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Adult Attachment Insecurity and Associations with Diabetes Distress, Daily Stressful Events and Self-Management in Type 1 Diabetes

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Abstract

Anxious and avoidant attachment may be detrimental for diabetes distress and management. Additionally, individuals' perceptions of their partner's involvement may affect these associations. The study explored cross-sectionally and at the daily level whether anxious and avoidant attachment associated with diabetes distress or stressors and diabetes management, and whether higher perceived collaboration and support (C&S) moderated associations between attachment and diabetes management. Individuals with type 1 diabetes ($N = 199$; $M_{age} = 46.82$; 52.3% women) completed measures of diabetes distress, diabetes-related C&S, self-care, average blood glucose (hemoglobin A1c), and attachment insecurity, and daily diary measures of diabetes-related C&S, diabetes stressors, mean blood glucose, and self-care. Higher anxious and avoidant attachment associated with higher diabetes distress. Higher anxious attachment associated with more daily stressors. Anxious attachment associated with lower self-care. C&S did not moderate any associations. Findings highlight the need to consider attachment when designing interventions to reduce diabetes-related distress.

Attachment reflects observable differences in how individuals expect others will respond to their needs in times of distress (see Bretherton, 1992 for a review of the origins of attachment theory). Those high in anxious attachment use a 'maximization' strategy to elicit what they need from their attachment figure by increasing proximity and escalating outward signs of distress. Those with higher avoidant attachment use a 'minimization' strategy to distance themselves and decrease their outward signs of distress (e.g., Simpson & Rholes, 2012). These differences in attachment are linked to health behaviors. For example, higher attachment security, or lower insecurity (i.e., higher anxious and avoidant attachment), associates with engaging in health-promoting activities, such as exercising and eating more fruits and vegetables (Scharfe & Eldredge, 2001). Moreover, evidence suggests higher

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attachment insecurity, particularly anxious attachment, associates with individuals' perceptions of poorer health and increased reports of negative health symptoms (Cienchanowski et al., 2002; Scharfe & Eldredge, 2001).

A chronic illness like type 1 diabetes is an especially interesting context in which to examine the overlap of health and attachment as it requires individuals to engage in a difficult, multi-step regimen that is highly visible to others (e.g., Chiang et al., 2014). Individuals must count carbohydrates, check blood glucose multiple times per day, and administer insulin in response to blood glucose levels. These self-management behaviors often occur while other people are around, such as before eating dinner with a romantic partner. One important component of whether others are beneficial for diabetes management and outcomes may be individuals' underlying expectations of supportive involvement from romantic partners that derive from attachment insecurity.

As attachment is activated in times of distress (e.g., Mikulincer & Shaver, 2007), attachment insecurity may associate with diabetes distress – an especially important psychosocial diabetes outcome. Diabetes distress is a worsening of psychological well-being as a result of having diabetes and is a common experience among individuals with diabetes (Fisher et al., 2015; Polonsky et al., 2005). Higher diabetes distress, in itself, is a negative diabetes outcome, but also associates with worse self-management and glycemic control (Fisher et al., 2015; Lašait et al., 2016; Polonsky et al., 2005). Understanding whether individuals higher in attachment insecurity also experience higher diabetes-specific distress may provide additional insight as to why individuals struggle with diabetes management.

Attachment insecurity may not only affect one's broad level of distress, but also the experience of stressful events that occur daily in one's regimen. Even for individuals with low diabetes distress overall, daily stressful events in the management of diabetes may associate with attachment insecurity. Individuals with type 1 diabetes encounter many diabetes-related stressful events throughout a day (Berg et al., 2013). For example, an individual may underestimate insulin needs before dinner which results in a high blood glucose reading before bed, then overcorrects the high blood glucose, which results in a low blood glucose reading in the middle of the night. The experience of these stressors may 'activate' the attachment system in day-to-day life. Some studies have examined attachment processes in everyday life in healthy couples (e.g., Campbell et al., 2005; Pietromonaco & Barrett, 1997), but the role of attachment insecurity on the daily experience of diabetes-related stress or self-management has not yet been examined across adulthood. Having higher attachment insecurity may relate to perceiving more daily diabetes stressors, as these individuals generally are more sensitive to stressful contexts and negative events (Mallinckrodt & Wei, 2005). Moreover, associations between attachment insecurity and health behaviors may extend to the daily level, resulting in worse daily management on days in which the experience of diabetes stress is high.

Despite the potential for attachment insecurity to affect individuals' abilities to engage in complex health behaviors (Mikulincer & Shaver, 2007), whether these associations extend to self-care behaviors and outcomes in type 1 diabetes is unclear. Higher attachment insecurity may associate with lower engagement in these diabetes self-management behaviors similar

to engagement in other health behaviors (e.g., Scharfe & Eldredge, 2001). Individuals with type 1 diabetes who were categorized as ‘dismissive’ (similar to higher avoidant attachment) were significantly more likely to also experience HbA1c levels > 8%, which was defined as ‘problematic’ in the study (Cienchanowski et al., 2002). It is unclear, however, whether examining attachment on a continuum of both anxiousness and avoidance in a similar sample would lead to similar results as found by Cienchanowski and colleagues (2002). Another study of adult men with type 2 diabetes found longer diabetes duration associated with worse HbA1c for those with higher avoidant attachment (Cohen et al., 2005). However, it is unclear from current research to what extent attachment insecurity associates with diabetes management and outcomes both cross-sectionally and at the daily level.

Individuals with type 1 diabetes who have higher attachment insecurity also may struggle to complete their self-management tasks as a result of difficulties in distress management and lower support. Individuals with higher anxious attachment, and to a lesser extent higher avoidant attachment, show patterns of worse emotional regulation in times of stress compared to less insecurely attached individuals (Mikulincer & Shaver, 2007). Within romantic relationships, individuals with higher attachment insecurity show differences in their perceptions of their partners’ support. Individuals higher in anxious or avoidant attachment report lower availability of support and perceive their partner’s support as less helpful compared to individuals lower in attachment insecurity (Collins & Feeney, 2004; Ognibene & Collins, 1998). Generally higher support from partners is associated with better self-care (e.g. Song et al., 2017). To understand the unique relationship between attachment insecurity and the management of diabetes, it is necessary to control for experiences of distress and perceptions of support.

Further, as attachment processes develop out of close relationships, their effect on distress and diabetes outcomes may be moderated by perceptions of support within those relationships. Individuals who are higher in avoidant attachment may react more negatively to higher support, as it conflicts with their expectations of how others should react when they are distressed. Individuals with higher anxious attachment, however, may react more favorably to perceiving higher support, as it is more aligned with their expectations that signaling distress will provide them with some, though perhaps never enough, of the support they need and desire. Determining whether attachment itself (i.e., individual trait-like differences) associates with self-management and outcomes above perceptions of support, and whether associations between support and diabetes management are different for anxious or avoidant attached individuals when support is high, would help inform intervention efforts intending to improve diabetes management.

Current Study

The current study examined the role of attachment insecurity in diabetes-related distress and diabetes management both cross-sectionally and at the daily level. The first aim examined cross-sectionally whether individual differences in attachment insecurity associated with greater diabetes-related distress, and whether these associations extended to daily experiences of diabetes stress. We expected that individuals higher in either anxious or avoidant attachment would report higher diabetes-related distress independent of perceptions

of partner's diabetes related collaboration and support (C&S) and that these associations would extend to daily diabetes stress. The second aim examined cross-sectionally, after controlling for C&S and diabetes-related distress, whether higher attachment insecurity associated with poorer diabetes management (i.e., perceptions of self-care, HbA1c) and whether these associations extended to daily diabetes self-care and mean blood glucose level. We expected higher anxious and higher avoidant attachment would both associate with poorer self-care and higher HbA1c cross-sectionally, and that this would extend to daily self-care. We had less certain predictions for daily mean blood glucose (BG), as more than self-care behaviors can cause fluctuations in daily BG values. Our third aim examined whether individuals' perceptions of C&S moderated associations between attachment insecurity and diabetes management both cross-sectionally and at the daily level, as an extension of our second aim. We expected perceiving higher C&S would moderate these associations, but do so differently for those high in anxious or avoidant attachment. That is, we expected higher C&S would associate with better diabetes management for individuals higher in anxious attachment, but worse diabetes management for individuals higher in avoidant attachment.

Method

Participant Characteristics

Participants were recruited from university-affiliated endocrinology clinics across two sites. Study procedures were approved by the Institutional Review Boards at both sites. All participants provided informed consent. Participants were eligible to participate if individuals were 25 years of age or older, had a diagnosis of type 1 diabetes for at least one year and were taking insulin within 1 year of diagnosis, spoke English as their primary language¹, and were married or in a cohabitating relationship for at least one year. One-hundred ninety-nine individuals with diabetes enrolled and completed study measures. Participants were on average 46.82 ($SD = 13.95$) years old, 52.3% were women, and were generally well educated (28.2% of participants had less than an associate's or vocational level of education). Participants were largely Non-Hispanic White (89.9%). Most participants were in heterosexual relationships (92%) and were married (91.5%). The average length of the romantic relationship was 19.36 years ($SD = 14.56$). Participants reported having lived with diabetes for an average of 26.97 ($SD = 13.88$) years, 68.3% reported using a pump for insulin delivery, and 43.4% reported using a continuous glucose monitor. Participants also reported information on how often they experienced low blood glucose episodes in a typical week: 17.2% reported having no low episodes; 46.0% reported having 1–2 low episodes; 23.7% reported having 3–4 low episodes; 8.6% reported having 5–6 low episodes; and, 4.5% reported having 7 or more low episodes. Average HbA1c for participants was 7.57% ($SD = 1.06$) - above current ADA guidelines of an HbA1c level < 7.0%.

Procedure

Participants completed study measures as part of a larger, multimethod project of communal coping and the management of type 1 diabetes in couples across adulthood. Data from the

¹Speaking English as a primary language was necessary for cognitive testing that was part of the larger study protocol.

present study were taken from a self-report online survey completed at home prior to an in-lab assessment; an online survey completed in the lab on the day of assessment; and, a 14-day nightly survey completed after the assessment. Additionally, participants' HbA1c was measured during the in-lab assessment and daily blood glucose was measured across the 14-day nightly survey period using a study-provided glucometer.

Survey Measures

Attachment insecurity—Attachment insecurity was measured using a shortened version of the Experiences in Close Relationships-Revised scale (ECR-R; Fraley et al., 2000). This shortened 26-item version was reduced from the original 36-item measure to reduce participant burden in the larger protocol and assessed attachment insecurity on two subscales: anxiety and avoidance. Participants were instructed to “think about how you *generally* feel in *important relationships*” in responding to each statement. The anxiety subscale ($\alpha = .89$) consisted of 13 items relating to anxious attachment (e.g., “I worry about being abandoned”). The avoidance subscale ($\alpha = .88$) consisted of 13 items that related to avoidant attachment (e.g., “I prefer not to show people how I feel deep down”). Response options were rated on a scale from 1 (disagree strongly) to 7 (agree strongly).

Diabetes-related collaboration & support—Participants answered questions about their general perceptions of how their partners provided diabetes-related collaboration and support (C&S) as part of a larger measure of diabetes-related support and persuasion (Berg et al., 2011; Helgeson et al., 2016; Helgeson et al., 2019). A principal components analysis of the full measure revealed 6 factors which overlapped with the theoretically derived subscales. Two subscales that assessed collaboration and support were included in this study (i.e. collaboration/tangible support; emotional support). The emotional support subscale ($\alpha = .80$) consisted of 5 items to assess diabetes-specific emotional support, in which patients were asked to indicate how often their partners engaged in supportive behaviors over the past month (e.g. “listened to me talk about my feelings”). The collaboration/tangible support subscale ($\alpha = .94$) consisted of 7 items to assess diabetes-specific collaboration/tangible support over the past month (e.g. “My partner and I worked together to manage diabetes”). Participant responses were rated on a 5-point scale from 1 (not at all) to 5 (a lot). These two subscales were highly correlated ($r = .63, p < .001$) and, because there were no *a priori* hypotheses expecting differences between the types of positive support included in these scales and outcomes, items were collapsed into a single measure of collaboration and support to more closely mirror the daily diary measure ($\alpha = .93$).

Diabetes-related distress—Participants completed the Diabetes Distress Scale (Polonsky et al., 2005). The 17-item Diabetes Distress Scale (DDS) assessed the emotional distress individuals living with diabetes experience and has been used in samples of individuals with type 1 diabetes (Lašait et al., 2016). Items on this measure comprise four empirically-derived subscales (emotional burden, regimen-related distress, physician-related distress, diabetes-related interpersonal distress²), which were combined to give an overall

²Supplemental analyses of the interpersonal distress subscale were conducted post-hoc but for clarity the results are not presented. In general, interpersonal distress did not have as strong associations with attachment insecurity or diabetes management compared to the originally used total score of diabetes distress. However, the pattern of results was largely the same.

indication of diabetes-related distress. Participants rated items on a scale from 1 (not a problem) to 6 (a very serious problem). In our sample, reliability of the total scale was excellent ($\alpha = .90$).

Self-care—Self-care was assessed using the widely used Self-Care Inventory (SCI) (Lewin et al., 2009). Participants rated how often they regularly engaged in 13 self-care behaviors (e.g., glucose testing, administering correct insulin dose, exercising regularly) as recommended by their healthcare provider in the past month from 1 (did not do) to 5 (always did without fail). Reliability was acceptable ($\alpha = .76$).

HbA1c—HbA1c estimates how well blood glucose was controlled over the previous approximate 2 or so months. Participants gave a capillary blood sample to trained research assistants to measure their HbA1c levels using Siemens DCA Vantage Analyzer during the in-lab assessment. HbA1c from the in-lab correlated highly with clinic-visit HbA1c values from medical record ($r = .84$).

Demographics and medical regimen covariates—Demographic and medical regimen variables were chosen as covariates *a priori*.³ Participants provided their date of birth during an online survey and age was computed from the date of the lab assessment. Older age has been linked in this sample with both less diabetes distress and better self-care (Helgeson et al, 2019). Participants reported their gender (0 = male, 1 = female, 2 = other). Because no participant identified as “other,” gender was scored as a dichotomous variable (0 = men; 1 = women). Gender was included to address potential differences in C&S between men and women (e.g., Neff & Karney, 2005). Participants provided information on how they received their insulin to indicate whether they used an insulin pump, which was recoded to indicate pump-use (1) compared to non-pump use (0). Use of an insulin pump has been consistently linked with better glycemic control (e.g. Miller et al., 2015). Moreover, as the number of times participants check their blood glucose may be associated with differences in mean blood glucose, BG checks were included in lieu of pump status in daily analyses.

Daily Diary Measures

Daily collaboration & support—Daily perceptions of collaboration and support (daily C&S) were measured using study-created items. Participants were asked to “describe the ways in which your partner might have been involved in your diabetes today.” The scale was comprised of 8 items to capture collaboration (e.g. “Made decisions together with me for diabetes care”) and positive social support (e.g. “Tried to understand my situation”). Items were subjected to an exploratory factor analysis procedure suitable for diary items in MPLus (Version 8), which revealed that these items loaded onto a single collaboration and support factor. Within-person reliability was $\lambda_{00} = .96$.

Daily diabetes stressors—Participants completed a brief checklist (0 = no, 1 = yes) of whether they experienced any of 6 common daily diabetes problems: 1) Did you have a

³In addition to the *a priori* covariates we tested, we also examined low blood glucose episodes in a typical week and comorbidities as covariates *post-hoc*. Our results were the same with the addition of these *post-hoc* covariates. However, as the variables themselves were less interpretable than our *a priori* covariates, we chose to not include them in the main text.

problem with high blood sugar?; 2) Did you have a problem with low blood sugar?; 3) Did you forget or skip a blood glucose test?; 4) Did you take the wrong amount of insulin?; 5) Did you feel bad (upset, angry, sad) because of your diabetes?; and, 6) Did you have difficulties with your diet today? These problems were based on empirically-derived coding of patients' descriptions of diabetes stressors (Beveridge, Berg, Wiebe, & Palmer, 2005) and represent the most common diabetes problems reported in previous daily diary studies (Berg et al., 2013). A daily total was created by using a count of the number of diabetes problems experienced each day.

Daily self-care behaviors—Daily self-care was measured using six items from a shortened version of the Self-Care Inventory created for use in daily diaries (Berg et al., 2014). Participants rated how well they followed recommendations from their healthcare provider to engage in six self-care behaviors (e.g. “Adjusting insulin based on blood glucose”) in the past 24 hours from 1 (did not do it) to 5 (did it exactly as recommended). Within-person reliability was $\lambda_{00} = .97$.

Daily mean blood glucose—Daily blood glucose (BG) was measured using OneTouch Verio IQ glucometers across participants. Participants were instructed to use this glucometer in place of their own and check glucose with the same frequency as they normally would across the 14-day diary portion of the study. Participants who used CGM were instructed to use the study provided glucometer – in addition to their own glucometer that was linked to their equipment – with the same frequency as they normally would (i.e., each time they checked their blood glucose). Blood glucose readings from study provided glucometers were uploaded by study staff after completion of the diary. A daily mean was computed to estimate average BG level across a one-day (24 hour) period. On average across the 14-day diary period, average daily mean blood glucose was 175.52 ($SD = 35.30$) and participants checked their blood glucose 4.24 ($SD = 1.85$) times per day.

Missing Data

Missing data was minimal in the cross-sectional study. Only 1 individual (< 0.01%) did not complete all key measures and thus was deleted from the analyses. Missingness in the diary data also was minimal. Number of completed days ranged from a minimum of 10 to a maximum 14 days. On average, participants completed 13.82 days. Missingness for the diary items of interest varied across measures but was generally under 5%: daily C&S = 2.62%; daily diabetes stressors = 1.33%; daily self-care = 0.01%; daily mean BG = 5.81%. All days in which participants had data were included in analyses.

Overview of Analysis

All models were run in SPSS Version 25 and multilevel models were run using the MIXED command (IBM Corp., 2013). Statistical significance for all analyses was tested at $p = .05$.

Diabetes distress and stressors—We used multiple regression models to examine associations between attachment insecurity and diabetes distress cross-sectionally, with covariates (e.g. gender, age, C&S) on step 1, and anxious attachment, avoidant attachment

on step 2 and diabetes distress as the outcome. Non-binary predictor variables were first centered at the grand-mean before being included in regressions.

To examine whether the associations between attachment insecurity and distress extended to the daily level, we used our daily measure of diabetes stressful events. Multilevel models included both within-person (daily) and between-person (across two weeks) effects by person-centering daily predictors (Level 1 below) and including between-person centered (grand-mean centered) variables across the 14 days as predictors (Level 2 below) to separate out within- and between-person effects (Hoffman & Stawski, 2009). Random effects were allowed on the intercept of diabetes outcomes (u_{0j}), but grand-mean centered day was expected to remain constant (β_{2j}).

$$\text{Level 1: Daily_Stressors}_{ij} = \beta_{0j} + \beta_{1j}(\text{Day}_{ij}) + \beta_{2j}(\text{Daily_C\&S}_{ij}) + e_{ij}$$

$$\text{Level 2: } \beta_{0j} = \gamma_{00} + \gamma_{01}(\text{Attachment}_j) + \gamma_{02}(\text{Average_C\&S}_j) + \gamma_{03}(\text{Age}_j) + \gamma_{04}(\text{Gender}_j) + u_{0j} \quad \beta_{1j} = \gamma_{10}$$

Diabetes management cross-sectionally and at the daily level—We used a similar approach to examine whether attachment insecurity associated with aspects of diabetes management and outcomes (i.e., self-care, HbA1c) above and beyond both C&S and diabetes distress cross-sectionally, and whether C&S moderated associations between attachment and diabetes management. Covariates (age, gender, pump-status, C&S) and diabetes-related distress were entered on step 1, and anxious attachment and avoidant attachment were entered on step 2, and interaction terms (anxious attachment*C&S and avoidant attachment*C&S) were entered on step 3.

To examine whether the associations with diabetes management extended to the daily level, we used multilevel models, which included an interaction on between-person attachment and between-person C&S⁴. An example equation using self-care as an outcome is below:

$$\text{Level 1: Daily_Self-Care}_{ij} = \beta_{0j} + \beta_{1j}(\text{Daily_C\&S}_{ij}) + \beta_{2j}(\text{Daily_Stressors}_{ij}) + \beta_{3j}(\text{Day}_{ij}) + e_{ij}$$

$$\text{Level 2: } \beta_{0j} = \gamma_{00} + \gamma_{01}(\text{Attachment}_j) + \gamma_{02}(\text{Average_C\&S}_j) + \gamma_{03}(\text{Average_Diabetes_Distress}_j) + \gamma_{04}(\text{Age}_j) + \gamma_{04}(\text{Gender}_j) + \gamma_{05}(\text{Attachment}_j * \text{Average_C\&S}_j) + u_{0j} \quad \beta_{1j} = \gamma_{10}$$

Results

Descriptives and Correlations of Key Variables

Descriptive statistics and correlations of all key variables are presented in Table 1 to understand not only associations between our key variables of interest, but also to understand how well our cross-sectional measures associated with our daily measures. Higher anxious attachment associated with greater diabetes distress ($r = .41$) and more frequent experiences of stressors aggregated across the two-week diary ($r = .24$). Individuals

⁴As C&S was conceptualized as the moderator, we included the interaction on Level 2, despite the data being daily diary. Additional analysis examined cross-level interactions between attachment and C&S, and found similar results.

with higher anxious attachment reported lower C&S cross-sectionally. Higher anxious attachment also associated with lower self-care ($r = -.31$), but this was limited to the survey measure of self-care. Higher avoidant attachment correlated with higher diabetes distress ($r = .24$) but did not associate with any other aspect of diabetes management. In both the survey and diary measures, collaboration and support (C&S) did not significantly associate with diabetes distress, stressors, or other aspects of diabetes management.

Attachment Insecurity and Diabetes Distress

Results of our multiple regressions to understand whether attachment insecurity independently associated with diabetes distress are presented in Table 2a. Both anxious attachment ($B = .21$, $SE = .04$) and avoidant attachment ($B = .13$, $SE = .05$,) were unique predictors of diabetes distress. There were no significant associations between C&S and diabetes distress.

Our multilevel models to extend the above associations at the daily level showed similar, but not identical, findings (Table 2b). Only anxious attachment emerged as a significant predictor of daily diabetes stressors (est. = .02, $SE = .01$, $p = .02$). Avoidant attachment was not a significant predictor of daily diabetes stressors (est. = .01, $SE = .01$, $p = .59$). Additionally, higher C&S associated with slightly higher reports of diabetes-related stressors on a daily basis.

Associations of Attachment and Diabetes Management

Results of our regressions examining whether attachment insecurity uniquely associated with self-care and HbA1c are presented in Table 3a. Higher anxious attachment significantly associated with lower self-care. No main effects were found for avoidant attachment. In our sample, women and older participants reported better self-care, whereas those with higher diabetes distress reported lower self-care. Somewhat surprisingly, there was no association between C&S and self-care cross-sectionally. We found no significant associations between either attachment insecurity and HbA1c. We did find a significant association between diabetes distress and HbA1c, such that those who reported higher diabetes distress also had higher (or worse) HbA1c.

The results of our multilevel models examining associations between attachment insecurity and daily self-care and mean BG are presented in Table 3b. We found no associations between either anxious or avoidant attachment and daily self-care. However, greater daily diabetes stressors and higher diabetes distress associated with lower daily self-care. Moreover, unlike our cross-sectional results, daily C&S associated with better self-care, above and beyond attachment insecurity and distress. Though significant, this daily effect was small (est. = .04, $SE = .01$, $p = .001$). We found no significant associations between either anxious or avoidant attachment and mean blood glucose levels. However, both higher daily stressors and higher diabetes distress significantly associated with higher (or worse) daily mean BG. A statistically significant main effect also emerged for day, suggesting that BG was slightly higher across the 14 days of the diary. The effect of day on mean BG was consistent but small.

Does C&S Moderate Associations of Attachment Insecurity for Diabetes Management?

Cross-sectionally, C&S did not moderate associations between attachment insecurity and self-care or HbA1c (Table 3a). Between-person C&S also did not moderate associations of attachment insecurity to daily self-care or daily mean BG (Table 3b).

Discussion

Attachment Insecurity and Diabetes Distress

These results show that attachment insecurity is a factor in understanding individuals' experiences of diabetes distress and daily stressors. Attachment insecurity consistently associated with diabetes-specific distress and stressors. Cross-sectionally, both anxious and avoidant attachment uniquely associated with higher diabetes distress. Across the days of the diary, higher anxious attachment also associated with experiencing a greater number of diabetes stressors. These results are in line with some work that shows individuals with higher attachment insecurity experience higher psychological distress (Mallinckrodt & Wei, 2005), but also suggest that associations between attachment insecurity are not limited to more global, retrospective reports of distress. Individuals higher in anxious attachment also reported more diabetes-related stressful events on a given day. The replication of the cross-sectional findings at the daily level highlights that individuals with higher attachment insecurity, particularly higher anxious attachment, perceive more diabetes-related stressors in their everyday lives. Experiencing more stressors was also associated with worse daily diabetes management.

Further, much work in attachment has examined issues of distress where the source of stress is explicitly relationship-focused (e.g., Collins & Feeney, 2000; Simpson et al. 2012). Our results suggest that the associations between attachment insecurity and higher distress may not be limited to explicit or even implicit relationship threats. In our sample, attachment insecurity associated with increased illness-specific distress. Though illness-specific distress may affect or be affected by relationship processes like social support or collaboration, attachment research has typically limited explorations to more explicit relationship processes (e.g., Collins & Feeney, 2000, 2004; Pietromonaco & Barrett, 1997). As increased diabetes-related distress and stressful events are linked to worse diabetes self-management and outcomes (Fisher et al., 2012; Lasaite et al., 2016), individuals with higher attachment insecurity may be at especially high risk as a result of experiencing greater distress.

Attachment Insecurity and Diabetes Management

Our results indicate there may be a distinct role of attachment insecurity in diabetes management, but our findings were limited to anxious attachment with self-assessments of self-care. Higher anxious attachment associated with worse self-care in correlations and uniquely predicted self-care even after controlling for diabetes distress cross-sectionally. These results align with research that suggests higher anxious attachment associates with higher reports of physical health symptoms (Wearden et al., 2003) and more negative self-views (Mikulincer, 1995) in young, healthy samples. Similar to other negative self-evaluations, individuals higher in anxious attachment may evaluate their self-care efforts more negatively. Given that this finding does not appear with HbA1c or mean BG,

individuals with higher anxious attachment may appraise their self-management differently from how they are actually managing their illness. Further, the significant association between anxious attachment and self-care was limited to the cross-sectional analyses and did not extend to daily self-care. These findings suggest higher anxious attachment only affects more general assessments of self-management efforts rather than assessments that are linked closer in time on a daily basis. Daily assessments may be less affected by more general negative self-views.

The lack of findings between avoidant attachment and diabetes management, though contrary to our hypotheses, is not surprising. Higher avoidant attachment also is not linked with more negative self-views and self-assessments (Mikulincer, 1995; Wearden et al., 2003). The lack of findings for physiological assessments (e.g., HbA1c, mean BG) also may have occurred for several reasons. The management of type 1 diabetes consists mostly of blood glucose and insulin management (Chiang et al., 2014) rather than more shared activities like eating and exercise as seen in type 2 diabetes (e.g., Inzucchi et al., 2015). Thus, the difference in findings in our sample from Cohen and colleagues (2005) may be because management efforts are much more individualized in type 1 diabetes compared to type 2 diabetes. Moreover, compared to Cienchanowski and colleagues' (2002) findings, our measure of attachment conceptualized attachment as being comprised of both anxious and avoidant dimensions rather than discrete categories, which is in line with current attachment research (Simpson & Rholes, 2012). Though dismissive attachment as defined by the measure used in their study is similar to avoidant attachment (Cienchanowski et al., 2002), they are not synonymous. Future research should explore different measures of attachment and similar illnesses (i.e., type 2 diabetes) to better understand what role, if any, avoidant attachment plays in diabetes management.

Minimal Role of Collaboration and Support in Associations of Attachment and Diabetes Management

Collaboration and support (C&S) appeared to have only minimal associations with attachment insecurity and did not moderate associations between attachment and self-management cross-sectionally or at the daily level. Only anxious attachment associated with lower perceptions of C&S. Moreover, C&S itself did not associate cross-sectionally with better diabetes management. This is in contrast to research in type 2 diabetes, which suggests that positive aspects of support associate with better diabetes management (e.g., Mayberry & Osborn, 2012). A recent meta-analysis suggests that social support may be beneficial for those with type 1 diabetes, but perhaps less so when compared to those with type 2 diabetes (Song, Nam, Park, Shin, & Ku, 2017). It may be for adults with type 1 diabetes expectations of partner involvement are more nuanced than our measure of C&S captured. One qualitative study found individual differences in how much support patients expected and wanted from their partners (Trief, Sandberg, Dimmock, Forken, & Weinstock, 2013). Our measure of C&S assessed perceptions of what partners provided but not how much C&S patients desired. Further, although attachment insecurity captures differences in how individuals perceive support (e.g. Collins & Feeney, 2004), it may not adequately capture how much individuals desire support.

Limitations

Though the current study had several strengths, including examining both cross-sectional and daily associations, it was not without limitations. First, the sample was largely of higher socioeconomic status, non-Hispanic White, and experiencing relatively good diabetes management. Results may not generalize to individuals struggling with their diabetes care, whether because of lack of access, financial concerns about cost of care, or other issues that are not as common in this sample. Second, while our reliance on study-provided glucometers helped to minimize variability across different meters, our blood glucose readings may be affected by how well people followed our instructions to use our glucometers as they normally would to check blood glucose. Further, although often tied to lower HbA1c, BG checks may have been a less relevant daily self-care behavior for those on CGM, who may check blood glucose less regularly than those who do not use CGM. Third, the presented analyses were limited to *patients'* attachment and diabetes management. Individuals in romantic partnerships and their social interactions are dyadic (e.g. (Reis, Collins, & Berscheid, 2000)). However, as the diabetes outcomes of interest for this study were at the level of the patient and there are few studies that have applied attachment theory to diabetes management in the context of romantic relationships, the presented results were an important first step. Future studies should directly examine the dyadic nature of attachment in the context of diabetes management. Finally, it is noteworthy that we asked participants to think broadly of 'important relationships in general'. The reason for this wording choice was to capture a more 'developmental' definition of attachment rather than attachment to one person. Yet, individuals have different attachments to different individuals (Collins & Feeney, 2000). A romantic-relationship specific wording assessing attachment to participants' current partner may yield different results. Further, attachment was only measured cross-sectionally, and attachment insecurity may fluctuate within-person (Guardia, Ryan, Couchman, & Deci, 2000). It is possible that a daily measure of attachment would be more closely related to daily perceptions of C&S and diabetes management than a one-time assessment.

Implications and Future Directions

Our results from this study show the importance for researchers interested in health, development, or relationships to consider attachment insecurity in a context beyond relationship specific sources of stress for individuals with a chronic illness like diabetes. Individuals higher in either anxious or avoidant attachment may benefit from interventions that target reducing diabetes stress and increasing perceived competence in self-care, rather than through interventions that target increasing social support. Moreover, our findings suggest individuals higher in anxious attachment also may benefit from interventions that provide cognitive-behavioral support that targets reframing individuals' general perceptions of their self-care behaviors. Future studies should continue to work toward disentangling issues surrounding attachment and chronic illness management and outcomes, including psychosocial outcomes. The associations of anxious and avoidant attachment with higher diabetes-specific distress and stressors also are clinically important. Individuals with higher anxious or higher avoidant attachment experienced higher diabetes distress, but did not necessarily experience worse diabetes management, as evidenced by no significant differences observed in glucose levels or differences in daily self-care behaviors. Measuring

diabetes distress and intervening to reduce diabetes distress—even when patients seem to be managing their illness well—may particularly benefit individuals with higher attachment insecurity.

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Table 1.

Correlations and descriptives of key study variables.

	1	2	3	4	5	6	7	8	9	10	11	M (SD)
1. Anxious Attachment	---	---	---	---	---	---	---	---	---	---	---	2.82 (1.17)
2. Avoidant Attachment	.28	---	---	---	---	---	---	---	---	---	---	3.14 (1.08)
3. Collaboration & Support	-.27	-.08	---	---	---	---	---	---	---	---	---	3.01 (.93)
4. Diabetes Distress Scale	.41	.24	-.07	---	---	---	---	---	---	---	---	1.98 (.74)
5. Gender	.08	-.27	-.08	.11	---	---	---	---	---	---	---	.52 (.50)
6. Age	-.14	.08	-.05	-.21	-.08	---	---	---	---	---	---	46.82 (13.95)
7. Self-Care	-.31	-.07	.04	-.39	.14	.25	---	---	---	---	---	3.67 (.56)
8. HbA1c	.03	-.00	.04	.20	-.00	.12	-.32	---	---	---	---	7.57 (1.06)
9. Diary C&S	-.20	-.14 ⁺	.70	-.06	-.12	-.04	.06	-.03	---	---	---	2.14 (.92)
10. Diary Diabetes Stressors	.24	.04	-.02	.43	.15	-.28	-.32	.18	.05	---	---	1.71 (.94)
11. Diary Self-Care	-.10	-.08	-.05	-.33	.22	.28	.58	-.33	-.06	-.43	---	4.38 (.59)
12. Diary BG Mean	.05	.07	.02	.17	-.03	-.03	-.34	.59	.05	.23	-.36	175.52 (35.30)

Note. Diary scales were averaged across the two-week diary. Gender coded 0 ('men') and 1 ('women'). Bold indicates significant at $p < .05$.

⁺ $p = .06$.

Table 2.

Associations between attachment insecurity and diabetes-related distress and stressors.

<u>Diabetes Distress</u>			
Table 2a.	R^2	B_{in}	95% CI
<u>Step 1</u>	.05		
Intercept		1.91	[1.77, 2.06]
Gender		.13	[-.07, .34]
Age		-.01	[-.02, -.003]
C&S		-.05	[-.16, .06]
<u>Step 2</u>	.17		
Anxious Attachment		.21	[.12, .30]
Avoidant Attachment		.13	[-.04, .23]

<u>Daily Diabetes Stressors</u>			
Table 2b.	Estimate	SE	95% CI
Intercept	.24	.01	[.21, .27]
Gender	.03	.02	[-.01, .06]
Age	-.002	.00	[-.004, -.001]
Day	-.002	.00	[-.003, -.000]
Daily C&S	.03	.01	[.02, .04]
Average C&S ^I	.02	.01	[-.003, .04]
Anxious Attachment	.02	.01	[.01, .04]
Avoidant Attachment	.01	.01	[-.01, .03]

Notes. Bold indicates significant at $p < .05$. Gender coded as 0 ('men') and 1 ('women'). Table 2a contains cross-sectional variables. Table 2b contains daily variables.

^I Average C&S is daily C&S averaged over the diary period.

Table 3.

Associations of attachment insecurity with diabetes management.

Table 3a Cross-Sectional	R^2	<u>Self-Care</u>		R^2	<u>HbA1c</u>	
		B_{in}	95% CI		B_{in}	95% CI
Step 1	.21			.08		
Intercept		3.55	[3.45, 3.65]		7.73	[7.46, 8.01]
Gender		.22	[.08, .36]		.01	[−.29, .32]
Age		.01	[.002, .01]		.01	[.002, .02]
Insulin Pump ^I		---	--		−.26	[−.59, .07]
Diabetes Distress ²		−.28	[−.38, −.18]		.34	[.14, .54]
Step 2	.04			.01		
Anxious Attachment		−.10	[−.17, −.03]		.00	[−.15, .15]
Avoidant Attachment		.06	[−.02, .13]		−.08	[−.24, .07]
C&S		−.002	[−.08, .08]		.05	[−.12, .22]
Step 3	.00			.01		
Anxious*C&S		.04	[−.04, .11]		.07	[−.08, .22]
Avoidant*C&S		−.02	[−.09, .05]		.04	[−.12, .19]

Table 3b Daily	Estimate	<u>Daily Self-Care</u>		Estimate	<u>Daily Mean BG</u>	
		SE	95% CI		SE	95% CI
Intercept	4.22	.05	[4.11, 4.32]	177.20	3.77	[169.76, 184.64]
Day	−.001	.002	[−.005, .002]	.59	.23	[.13, 1.04]
BG Checks ^I	---	---	---	−.46	.71	[−1.84, .92]
Daily Stressors	−.11	.01	[−.12, −.10]	9.89	.82	[8.28, 11.49]
Daily C&S	.04	.01	[.02, .06]	.80	1.48	[−2.10, 3.70]
Diabetes Distress	−.26	.06	[−.37, −.15]	8.48	3.78	[1.02, 15.94]
Average C&S	−.01	.04	[−.09, .07]	3.07	2.78	[−2.41, 8.56]
Anxious Attachment	.01	.04	[−.06, .08]	−.27	2.42	[−5.04, 4.51]
Avoidant Attachment	.03	.04	[−.04, .11]	.40	2.62	[−4.76, 5.56]
Age	.01	.003	[.005, .02]	.06	.19	[−.31, .42]
Gender	.33	.08	[.18, .48]	−3.13	5.35	[−13.69, 7.43]
Anxious*C&S	.004	.01	[−.01, .02]	2.10	1.11	[−.08, 4.27]
Avoidant*C&S	.01	.01	[−.01, .03]	−1.12	1.20	[−3.49, 1.23]

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

^I Insulin pump coded as no pump use ('0') and pump use ('1') and only included in analyses with HbA1c and BG checks only included in analyses with mean BG. Gender coded as 0 ('men') and 1 ('women'). C&S in interactions is between-person Average C&S.