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Keeping Parents Connected in Early Emerging Adulthood: Diabetes-Related Disclosure and Solicitation

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Abstract

Emerging adults with type 1 diabetes benefit when parents remain knowledgeable of their self-management. Yet, how early emerging adults remain connected with parents while they experience normative declines in involvement and move out of the parental home is unclear. The present study examined how disclosure to and solicitation from parents may 1) be a way that emerging adults and parents remain connected, 2) occur with different methods of contact (i.e., face-to-face; nonface-to-face), and 3) associate with diabetes management differently for those living in versus outside of the parental home. Early emerging adults with type 1 diabetes ($N = 202$, $M_{\text{age}} = 18.81$, 66% Female) completed measures of their methods of contact with parents, diabetes-related disclosure to and solicitation from parents, and diabetes management as part of a 14-day daily diary. General linear models found that largely face-to-face contact associated with greater disclosure to parents, for both those living in and out of the parental home. Individuals who lived outside the parental home used more nonface-to-face contact (e.g., texting) than those in the parental home. Multilevel models revealed that higher disclosure to mothers on a daily basis (within-persons), and to mothers and fathers overall (between-persons) associated with better diabetes management largely similarly for those living in versus out of the parental home. Results suggest that face-to-face contact may be most effective for keeping parents “in the know” about diabetes management. Moreover, disclosure and solicitation continue to support diabetes management, even as individuals move out of the parental home.

Keywords

emerging adulthood; type 1 diabetes; parent-child contact; disclosure; diabetes management

Emerging adulthood – the developmental period roughly from ages 18–25 - is a changing time for parent-child relationships (Arnett, 2000). Across adolescence, teens spend less time in face-to-face contact with their parents and more time away from the family home at

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school or in extracurricular activities (Keijsers & Poulin, 2013). By early emerging adulthood, individuals begin to leave the parental home, embark on full-time employment or higher education, and take on many other more ‘adult-like’ responsibilities (Arnett, 2000). Although decreased parental involvement is normative, across late adolescence and into early emerging adulthood individuals with chronic illnesses like type 1 diabetes experience better illness management and outcomes when parents are aware of and involved in their daily self-management (Hanna et al., 2013; Helgeson et al., 2014; King, Berg, Butner, Butler, & Wiebe, 2014).

Type 1 diabetes is a chronic illness in which individuals engage in a complex daily self-management regimen, which is bolstered by higher supportive parental involvement across adolescence (Wiebe, Berg, Mello, & Kelly, 2018). Late adolescence and emerging adulthood have been characterized as especially ‘high risk’ times compared to other ages for individuals with type 1 diabetes (Weissberg-Benchell, Wolpert, & Anderson, 2007), as evidenced by both high and increased HbA1c levels (Hanna et al., 2014; Miller et al., 2015), gaps in receiving routine medical care, and higher rates of life-threatening complications (Peters & Laffel, 2011). Diabetes management consists of numerous daily behaviors (e.g., checking blood glucose before meals, calculating and administering insulin in response to blood glucose values, carrying emergency supplies, and adjusting insulin needs in response to exercise). Late adolescents and emerging adults take on increasingly more responsibility for these behaviors (Follansbee, 1989; Palmer et al., 2009). Increased independence in diabetes management may be fostered by supportive relationships, similar to how independence or autonomy develops and is bolstered in the context of supportive relationships – most notably, with parents (Allen et al., 2002; McElhaney-Boykin, Allen, Stephenson, & Hare, 2004). A qualitative study of university students with type 1 diabetes showed that participants continue to rely on their families, especially mothers, for diabetes-related support. Further, as they moved from home to living at university, most participants discussed issues of effectively utilizing their mothers for support, and perceived lower support from mothers as having negative impacts on their diabetes self-care (Habenicht, Gallagher, O’Keefe, & Creaven, 2018). It is unclear in the context of diabetes how emerging adults and parents remain connected as they make the transition out of the parent home for the first time. Moreover, early emerging adults with type 1 diabetes may require a delicate balance between keeping parents in the know about diabetes management and promoting normative independence. As individuals begin to move out of the parent home, how do they keep their parents aware of their diabetes management, and does the sharing of diabetes-related information support self-management in early emerging adulthood?

Disclosure and solicitation are two processes by which early emerging adults may help keep parents informed about their diabetes management during this transitional time. Emerging adults may spontaneously disclose diabetes management information to their parents to keep them “in the know” and elicit help when they feel they need it. Across adolescence, greater disclosure to mothers and fathers about diabetes has been associated with better adherence and mean blood glucose values (Berg et al., 2017; Osborn et al., 2013). In late adolescence, daily associations of disclosure also are evident, such that on days in which teens disclose to mothers about diabetes, teens also experience better daily adherence and fewer daily diabetes-related self-regulation failures (e.g., forgetting to check blood glucose or being too

upset to check blood glucose, Berg et al., 2017). Parents also may solicit diabetes-related information (i.e., directly ask) as a way to stay in the know in emerging adults' diabetes management. Though solicitation is part of the process of communicating about diabetes, and is associated with adolescent reports of greater parental knowledge of and helpfulness with their diabetes management, by late adolescence it was not associated with daily diabetes management (Berg et al., 2017). It is not clear from the current literature whether processes of disclosure and solicitation are still beneficial for diabetes management in early emerging adulthood when increased independence and decreased contact with parents are both developmentally normative.

Disclosure to and solicitation from parents may be more difficult to maintain in ways that are perceived as supportive as early emerging adults make their first move out of the parental home. Emerging adults with type 1 diabetes may utilize communication strategies other than face-to-face contact (e.g., texting during the day, phone conversations) in order to share diabetes-related information with parents. College students and their parents typically remain in regular contact (at least weekly) via a variety of methods most especially texting and phone calls (Fingerman et al., 2016; Stein, Osborn, & Greenberg, 2016). To the best of our knowledge no studies have examined daily contact with parents in a sample of early emerging adults with type 1 diabetes. Although it is likely that emerging adults keep connected with their parents through both face-to-face and nonface-to-face methods, it is unknown whether nonface-to-face communication strategies elicit disclosure and solicitation about diabetes management that have been effective for bolstering diabetes care earlier in adolescence.

Processes of daily disclosure and solicitation may work differently for emerging adults who live outside, compared to inside, the parental home. Moving out of the parental home is thought to spark changes in the parent-child relationship (Lindell & Campione-Barr, 2017). Moreover, leaving the parental home is associated with successful progression through developmental tasks of early emerging adulthood and normative decreased involvement from parents in daily life (Fingerman et al., 2016; Seiffge-Krenke, 2009). Early emerging adults with type 1 diabetes who leave the parental home are more independent in diabetes self-care than those who continue to live in the parental home (Hanna et al., 2014). Solicitation of diabetes-related information may not be beneficial for diabetes management for individuals who live outside the parental home, as it may be more difficult to solicit information in a way that is perceived as supportive rather than intrusive. That is, solicitation may signal to emerging adults that parents are not confident in their abilities to manage diabetes independently (Berg et al., 2013). In contrast, because disclosure to parents is initiated by the emerging adult, it may continue to be associated with better diabetes management even for those who live outside the parental home.

The ways in which emerging adults expect their parents to be involved in diabetes care may differ between mothers and fathers. Many studies of parental involvement in diabetes management across childhood and adolescence is based on research in mothers (e.g., Miller & Drotar, 2003) or as combined parent scores (e.g., Cameron et al., 2008; Hanna et al., 2014). Qualitative work highlights adolescents' perceptions that their mothers are more involved and knowledgeable in their diabetes, whereas perceptions of fathers are more

variable (Leonard, Garwick, & Adwan, 2005). Though fathers may not be as heavily involved as mothers, relationships and communication with fathers also are important for diabetes outcomes (Dashiff, Morrison, & Rowe, 2008). As mothers and fathers may be utilized differently, it is important to distinguish whether methods of contact, disclosure, or solicitation show similar or different patterns for mothers and fathers.

In the current study, we explored: 1) how and with what frequency early emerging adults with type 1 diabetes keep in contact with their parents on a daily basis (comparing those who lived outside versus inside the parental home), 2) to what extent different forms of contact (i.e. face-to-face compared to nonface-to-face) with parents associate with diabetes-specific disclosure and solicitation, and 3) whether there are differences in the benefits of disclosure to and solicitation from parents for daily diabetes management and outcomes for those living in versus outside of the parental home. First, we explored mean differences in the frequency and type of contact emerging adults used with their parents based on living situation. We expected that emerging adults who lived outside the parental home would report less contact with parents and use more nonface-to-face communication methods (e.g. texting) than those who lived inside the parental home. Second, we examined whether disclosure and solicitation associated with nonface-to-face (e.g., texting, social media, and phone calls) contact with parents or whether face-to-face contact was crucial for these processes. As the current research in this area is limited, we did not have specific predictions for whether nonface-to-face contact would be associated with disclosure and solicitation. Third, we examined whether emerging adults' daily reports of disclosure to or solicitation from parents associated with daily diabetes management across a 14-day time period and whether associations of daily disclosure and solicitation and diabetes management were moderated by living situation. We expected that on days when emerging adults reported that they disclosed diabetes-related information to their parents or their parents solicited information, diabetes management would be better (e.g., higher adherence, fewer self-regulation failures, and lower mean blood glucose). We further expected disclosure would be associated with better diabetes management regardless of whether or not early emerging adults lived in the parental home, while those who lived outside of the parental home would benefit less from solicitation than those who lived inside the parental home.

Methods

Participant Characteristics

Participants were recruited for a larger, multi-year longitudinal study on diabetes self-regulation during late adolescence and emerging adulthood. Individuals were eligible to participate if they were diagnosed with type 1 diabetes for at least one year, spoke English as their primary language (due to cognitive testing conducted as part of the larger study), had no condition that would prohibit study completion (e.g., severe intellectual disability), were in their final year of high school, lived with a parent or parental figure at time of recruitment, and expected to have regular contact with parents over the subsequent two-year follow-up assessment periods. Participants were recruited from three outpatient pediatric endocrinology clinics in two southwestern U.S. cities affiliated with two local universities – the University of Utah and the University of Texas Southwestern Medical Center. All study

procedures were approved by each university's Institutional Review Board (University of Utah in Salt Lake City, Utah; University of Texas Southwestern Medical Center in Dallas, Texas). More information about the sample at Time 1 is presented in other publications (Berg et al., 2017).

In the present study, we examined participants who completed both a survey and a 2-week daily diary one year after enrollment (Time 2). A total of 217 participants (89.7% of the original sample at Time 1) completed follow-up cross-sectional surveys at Time 2 and 212 participants completed at least one day of the 14-day daily diary. Participants ($N = 212$), on average, were 18.81 years old ($SD = .40$), 66.4% women, 46.7% used an insulin pump, and had an average HbA1c of 8.93%. Participants largely identified as White (76.26%), 5.05% identified as Black/African American, 2.53% identified as either Native American, Asian, or Native Hawaiian/Pacific Islander, 2.53% identified as more than one race, and 13.36% identified as Hispanic/Latino. Compared to those who completed diary measures, participants who did not complete the diary ($n = 6$) did not differ on cross-sectional measures of diabetes management ($p = .42$ – $.57$) or age ($p = .21$), but all 6 participants who did not complete diary measures lived in the parent home.

Procedure

Parental consent and participant assent (if younger than 18) or participant consent (if 18 or older) were obtained prior to enrollment in the larger study. All participants who were under age 18 at enrollment provided consent at Time 2. At Time 2, participants completed a cross-sectional online survey assessing diabetes management, family and social contexts, and provided a dried capillary blood sample to assess glycemic control. Participants then were asked to complete an online daily diary each night for 14 consecutive days. Participants were paid \$50 for completion of the cross-sectional online survey and providing a dried capillary blood sample, and \$5 for each night of diary surveys completed. On average, participants completed 11.04 ($SD = 3.75$) days of diaries across the maximum of 14 days. The present study mainly utilized measures from the daily diary survey, with the exception of living situation obtained from the cross-sectional survey.

Measures

Daily contact with parents.—After confirming that participants had a mother or father figure, participants were asked whether they had any contact with their mother or their father ('0' = no; '1' = yes) each day. To assess the methods by which emerging adults had contact with parents, participants were asked, "How many times did you and your mother/father talk *face-to-face* (in person) in the last 24 hours?", with response options ranging from 0 ("we did not talk face-to-face today") up to 11 ("more than 10 times). In addition, participants were asked how many times they were in contact with their mother or father that day via nonface-to-face methods via five forms of contact (email, phone, texting, social media, or other) using the same scale. A sum of *nonface-to-face* contact was calculated across these forms of contact for participant reports of mothers and fathers.

Daily disclosure to and solicitation from mothers and fathers.—To assess daily disclosure about diabetes to each parent, participants responded "yes" (1) or "no" (0) to the

prompt “Did you tell your mother/father about things that happened with your diabetes today, without her/him asking you?” each day of the diary. To assess parental solicitation, participants responded “yes” (1) or “no” (0) to “Did your mother/father ask what happened with your diabetes today?” each day of the diary.

Daily adherence.—Participants completed a brief index of seven items from the Self Care Inventory (SCI) (Lewin et al., 2009) that assessed self-care behaviors that occur daily. This scale has been used in other studies to examine daily adherence (Berg et al., 2017). Participants rated how well they followed recommendations for each adherence behavior that day (e.g., administering insulin) on a scale from 1 (“never did it”) to 5 (“always did it without fail”). Ratings were averaged across items to create a daily adherence composite, with higher scores indicating higher daily adherence ($\lambda_{00} = .96$).

Daily self-regulation failures.—Participants reported daily on their experience of eight failures in self-regulation surrounding blood glucose (BG) monitoring (e.g., “I kept putting off my BG testing,”; “Each time I was about to test my BG, I got distracted by something else”) using a 1 (“strongly disagree”) to 5 (“strongly agree”) scale. Daily monitoring of blood glucose is a crucial and difficult daily self-management behavior (Hood et al., 2009). Self-regulation failures are associated with, but distinct from, daily adherence and aim to capture the complex regulatory processes involved with diabetes management (Berg et al., 2014). A daily average of the items was used, with higher values indicating more self-regulation failures. Inter-item reliability of the eight items was calculated via random intercept models, with both time and item treated as nested levels and was excellent ($\lambda_{00} = .95$).

Daily average blood glucose (BG).—At the end of each day, participants were instructed to use their glucometers to report their BG values and time of each BG check. A daily mean BG level was created for each individual’s BG levels across the day. The transitional period of early emerging adulthood presented some challenges to more traditional methods of capturing blood glucose values, such as through direct glucometer downloads. That is, our participating clinics did not routinely download glucometer data, and the geographic mobility of individuals precluded in person downloads at the participating university sites. Additionally, as individuals at this age may not be regularly receiving care at practitioner’s offices (e.g., Peters & Laffel, 2011), we aimed for a method that would allow us to capture the most data from the most participants by relying on self-report of glucometer data.

Living situation.—To assess whether differences emerged for individuals who lived inside compared to outside the parental home, participants were asked to report their *primary* residence. Participants who indicated they lived primarily with their parents or guardians were coded as ‘1’. Participants who indicated they lived primarily elsewhere (e.g., in a college dorm; in an apartment with roommates) were coded as ‘0’. Roughly half of participants (47.5%) in the present sample had moved out of the parental home by the current Time 2 assessment.

Plan of Analysis

The goal of the current study was to understand how individuals kept in contact with mothers and fathers during the transitional time of emerging adulthood, and how contact with parents associated with daily diabetes management. Thus, the sample was limited to individuals who reported having a mother or father figure and having contact with a mother or father figure on at least one day across the 14-day diary period.

Missing data.—The total potential sample size for variables included 202 participants who answered questions about contact with mothers or fathers ($n = 8$ did not answer these questions) and who reported their living situation ($n = 2$ did not report living situation). Additionally, some participants reported they did not have a mother ($n = 1$) or father ($n = 11$) figure in their lives, and some participants reported they had no contact with their mothers ($n = 13$) or fathers ($n = 30$) at all across the diary period. For analyses with contact with mothers, the sample includes 188 individuals. For analyses with contact with fathers, the sample includes 161 individuals.

We did not impute missing data as 1) we did not want to impute data for participants who reported they did not have a mother or father figure and 2) we did not want estimate daily disclosure or solicitation for individuals who reported no contact at all with their mother or father across the two-week diary period.

No statistically significant differences emerged for individuals who reported not having a father figure compared to those who did on daily adherence, self-regulation failures, or mean BG averaged across the diary, or living situation ($p = .52 - .95$). For individuals who reported no contact with their mothers across the diary period, compared to those who did, there also were not statistically significant differences ($p = .31-.91$). Participants who reported no contact with their fathers across the diary period, compared to those who did, reported lower daily adherence ($M = 3.68$, $SD = .97$, $M_{\text{diff}} = .43$, $p = .03$) and higher daily mean BG ($M = 214.85$, $SD = 73.42$, $M_{\text{diff}} = 14.57$, $p = .03$).

Analyses.—To understand how early emerging adults kept in contact with parents and whether differences emerged based on living situation, we used *t*-tests to determine whether individuals differed on the methods they used to communicate with parents (e.g. texting, phone calls, face-to-face) depending on their living situation.

To understand whether different methods of contact (i.e. face-to-face, nonface-to-face) associated with diabetes disclosure or solicitation, we used a series of logit general linear models (GLM). We ran separate models for reports of mothers and reports of fathers, as including both in the same analysis would limit results to those individuals who had both a mother and father figure. We ran separate models for each form of contact (i.e., face-to-face contact and nonface-to-face contact with mothers; face-to-face and nonface-to-face contact with fathers) predicting each of the four outcomes (i.e., disclosure to and solicitation from mothers; disclosure to and solicitation from fathers). Living situation was included as a predictor in all GLM models.

To understand whether processes of disclosure and solicitation were beneficial for daily diabetes management, and whether within-person disclosure or solicitation worked differently based on living situation, we used a series of multilevel models (MLM). Similar to the analyses above models were separated for disclosure to and solicitation from mothers and disclosure to and solicitation from father. Gender was included as a covariate in all MLMs as evidence suggests there may be gender differences in adherence during adolescence (Naar-King et al., 2006). Use of an insulin pump was included as a covariate for MLMs with mean BG as an outcome, as use of an insulin pump associates with lower blood glucose (Weissberg-Benchell, Antidel-Lomaglio, & Seshadri, 2003).

All analyses were run in SPSS 24 (IBM, 2016) and statistical significance was determined at $p < .05$. In GLM and MLM models, we separated within-(daily) and between-person (average across days) effects by person-centering and grand-mean centering all predictor variables (see Hoffman & Stawski, 2009). Time was controlled for in all models using grand-mean centered day.

Results

Preliminary Analyses

Correlations and descriptives of all key variables are presented in Table 1. On average, participants reported contact with mothers on 63% of days and with fathers on 47% of days.

Differences in Disclosure, Solicitation, and Contact with Mothers and Fathers by Living Situation

Independent sample *t*-tests were used to first examine whether differences emerged in disclosure to, solicitation from, and type of contact with mothers or fathers as a function of living inside versus outside of the parental home. Results are presented in Table 2. There were no significant differences in disclosure to mothers or fathers by living situation. There were, however, significant differences in solicitation from mothers and fathers, such that individuals who lived outside of the parental home reported less solicitation from both mothers and fathers compared to individuals who lived inside the parental home. Moreover, differences emerged in the frequency and types of contact used, with those who lived outside the parental home reporting less frequent face-to-face contact with mothers and fathers across the diary period. Individuals who lived outside the parental home also used texting more than individuals who lived in the parental home.

Associations of Face-to-Face and Nonface-to-face Contact with Disclosure to and Solicitation from Mothers and Fathers

General linear models were used to examine whether face-to-face and nonface-to-face contact associated with both disclosure to and solicitation from parents. Face-to-face contact with mothers and fathers associated with disclosure and solicitation both within- and between- persons (see Table 3). That is, on days in which participants reported having more face-to-face contact with mothers or fathers, they were more likely to report they disclosed or their parent solicited information from them about their diabetes care. Moreover, individuals who reported higher face-to-face contact across the diary period (between-person

effect) also reported greater disclosure to and solicitation from both mothers and fathers. Nonface-to-face contact only associated with solicitation from fathers on average (i.e., between but not within-persons, see bottom of Table 3). That is, individuals who on average reported greater nonface-to-face contact also reported higher solicitation from their fathers. Nonface-to-face contact did not significantly associate with solicitation from mothers nor to disclosure to mothers or fathers within- or between-persons.

Associations of Disclosure to and Solicitation from Mothers and Fathers to Diabetes Management by Living Situation

We examined whether participants' reports of disclosure to and solicitation attempts from mothers and fathers associated with diabetes management and whether this was moderated by living situation. Results are presented separately for disclosure to (Table 4) and solicitation from mothers and fathers (Table 5). Higher between-person disclosure to mothers and fathers both associated with reports of better daily adherence and fewer self-regulation failures. Additionally, higher within-person disclosure to mothers associated with participants' reports of fewer daily self-regulation failures such that greater disclosure than one's average was associated with fewer self-regulation failures. No main effects of disclosure were significant when daily mean BG was an outcome. Further, no main effects emerged for living situation on any aspect of diabetes management, but a significant interaction emerged for within-person disclosure to fathers and living situation on mean BG (Table 3). A test of simple slopes revealed that the slope of the line was statistically significant for those who lived inside the parental home ($t = -19.79$; $p = .01$), such that one day in which individuals disclosed to their fathers about diabetes more than their average, their mean BG level was lower. The slope of the line for those who lived outside the parental home was not statistically significant ($t = 4.95$; $p = .60$).

Higher between-person solicitation from mothers associated with greater reports of daily adherence. Higher between-person solicitation from mothers and fathers both associated with fewer self-regulation failures (Table 5). No within-person effects were significant for solicitation from mothers or fathers on any aspect of diabetes management. Moreover, there were no interactions between living situation and daily solicitation.

Discussion

Our findings show that emerging adults use a variety of methods to keep in contact with their parents. Frequency of contact in our sample occurred on 63% of days for mothers and 47% of days for fathers across the two-week diary period. This was somewhat higher than reported by Fingerman and colleagues (2016) in which college students in the United States reported they contacted their parents 'a few times a month' on average by phone and a little less than 'a few times a month' on average in person. The methods used to communicate with parents and overall frequency of contact differed depending on whether emerging adults continued to live with their parents or not. Not surprisingly, emerging adults who lived outside of the parental home reported less face-to-face contact with their mothers and fathers, but greater nonface-to-face contact - especially texting. Our findings also were consistent with observations of emerging adults reporting lower nonface-to-face contact with

fathers than with mothers (Stein et al., 2016). The roughly half of emerging adults living in the parental home aligns with national statistics regarding the living situation of 18–24 year olds in the United States (Vespa, 2017). These results suggest that early emerging adulthood is characterized by continued (although less) frequent contact with both mothers and fathers even among emerging adults who have moved out of the parental home.

Importantly, nonface-to-face contact only associated between-persons with participants' reports of solicitation from fathers, but not from mothers. This finding for fathers, but not for mothers, highlights that communication methods and processes may be different between parents. Disclosing information about diabetes management may occur in face-to-face interactions with parents but not nonface-to-face interactions for a number of reasons. First, it may be that disclosing information about diabetes occurs more naturally in face-to-face interactions when self-care behaviors are happening concurrently with social interactions with parents. Second, many of our participants used text messages as their most frequent form of nonface-to-face communication. Disclosing to parents about diabetes may be difficult via text, as messages are short and may not be as conducive to a conversation about management issues. Future research in this area would benefit from analyzing text message content to understand to what extent diabetes management is communicated via this form of contact (see Underwood, Rosen, More, Ehrenreich, & Gentsch, 2012). Finally, rates of disclosure were fairly low in our sample (occurred on 24% of days to mothers and on 18% of days to fathers, on days in which individuals reported contact with parents). It was almost exclusively face-to-face contact that was associated with diabetes-related disclosure to and solicitation from mothers and fathers. As participants still reported fairly high face-to-face contact, it may be that in early emerging adulthood individuals still have enough face-to-face contact to feel as though they can discuss management in person, rather than using nonface-to-face forms of contact.

Higher between-person disclosure to and solicitation from mothers and fathers continued to support daily diabetes management across living situation, despite the fact that contact frequency and methods of contact were different between those who lived inside compared to outside the parental home. Higher disclosure across days to both mothers and fathers (see Table 4) associated with better daily adherence and fewer self-regulation failures. Higher solicitation across days from mothers associated with both better adherence and fewer self-regulation failures, and higher solicitation across days from fathers associated with fewer self-regulation failures (see Table 5). The between-persons, or across days, results are consistent with a growing body of literature that shows that greater parental involvement during late adolescence and early emerging adulthood associates with better diabetes management (Helgeson et al., 2014). On a daily basis, however, only disclosure to mothers associated with fewer self-regulation failures, unlike earlier in adolescence when individuals reported better adherence and fewer self-regulation failures on days in which they disclosed to mothers (Berg et al., 2017). By early emerging adulthood, the support individuals receive on days in which they disclose to mothers may assist in reducing self-regulation failures surrounding checking BG, rather than broader adherence behaviors such as eating the proper foods or counting carbohydrates – which individuals are more likely to be independently responsible for as they move out of the parental home.

Contrary to our hypothesis, our findings on the frequency of disclosure to and solicitation from parents and findings on the associations of disclosure to and solicitation from parents with diabetes management are largely similar regardless of living situation. Individuals who moved out of the parental home reported similar, though somewhat low, levels of disclosure to mothers and fathers. Only solicitation was lower for individuals who lived outside the parent home, which may reflect both mothers and fathers understanding that too much solicitation of information may be viewed as nagging or intrusive for their emerging adult child who has achieved this milestone. We found some support for a differential benefit of disclosure to fathers with mean BG levels as a function of living situation. It was only individuals who lived inside the parental home who displayed a modest decline in mean BG on days in which they disclosed more to their fathers (see Figure 1). This effect should be interpreted with caution, as, as the effect was small and replication in larger samples is warranted. It does, however, provide some support that relationship processes with parents are starting to change even at this early period in emerging adulthood one year out of high school. Moreover, the changes observed may occur differently in relationships with mothers and relationships with fathers.

The study results should be interpreted in the context of some limitations. First, our participants were only one year out of high school. While we were interested in examining the initial move out of the home at this early time period, disclosure to and solicitation from parents may change more substantially at later points in emerging adulthood. Our results only capture that first change and not subsequent changes that may occur across longer periods of time. Second, although disclosure to parents appears to be important for early emerging adults' adherence to self-care and experience of self-regulation failures, our findings may not extend to later emerging adulthood as individuals begin to use romantic partners or close friends more (Villalobos Solís, Smetana, & Comer, 2015) to elicit support for diabetes care. It is important to note, however, that in at least one other sample, emerging adults (M age = 25.2 years old) reported that parents were still the most frequent (52%) source of health-related social control surrounding diabetes (Thorpe, Lewis, & Sterba, 2008). Thus, while parents certainly are not the only important relationship for diabetes care at this age (see Wiebe et al., 2018), they are still involved. Whether that involvement is largely positive, negative, or a mix of both, however, warrants further longitudinal investigation. Third, we asked about the frequency and type of communication participants had with their mothers and fathers, but we did not limit this to diabetes-specific communications as was specified for disclosure and solicitation. As only face-to-face contact associated with greater diabetes-related disclosure to and solicitation from parents, further work is needed to understand how diabetes-specific contact occurs in emerging adulthood. Fourth, the blood glucose data were captured via self-report of blood glucose values from glucometers to capture blood glucose data from individuals who may not regularly attend clinics (where glucometer data may be downloaded) or who had moved out of the study area, both of which are common experiences for early emerging adults with diabetes. However, it is possible that some glucometer readings were mis-entered by participants or not reported (e.g., participants having multiple meters and only having access to one at the end of the day). Replication of these results with glucometer downloads from study-provided glucometers or real-time glucose data via continuous glucose monitoring

would be beneficial. Finally, though our analyses capture processes of disclosure and solicitation at the daily level and across days, the results presented are same-day associations. In our sample, exploration of lagged effects was complicated, and results would have been limited to a subsample of days within individuals. That is, only participants who reported contact with their mother or father and also completed the diary the following day would be included in these analyses. Additionally, examination of disclosure to or solicitation from mothers or fathers may best be examined throughout the day so that the process of disclosure to parents, their provision of support, and diabetes management can be assessed in real time. Future research should explore both next-day and real-time (e.g., via ecological momentary assessment) associations to understand whether there may be additional effects of disclosure or solicitation for diabetes-self management.

To the best of our knowledge, this study is among the first to explore how transitions such as moving out of the parental home are associated with how early emerging adults keep in contact with their parents and whether parents being ‘in the know’ about diabetes continues to support good diabetes management during this transitional developmental period. The present study has implications for the management of type 1 diabetes in the family context. Results demonstrated that keeping parents ‘in the know’ about diabetes may be beneficial for early emerging adults’ diabetes management, even when they live outside of the family home. Results suggest that early emerging adults may benefit from some face-to-face contact with parents with parents that fosters disclosure and solicitation, which may help support diabetes management. It is unclear, however, if intervention efforts that use nonface-to-face methods (i.e. texting) to support diabetes management (Mulvaney et al., 2012) also will be effective in emerging adulthood. Interventions may help determine how to best encourage diabetes-related disclosure in early emerging adulthood to help reduce daily self-regulation failures during this transitional time. Individuals may or may not disclose to their parents about their diabetes management for a variety of reasons. For some individuals, disclosure may elicit parent reactions to poor management that may not be perceived as helpful. For others, disclosing about diabetes management may lead to more collaborative efforts, even as individuals move away from home, to figure out together how to get back on track with self-care efforts. Variability in responses to disclosure have been observed in qualitative work (Habenicht et al., 2018) and would caution against blanket recommendations for increasing disclosure to parents for all emerging adults.

The results have implications for keeping parents and emerging adults connected as they deal with other transition issues during early emerging adulthood. For instance, keeping parents connected so that they can monitor emerging adults has been beneficial in reducing harmful drinking or substance abuse (Pesola et al., 2015; White et al., 2006). Persistently low levels of disclosure across adolescence, in particular, associated with riskier behavior at age 18 (e.g. drinking, substance abuse) (Padilla-Walker, Son, & Nelson, 2018). Though disclosure to parents is important across a variety of domains, future research is needed to understand how individuals are affected by established patterns of interacting with parents and whether family-based interventions may help to move individuals into less risky trajectories. Finding a way to balance continued parental involvement that is supportive without being intrusive may be most beneficial for emerging adults and changing relationships with their parents. One way developmentally-appropriate involvement from

parents may be accomplished is by keeping in contact with parents through a variety of methods, for example texting, to facilitate communication and support with parents when it is needed. Among emerging adults with type 1 diabetes, keeping parents connected may facilitate the support needed for both normative and diabetes-specific issues that occur during a potentially difficult transitional developmental period.

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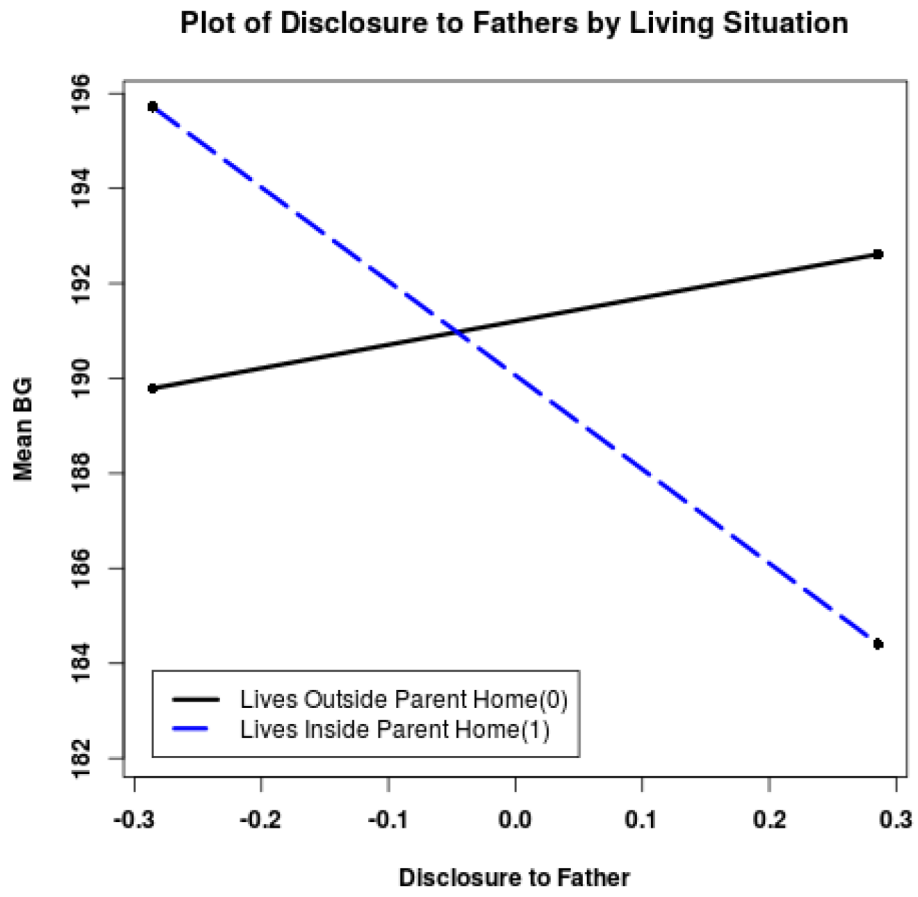


Figure 1. Plot of cross-level interaction between daily disclosure to fathers and living situation with daily mean blood glucose.

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Table 1.

Correlations, means, and standard deviations of key variables aggregated across days

	1	2	3	4	5	6	7	8	9	M (SD)
1. Contact with Mother	---	---	---	---	---	---	---	---	---	.63 (.33)
2. Disclosure to Mother	.17	---	---	---	---	---	---	---	---	.24 (.31)
3. Solicitation to Mother	.14	.68	---	---	---	---	---	---	---	.28 (.34)
4. Contact with Father	.46	.17	.10	---	---	---	---	---	---	.47 (.35)
5. Disclosure to Father	.05	.74	.45	.17	---	---	---	---	---	.18 (.29)
6. Solicitation to Father	-.04	.61	.61	.20	.74	---	---	---	---	.17 (.29)
7. Adherence	.08	.29	.20	.17	.17	.11	---	---	---	4.05 (.74)
8. Self-Regulation Failures	-.11	-.37	-.30	-.12	-.23	-.25	-.69	---	---	2.23 (.88)
9. Mean BG	.04	-.05	-.07	-.14	-.13	-.21	-.40	.29	---	185.69 (51.91)
10. Living Situation	.18	.08	.15	.24	.08	.16	-.01	-.05	-.00	.52 (.50)

Notes. All diary variables are mean scores across the diary days. *n* = 202. Bold indicates significant at *p* .05.

Table 2.

Mean Differences in Parent Contact and Diabetes Management by Living Situation.

	Lives In Parent Home		Lives Outside Parent Home		Comparison	
	<i>Mean (SD)</i>	<i>Mean (SD)</i>	<i>Mean Difference (SE)</i>	<i>95% CI</i>		
Mothers (n = 188)						
Any Contact	.73 (.29)	.60 (.29)	-.13 (.04)	[-.21, -.05]		
Face-to-Face	4.88 (3.06)	2.36 (2.79)	-2.52 (.43)	[-3.36, -1.68]		
Phone Call	.99 (1.10)	1.24 (1.21)	.25 (.17)	[-.08, .58]		
Text	1.68 (2.09)	2.52 (2.36)	.84 (.33)	[.20, 1.48]		
Email	.13 (.53)	.13 (.37)	.00 (.07)	[-.13, .14]		
Social Media	.17 (.63)	.08 (.20)	-.09 (.07)	[-.22, .05]		
Disclosure	.26 (.33)	.21 (.28)	-.05 (.05)	[-.14, .04]		
Solicitation	.33 (.36)	.23 (.30)	-.10 (.05)	[-.20, -.01]		
Fathers (n = 161)						
		Lives In Parent Home		Lives Outside Parent Home		Comparison
	<i>Mean (SD)</i>	<i>Mean (SD)</i>	<i>Mean Difference (SE)</i>	<i>95% CI</i>		
Any Contact	.65 (.32)	.45 (.28)	-.20 (.05)	[-.28, -.11]		
Face-to-Face	4.02 (2.76)	2.75 (2.80)	-1.28 (.44)	[-2.14, -.41]		
Phone Call	.66 (.99)	.85 (1.29)	.19 (.18)	[-.16, .56]		
Text	.75 (1.60)	1.52 (1.82)	.77 (.27)	[.23, 1.31]		
Email	.03 (.18)	.06 (.20)	.03 (.03)	[-.03, .09]		
Social Media	.04 (.18)	.03 (.11)	-.02 (.02)	[-.06, .03]		
Disclosure	.20 (.31)	.15 (.27)	.05 (.05)	[-.14, .04]		
Solicitation	.22 (.32)	.12 (.24)	-.09 (.04)	[-.18, -.00 [†]]		
Diabetes Management (n = 201)						
		Lives In Parent Home		Lives Outside Parent Home		Comparison
	<i>Mean (SD)</i>	<i>Mean (SD)</i>	<i>Mean Difference (SE)</i>	<i>95% CI</i>		
Adherence	4.04 (.77)	4.06 (.72)	.01 (.10)	[-.19, .22]		
BG Self-Regulation Failures	2.20 (.87)	2.28 (.90)	.08 (.12)	[-.17, .32]		
BG Mean	183.61 (54.32)	185.78 (49.14)	.17 (.744)	[-14.51, 14.85]		

Note. All variables averaged across the diary period. 'Lives in parent home' coded as 1 and 'lives outside parent home' coded as 0. Equal variances not assumed in *t*-tests. Bold indicates statistically significant at *p* < .05.

[†]Upper Bound 95% CI = -.004

Associations of face-to-face and nonface-to-face contact with disclosure to and solicitation from mothers and fathers.

Table 3.

<u>Mothers</u>	Disclosure		Solicitation		Fathers	Disclosure		Solicitation	
	Coeff. Estimate	p value	Coeff. Estimate	p value		Coeff. Estimate	p value	Coeff. Estimate	p value
Intercept	-1.58	< .001	-1.17	< .001	Intercept	-1.96	< .001	1.92	< .001
Face-to-Face (WP)	.18	< .001	.17	< .001	Face-to-Face (WP)	.16	< .001	.20	< .001
Face-to-Face (BP)	.22	< .001	.19	< .001	Face-to-Face (BP)	.21	.001	.23	.001
Living Situation	.11	.75	-.19	.57	Living Situation	-.13	.72	-.56	.16
Day	-.02	.28	.00	.82	Day	-.04	.17	.03	.27
<u>Mothers</u>	Disclosure		Solicitation		Fathers	Disclosure		Solicitation	
Coeff. Estimate	p value	Coeff. Estimate	p value	Coeff. Estimate		p value	Coeff. Estimate	p value	
Intercept	-1.19	< .001	-.85	< .001	Intercept	-1.64	< .001	-1.56	< .001
NonFace-to-Face (WP)	.02	.40	.02	.39	NonFace-to-Face (WP)	-.02	.69	-.05	.39
NonFace-to-Face (BP)	.07	.10	.05	.28	NonFace-to-Face (BP)	.13	.07	.14	.05
Living Situation	-.48	.11	.64	.03	Living Situation	-.50	.18	-.91	.19
Day	-.02	.32	.01	.77	Day	-.04	.15	.03	.28

Note. Coefficient estimates are z-scores from general linear models. Living situation coded as 0 ('lives outside parent home') and 1 ('lives inside parent home'). 'Mothers' and 'fathers' refers to participants' reports of contact for their mothers and/or fathers, either face-to-face or nonface-to-face above. WP is 'within-person' and BP is 'between-person'. Bold indicates significant at $p < .05$.

Table 4. Daily Associations between Emerging Adults' Diabetes Management and Parents' Disclosure.

	Adherence			Self-Regulation Failures			Daily Mean BG		
	Estimate	SE	95% CI	Estimate	SE	95% CI	Estimate	SE	95% CI
Mothers									
Intercept	4.05	.08	[3.89, 4.22]	2.32	.09	[2.13, 2.50]	192.22	7.77	[176.87, 207.57]
Disclosure (WP)	.06	.05	[-.04, .15]	-15	.06	[-.26, -.03]	-9.85	6.90	[-23.39, 3.69]
Disclosure (BP)	.68	.17	[.34, 1.02]	-96	.19	[-1.34, -.58]	-6.99	13.25	[-33.15, 19.17]
Living Situation	-.03	.11	[-.24, .18]	-.04	.12	[-.28, .19]	1.30	8.19	[-14.86, 17.46]
Insulin Pump ¹	---	---	---	---	---	---	-8.52	8.14	[-24.59, 7.54]
Gender	.10	.12	[-.13, .33]	-.23	.13	[-.49, .03]	-14.53	9.03	[-32.36, 3.30]
Day	.00	.00	[-.00, .01]	-01	.00	[-.02, -.01]	-.24	.39	[-1.00, .52]
Disclosure (WP) * Living Situation	.09	.07	[-.04, .22]	.06	.08	[-.22, .10]	10.65	9.37	[-7.74, 29.04]
Fathers									
Intercept	4.12	.07	[3.97; 4.27]	2.26	.10	[2.06, 2.46]	191.20	7.86	[175.67, 206.73]
Disclosure (WP)	.03	.07	[-.11, .17]	-.05	.08	[-.21, .11]	4.95	9.42	[-13.54, 23.44]
Disclosure (BP)	.34	.17	[.00 ² , .68]	-64	.23	[-1.10, -.18]	-2.03	14.54	[-30.79, 26.72]
Living Situation	-.06	.10	[-.26, .14]	-.03	.14	[-.30, .24]	-1.14	8.40	[-17.74, 15.47]
Insulin Pump ¹	---	---	---	---	---	---	-8.79	8.29	[-25.18, 7.59]
Gender	.14	.11	[-.08, .36]	-.14	.15	[-.43, .16]	-20.27	9.33	[-38.71, -1.84]
Day	-.00	.00	[-.01, .00]	-01	.00	[-.02, -.00 ³]	-.36	.44	[-1.22, .51]
Disclosure (WP) * Living Situation	.05	.09	[-.14, .23]	-.06	.11	[-.27, .15]	-24.74	11.95	[-48.21, -1.27]

Notes. Bold indicates significant at $p < .05$.

¹ Insulin pump controlled for in analyses with BG Mean as outcome only.

² Lower 95% CI = .002.

³ Lower 95% CI = -.001. Gender coded as 0 (women) and 1 (men). WP is 'within-person' and BP is 'between-person'.

Table 5. Daily Associations between Emerging Adults' Diabetes Management and Parents' Solicitation

	Adherence			Self-Regulation Failures			Daily Mean BG		
	Estimate	SE	95% CI	Estimate	SE	95% CI	Estimate	SE	95% CI
Mothers									
Intercept	4.05	.84	[3.86, 4.22]	2.30	.10	[2.11, 2.49]	192.40	7.83	[176.95, 207.85]
Solicitation (WP)	.07	.05	[-.02, .17]	-.09	.06	[-.20, .03]	3.95	6.83	[-9.45, 17.35]
Solicitation (BP)	.42	.17	[.10, .75]	-.71	.19	[-1.08, -.34]	-.38	12.31	[-24.67, 23.91]
Living Situation	-.04	.11	[-.25, .18]	-.02	.12	[-.27, .22]	.96	8.24	[-15.32, 17.23]
Insulin Pump ¹	---	---	---	---	---	---	-8.36	8.14	[-24.43, 7.71]
Gender	.10	.12	[-.14, .34]	-.20	.13	[-.47, .06]	-15.09	9.13	[-33.10, 2.92]
Day	.00	.00	[-.00, .01]	-.01	.00	[-.02, -.00 ²]	-.25	.39	[-1.02, .51]
Solicitation (WP) * Living Situation	-.08	.07	[-.21, .04]	.08	.08	[-.08, .24]	4.94	9.65	[-13.98, 23.87]
Fathers									
Intercept	4.12	.08	[3.97, 4.27]	2.24	.10	[2.04, 2.44]	190.31	7.87	[174.77, 205.85]
Solicitation (WP)	.13	.08	[-.03, .30]	-.15	.10	[-.34, .04]	2.90	10.94	[-18.57, 24.38]
Solicitation (BP)	.27	.17	[-.08, .61]	-.71	.23	[-1.17, -.25]	-16.33	14.56	[-45.12, 12.47]
Living Situation	-.07	.10	[-.27, .14]	.00	.14	[-.27, .27]	.08	8.43	[-16.58, 16.75]
Insulin Pump ¹	---	---	---	---	---	---	-8.54	8.26	[-25.87, 7.79]
Gender	.14	.11	[-.08, .37]	-.13	.15	[-.42, .17]	-19.06	9.33	[-37.51, -.61]
Day	-.00	.00	[-.01, .00]	-.01	.00	[-.02, -.00 ³]	-.30	.44	[-1.16, .56]
Solicitation (WP) * Living Situation	-.12	.10	[-.33, .08]	.10	.12	[-.14, .33]	-9.78	13.26	[-35.82, 16.26]

Notes. Bold indicates significant at $p < .05$.

¹ Insulin pump controlled for in analyses with BG Mean as outcome only.

² Upper 95% CI = -.004.

³ Upper 95% CI = -.001. Gender coded as 0 (women) and 1 (men). WP is 'within-person' and BP is 'between-person'.