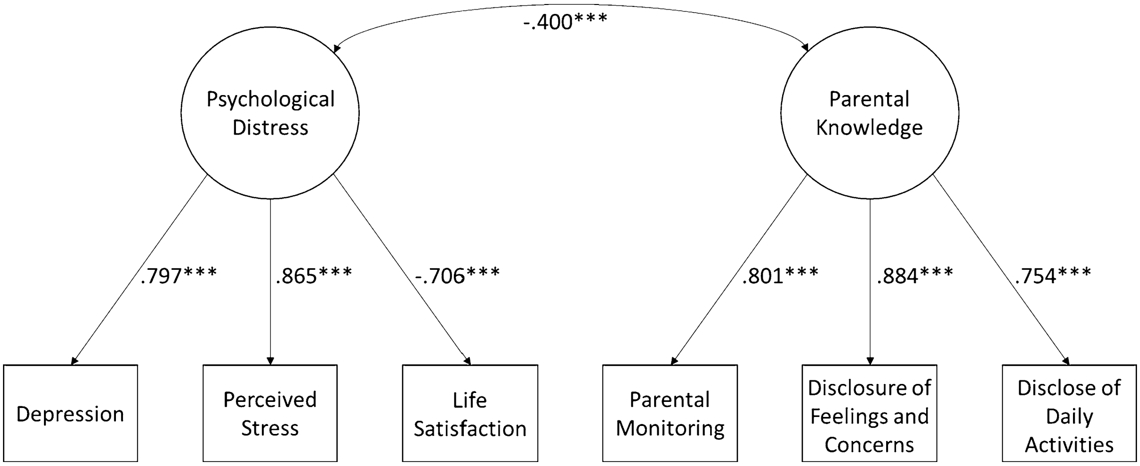

Fig. 1 Confirmatory factor analysis of parent knowledge and psychological distress latent variables. ***$p < .001$

control). The hypothesized model, shown in Fig. 2, fit the data well (CFI = .99; TLI = .99; RMSEA = .01; SRMR .07). The Chi square also was not significant—X^2 (19) = 19.26, $p = .44$. In addition, all of the paths were significant. To further support this mediational model, we used bootstrapping within MPlus to test the specific indirect effects. The indirect effect of psychological distress on the relation of parent knowledge to self-care was significant (B = .12, SE = .06, $p < .05$), whereas the direct relation of parent knowledge to self-care was not (B = .17, SE = .13, $p = .19$). The indirect effect of self-care on the relation of psychological distress to glycemic control was significant (B = .18, SE = .06, $p < .01$), whereas the direct effect was not (B = .03, SE = .13, $p = .83$).

Because the data are largely cross-sectional, we can only conclude that this model is consistent with the data. Therefore, we tested several alternative models. First, we reversed the direction between glycemic control and self-care behavior. In this case, the Chi square was significant, $X^2(19) = 30.47$, $p < .05$, and the fit indices not optimal (CFI = .95; TLI = .93; RMSEA = .08; SRMR = .10). In addition, the relation of psychological distress to glycemic control was only marginally significant.

We also tested an alternative model in which we switched the relations of self-care behavior to psychological distress, so that self-care behavior mediated the relation of parental involvement to psychological distress. This model also revealed a poor fit to the data. The Chi square was significant, $X^2(19) = 34.65$, $p < .05$. The fit statistics were not optimal: CFI = .93; TLI = .90; RMSEA = .09; SRMR = .11. Here the path from psychological distress to glycemic control was not significant.

Discussion

We investigated whether parents continue to exert an influence on the lives of emerging adults with type 1 diabetes by examining the links of parent knowledge to psychological, behavioral, and physical outcomes. The data we reported here suggest that the parent relationship remains an important one during emerging adulthood. The aspect of the relationship upon which we focused is parent knowledge. Parent knowledge is likely to reflect a healthy relationship between adult children and their parents—one in which emerging adults are choosing to share information about their lives with their parents. Emerging adults who discuss feelings and concerns as well as daily activities with parents may feel more comfortable turning to parents as a resource during times of stress. In turn, these parents may then be better equipped to provide helpful support. Parent knowledge is indicative of a relationship characterized by trust, as self-disclosure is more likely to take place in the context of a trusted relationship (Kerr et al., 1999).

One qualifier to the link of parent knowledge and child disclosure to health outcomes is the parent's reaction to the disclosure. Disclosure to accepting and non-judgmental parents is likely to benefit the relationship and the parent's ability to be an effective support resource to which the

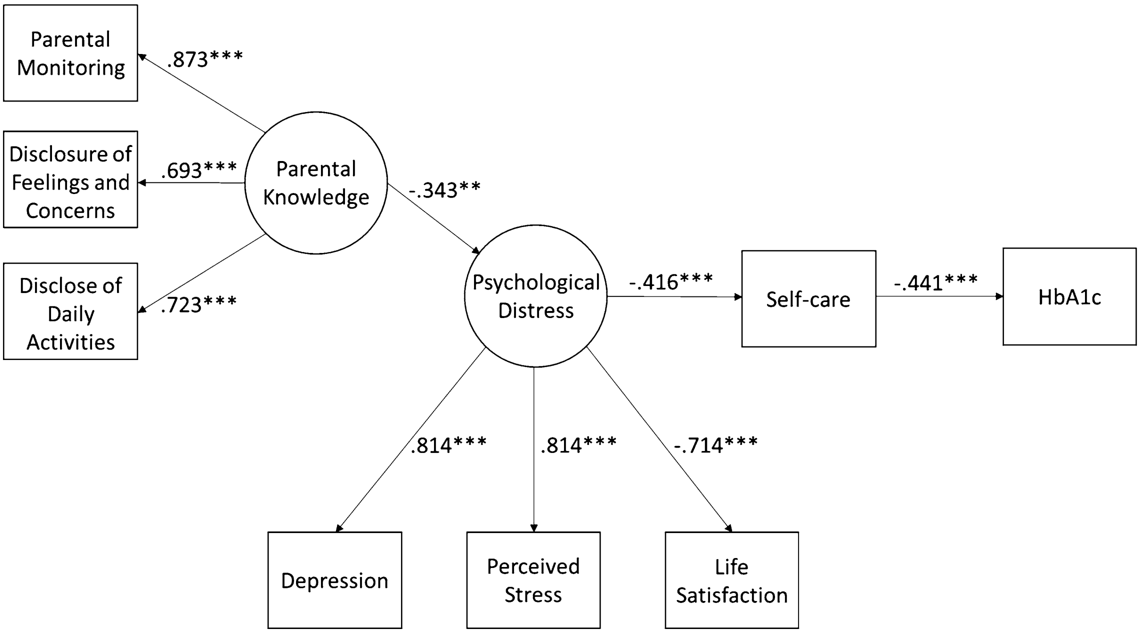

Fig. 2 Structural equation model of the link between parent knowledge and glycemic control. *$p < .05$; ***$p < .001$

child can turn. However, if parents react negatively by criticizing, failing to acknowledge feelings, or engaging in controlling behavior, the results of the disclosure are likely to be negative, as research has shown that social constraints inhibit disclosure and negatively affect mental health (Lepore & Helgeson, 1998). Thus, future research should incorporate parental reaction to disclosure as a potential moderator variable.

The model we confirmed suggests that one mechanism by which the relationship between parents and emerging adults is linked to diabetes outcomes is general psychological distress. There is a vast literature on healthy adolescents as well as those with diabetes showing high quality parent–child relationships are linked to better psychological well-being (see Helgeson & Palladino, 2012, for a review; Keijsers & Poulin, 2013). However, there is much less evidence to show that this remains the case with emerging adults. Thus, despite the increased autonomy associated with emerging adulthood, parents appear to be an important resource.

These findings suggest that adult practitioners should encourage rather than discourage the involvement of family members in the care of an emerging adult with diabetes. One concern that has been expressed in regard to the transfer of youth with diabetes from the pediatric to the adult health care system is the emphasis on autonomy and self-reliance and the failure to include family who were often heavily involved in pediatric care (Peters & Laffel, 2011). Given these findings, the diabetes health of an emerging adult may benefit from either a greater inclusion of family in the clinic or adult practitioners' encouragement of continued connections to family.

It is important to note that our parent knowledge variable is not diabetes-specific. We did not assess whether emerging adults are sharing information about their diabetes and their diabetes management with parents or whether parents are aware of their diabetes management behaviors, which we would expect to be even more strongly linked to diabetes outcomes. Ellis and colleagues (Ellis et al., 2008) developed a diabetes-specific measure of monitoring that includes parental supervision of diabetes-related activities, being present during diabetes self-management behaviors, and knowledge of diabetes management behaviors and found that it was indirectly related to glycemic control through self-care behavior in a study of adolescents. In a revision of the instrument, the investigators pulled the knowledge items out of the scale and showed that monitoring, child disclosure, and parent knowledge are all linked to glycemic control through self-care behavior among adolescents (Ellis et al., 2012). All of these studies, however, focus on adolescents. Thus, on the one hand, we recognize that our lack of diabetes-specific measures is a limitation of this study. However, we also suggest that the findings we report are all the more compelling because *general* parent knowledge is linked to diabetes-specific outcomes. And, importantly, this link appears among emerging adults. Future research should test whether diabetes-specific knowledge is another mechanism that links parent general knowledge to these outcomes, or whether parent general knowledge reflects some other aspect of parent–child interactions that could have benefits on psychological, behavioral, and physical health.

Because these data are cross-sectional, we can only conclude that the model we proposed and tested is consistent with our theory. To increase our confidence that the causal sequence we present in Fig. 2 best represented the data, we tested several alternative models. Specifically, we tested (1) whether self-care behavior mediated the relation of parent knowledge to psychological distress rather than psychological distress mediating the relation of parent knowledge to self-care behavior and (2) whether glycemic control mediated the relation of psychological distress to self-care behavior rather than self-care behavior mediating the relation of psychological distress to glycemic control. Neither was the case. However, we concur with Bullock et al., (2010) who argue that tests of mediation should be considered to be a "cumulative enterprise" as all mediational analyses, even experimental ones, have limitations. Many of these limitations stem from the influence of omitted variables, in particular omitted influences on mediators.

Other limitations include the fact that reports of parent knowledge came from the emerging adult rather than the parent, the fairly small sample size, and the lack of racial and ethnic diversity among participants. There may be cultural and ethnic differences in the norms for parent involvement in the lives of emerging adults. Whereas independence and individuality are emphasized as goals of adolescence in Western cultures, Eastern cultures may view maturity in terms of interdependence (Trommsdorff, 2006). The fact that all of the participants were recruited from the same clinic might be viewed as a study limitation, but 11 years later these emerging adults are seeing a variety of practitioners and do not all remain in the same geographic region. The fact that some participants moved out of the area made retention additionally challenging and limited our ability to apply the same in-person assessments to all participants. Despite this fact, a study strength is that our overall retention was high given that participants were followed for 11 years.

In conclusion, this study examines an understudied period of development—emerging adulthood—in an at-risk population and suggests that parents remain an important source of influence on psychological, behavioral, and physical health. Future longitudinal research should be directed at understanding more about the nature of the parent-emerging adult relationship at this time in their lives and how it can impact diabetes outcomes.

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Compliance with Ethical Standards

Conflicts of interest Vicki S. Helgeson, Abigail Kunz Vaughn, Howard Seltman, Trevor Orchard, Dorothy Becker, and Ingrid Libman declare that they have no conflicts of interest.

Human and animal rights and Informed consent All procedures performed in this study involving human participants were in accordance with the ethical standards of the Institutional Review Boards and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants for whom identifying information is included in this article.

References

Allen, D., & Gregory, J. (2009). The transition from children's to adult diabetes services: Understanding the 'problem'. *Diabetes Medicine, 26,* 162–166.

Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist, 55,* 469–480.

Arnett, J. J. (2004). *Emerging adulthood: The winding road from the late teens through the twenties*. New York: Oxford University Press.

Berg, C. A., King, P. S., Butler, J. M., Pham, P., Palmer, D., & Wiebe, D. J. (2011). Parental involvement and adolescents' diabetes management: The mediating role of self-efficacy and externalizing and internalizing behaviors. *Journal of Pediatric Psychology, 36*(3), 329–339.

Bryden, K. S., Dunger, D. B., Mayou, R. A., Peveler, R. C., & Neil, H. A. (2003). Poor prognosis of young adults with type 1 diabetes: A longitudinal study. *Diabetes Care, 26,* 1052–1057.

Bullock, J. G., Green, D. P., & Ha, S. E. (2010). Yes, but what's the mechanism? (Don't expect an easy answer). *Journal of Personality and Social Psychology, 98*(4), 550–558.

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior, 24,* 385–396.

Delamater, A., Applegate, B., Edison, M., & Nemery, R. (1998). Increased risks for poor metabolic control in minority youths with type 1 diabetes. *Diabetes, 47,* A326.

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment, 49*(1), 71–75.

Ellis, D. A., Templin, T. N., Moltz, K., Naar-King, S., Dekelbab, B., & Carcone, A. I. (2012). Psychometric properties of the revised parental monitoring of diabetes care questionnaire in adolescents with type 1 diabetes. *Journal of Adolescent Health, 50,* 289–295.

Ellis, D. A., Templin, T. N., Podolski, C.-L., Frey, M. A., Naar-King, S., & Moltz, K. (2008). The parental monitoring of diabetes care scale: Development, reliability and validity of a scale to evaluate parental supervision of adolescent illness management. *Journal of Adolescent Health, 42,* 146–153.

Fry, R. (2013). A rising share of young adults live in their parents' home. Pew Research Center. Retrieved from http://www.pewsocialtrends.org/2013/08/01/a-rising-share-of-young-adults-live-in-their-parents-home/

Gendelman, N., Snell-Bergeon, J. K., McFann, K., Rewers, M., Kinney, G., & Maahs, D. M. (2009). Prevalence and correlates of depression individuals with and without type 1 diabetes. *Diabetes Care, 32,* 575–579.

Greco, P., La Greca, A. M., Auslander, W. F., Spetter, D., Skyler, J. S., Fisher, E. B., et al. (1990). Assessing adherence in IDDM: A comparison of two methods. *Diabetes, 39,* 165A.

Harris, M. A., Wysocki, T., Sadler, M., Wilkinson, K., Harvey, L. M., Buckloh, L. M., et al. (2000). Validation of a structured interview for the assessment of diabetes self-management. *Diabetes Care, 23*(9), 1301–1304.

Helgeson, V. S., & Palladino, D. K. (2012). Implications of psychosocial factors for diabetes outcomes among children with type 1 diabetes: A review. *Social and Personality Psychology Compass, 6*(3), 228–242.

Helgeson, V. S., Palladino, D. K., Reynolds, K. A., Becker, D. J., Escobar, O., & Siminerio, L. M. (2014a). Early adolescent predictors of emerging adulthood outcomes: Youth with and without type 1 diabetes. *Annals of Behavioral Medicine, 47,* 270–279.

Helgeson, V. S., Palladino, D. K., Reynolds, K. A., Becker, D. J., Escobar, O., & Siminerio, L. M. (2014b). Relationships and health among emerging adults with and without type 1 diabetes. *Health Psychology, 33*(10), 1125–1133.

Helgeson, V. S., Reynolds, K. A., Siminerio, L. M., Escobar, O., & Becker, D. J. (2008a). Distribution of parent and adolescent responsibility for diabetes self care: Emerging impact of shared responsibility. *Journal of Pediatric Psychology, 33,* 497–508.

Helgeson, V. S., Reynolds, K. A., Siminerio, L. M., Escobar, O., & Becker, D. J. (2008b). Parent and adolescent distribution of responsibility for diabetes self-care: Links to health outcomes. *Journal of Pediatric Psychology, 33*(5), 497–508.

Helgeson, V. S., Siminerio, L. M., Escobar, O., & Becker, D. J. (2009). Predictors of metabolic control among adolescents with diabetes: A four year longitudinal study. *Journal of Pediatric Psychology, 34,* 254–270.

Hendricks, M., Monaghan, M., Soutor, S., Chen, R., & Holmes, C. S. (2013). A profile of self-care behaviors in emerging adults with type 1 diabetes. *The Diabetes Educator, 39,* 195–203.

Hislop, A. L., Fegan, P. G., Schlaeppi, M. J., Duck, M., & Yeap, B. B. (2008). Psychology prevalence and associations of psychological distress in young adults with type 1 diabetes. *Diabetic Medicine, 25,* 91–96.

Holmbeck, G. N., Friedman, D., Abad, M., & Jandasek, B. (2006). Development and psychopathology in adolescence. In D. A. Wolfe & E. J. Mash (Eds.), *Behavioral and emotional disorders in adolescents: Nature, assessment, and treatment* (pp. 21–55). New York: Guilford Publications.

Ingerski, L. M., Anderson, B. J., Dolan, L. M., & Hood, K. K. (2010). Blood glucose monitoring and glycemic control in adolescence: Contribution of diabetes-specific responsibility and family conflict. *Journal of Adolescent Health, 47,* 191–197.

Keijsers, L., & Poulin, F. (2013). Developmental changes in parent-child communication throughout adolescence. *Developmental Psychology, 49*(12), 2301–2308.

Kerr, M., & Stattin, H. (2000). What parents know, how they know it, and several forms of adolescent adjustment: Further support for a reinterpretation of monitoring. *Developmental Psychology, 36*(3), 366–380.

Kerr, M., Stattin, H., & Trost, K. (1999). To know you is to trust you: Parents' trust is rooted in child disclosure of information. *Journal of Adolescence, 22,* 737–752.

King, P. S., Berg, C. A., Butner, J., Butler, J. M., & Wiebe, D. J. (2014). Longitudinal trajectories of parental involvement in type

1 diabetes and adolescents' adherence. *Health Psychology, 33*(5), 424–432.

King, P. S., Berg, C. A., Butner, J., Drew, L. M., Foster, C., Donaldson, D. L., et al. (2012). Longitudinal trajectories of metabolic control across adolescence: Associations with parental involvement, adolescents' psychosocial maturity, and health care utilization. *Journal of Adolescent Health, 50,* 491–496.

Kristensen, L. J., Thastum, M., Mose, A. H., Birkebaek, N. H., & Danish Society for Diabetes in Childhood and Adolescence. (2012). Psychometric evaluation of the adherence in diabetes questionnaire. *Diabetes Care, 35*(11), 2161–2166.

La Greca, A. M., Swales, T., Klemp, S., & Madigan, S. (1988). *Self care behaviors among adolescents with diabetes*. Paper presented at the Ninth Annual Sessions of the Society of Behavioral Medicine, Baltimore, MD.

Lepore, S. J., & Helgeson, V. S. (1998). Social constraints, intrusive thoughts, and mental health after prostate cancer. *Journal of Social and Clinical Psychology, 17*(1), 89–106.

Lewin, A. B., La Greca, A. M., Geffken, G. R., Williams, L. B., Duke, D. C., Storch, E. A., et al. (2009). Validity and reliability of an adolescent and parent rating scale of type 1 diabetes adherence behaviors: The Self-Care Inventory (SCI). *Journal of Pediatric Psychology, 34*(9), 999–1007.

Lustman, P. J., Anderson, R. J., Freedland, K. E., de Groot, M., Carney, R. M., & Clouse, R. E. (2000). Depression and poor glycemic control: A meta-analytic review of the literature. *Diabetes Care, 23,* 934–942.

Lyons, S. K., Becker, D. J., & Helgeson, V. S. (2014). Transfer from pediatric to adult health care: Effects on diabetes outcomes. *Pediatric Diabetes, 15,* 10–17.

Lyons, S. K., Libman, I., & Sperling, M. (2013). Clinical review: Diabetes in the adolescent: Transitional issues. *Journal of Clinical Endocrinology and Metabolism, 98,* 4639–4645.

Main, A., Wiebe, D. J., Van Bogart, K., Turner, S. L., Tucker, C., Butner, J. E., et al. (2015). Secrecy from parents and type 1 diabetes management in late adolescence. *Journal of Pediatric Psychology, 40*(10), 1075–1084.

Monaghan, M., Helgeson, V. S., & Wiebe, D. J. (2015). Type 1 diabetes in young adulthood. *Current Diabetes Reviews, 11,* 239–250.

Needham, B. L. (2008). Reciprocal relationships between symptoms of depression and parental support during the transition from adolescence to young adulthood. *Journal of Youth and Adolescence, 37,* 893–905.

Osborn, P., Berg, C. A., Hughes, A. E., Pham, P., & Wiebe, D. J. (2013). What mom and dad don't know CAN hurt you: Adolescent disclosure to and secrecy from parents about type 1 diabetes. *Journal of Pediatric Psychology, 38*(2), 141–150.

Palmer, D. L., Osborn, P., King, P. S., Berg, C. A., Butler, J. M., Butner, J., et al. (2011). The structure of parental involvement and relations to disease management for youth with type 1 diabetes. *Journal of Pediatric Psychology, 36*(5), 596–605.

Peters, A., & Laffel, L. (2011). Diabetes care for emerging adults: Recommendations for transition from pediatric to adult diabetes care systems. *Diabetes Care, 34*(11), 2477–2485.

Psihogios, A. M., & Holmbeck, G. N. (2013). Discrepancies in mother and child perceptions of spina bifida medical responsibilities during the transition to adolescence: Associations with family conflict and medical adherence. *Journal of Pediatric Psychology, 38,* 859–870.

Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1,* 385–401.

Sparud-Lundin, C., Ohrn, I., Danielson, E., & Forsander, G. (2008). Glycaemic control and diabetes care utilization in young adults with type 1 diabetes. *Diabetic Medicine, 25,* 968–973.

Stattin, H., & Kerr, M. (2000). Parental monitoring: A reinterpretation. *Child Development, 71*(4), 1072–1085.

Substance Abuse and Mental Health Services Administration. (2011). *Results from the 2010 national survey on drug use and health: Summary of national findings*. Rockville, MD: Substance Abuse and Mental Health Services Administration.

Trommsdorff, G. (2006). Parent-child relations over the life-span. A cross-cultural perspective. In K. H. Rubin & O. B. Chung (Eds.), *Parenting beliefs, behaviors, and parent-child relations. A cross-cultural perspective* (pp. 143–183). New York, NY: Psychology Press.

Van Tilburg, M. A., McCaskill, C. C., Lane, J. D., Edwards, C. L., Bethel, A., Feinglos, M. N., et al. (2001). Depressed mood is a factor in glycemic control in type 1 diabetes. *Psychosomatic Medicine, 63,* 551–555.

Vesco, A. T., Anderson, B. J., Laffel, L. M. B., Dolan, L. M., Ingerski, L. M., & Hood, K. K. (2010). Responsibility sharing between adolescents with type 1 diabetes and their caregivers: Importance of adolescent perceptions on diabetes management and control. *Journal of Pediatric Psychology, 35*(10), 1168–1177.

Walders, N., Drotar, D., & Kercsmar, C. (2000). The allocation of family responsibility for asthma management tasks in African American adolescents. *Journal of Asthma, 37,* 89–99.

Wiebe, D. J., Berg, C. A., Korbel, C., Palmer, D. L., Beveridge, R. M., Upchurch, R., et al. (2005). Children's appraisals of maternal involvement in coping with diabetes: Enhancing our understanding of adherence, metabolic control, and quality of life across adolescence. *Journal of Pediatric Psychology, 30,* 167–178.

Wolpert, H. A., & Anderson, B. J. (2001). Young adults with diabetes: Need for a new treatment paradigm. *Diabetes Care, 24,* 1513–1514.

Wysocki, T., Nansel, T. R., Holmbeck, G. N., Chen, R., Laffel, L. M. B., Anderson, B. J., et al. (2009). Collaborative involvement of primary and secondary caregivers: Associations with youths' diabetes outcomes. *Journal of Pediatric Psychology, 34*(8), 869–881.