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Parent Affective Responses to Observed Adolescent Disclosures in the Context of Type 1 Diabetes Management

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Rates of Type 1 diabetes are rising, and diabetes management often deteriorates during adolescence. Adolescent disclosure to parents is a key factor for effective diabetes management, and parent affective responses to disclosures affect the timing of future disclosures in healthy populations, but no studies to our knowledge have examined parent affective behaviors that facilitate or inhibit disclosure in the context of managing Type 1 diabetes. The present study examined how observed parental affective responses to adolescent disclosures predict the timing of subsequent disclosures during a discussion task in a sample of adolescents with Type 1 diabetes and their parents ($N = 66$ dyads). Generalized linear mixed models were used to test whether increased or decreased levels of parent affect relative to their emotional baseline response to adolescent disclosures predicted the timing of subsequent disclosures. Adolescents took longer to disclose again when parents responded to prior adolescent disclosures with higher levels of anger and of positive affect relative to their baseline levels of these emotions. Findings suggest that parental affective responses to disclosures have implications for adolescent disclosure in the context of chronic illness management.

Keywords: disclosure, adolescence, parent–adolescent relationships, Type 1 diabetes, affect

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Parent–child relationship dynamics become increasingly transactional in adolescence (Lougheed, 2020). Disclosure to parents is a key way that adolescents regulate information to which parents have access as they become increasingly independent (Kerr & Stattin, 2000) and has been associated with better adolescent behavioral adjustment and mental health outcomes (Feiring et al., 1998) as well as physical health outcomes, such as better diabetes management (see Berg et al., 2017). The prevalence of Type 1 diabetes among children and adolescents is increasing (Mayer-Davis et al., 2017), and management during adolescence can be particularly challenging due to biological and social changes (Plamper et al., 2017). Recent work demonstrates that specific parental affective responses to adolescent disclosures are better predictors of future disclosures and adolescent outcomes than general parenting characteristics or overall relationship quality (Disla et al., 2019; Main et al., 2019; Martin et al., 2018). However, studies examining real-time parent transactional dynamics during parent–adolescent interactions in the context of diabetes management are lacking. The present study utilized an observational methodology to investigate how parent affective responses to adolescent disclosures during discussions about diabetes-related conflicts predict the timing of subsequent disclosures. Examining parental responses to adolescent disclosures in real time in families managing Type 1 diabetes will inform more targeted interventions for families struggling with positive parent–adolescent communication in the context of chronic illness management (e.g., May et al., 2017).

Parent Responses to Adolescent Disclosures

Disclosure is defined as voluntarily or spontaneously providing information about one's thoughts and feelings to another (Kerr & Stattin, 2000). Adolescents are more likely to disclose to parents when the relationship is characterized by trust, acceptance, and warmth (Keijsers et al., 2009; Smetana et al., 2006) and less likely to disclose when adolescents expect parents to respond negatively (e.g., with criticism; Tilton-Weaver et al., 2010). Most research on parental predictors of adolescent disclosure has relied on self-report. However, social desirability concerns or recall biases may prompt adolescents to overreport how much they disclose to parents (Berg et al., 2017). Thus, observing adolescent disclosure during real-time interactions with parents and the kinds of emotions that parents express in response to disclosures (e.g., positive, anger, sadness, anxiety) provides insight into adolescent disclosure in everyday life.

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One type of affective response during social interactions that has received a great deal of attention in the adult literature is expressive suppression, in which individuals make attempts to hide their emotional experiences from others (Aldao et al., 2015). A large body of research suggests that when individuals suppress their emotions, they experience more intrapersonal costs including increased depressed mood, greater fatigue, and lower self-esteem (see Cameron & Overall, 2018). In the context of interpersonal interactions, individuals who report greater expressive suppression report lower levels of closeness, social support, and relationship quality during such interactions (Low et al., 2017). However, expressive suppression, when used sparingly, may serve positive functions during interpersonal interactions. A recent study with adult romantic partners found that expressive suppression had a curvilinear effect on the partner's relationship satisfaction and discussion success (Girme et al., 2021), suggesting that at moderate levels, expressive suppression may confer benefits during interactions in close relationships. In the context of parent–child interactions, the literature is also mixed, with some studies finding negative consequences of suppressing emotions during parent–child interactions, including decreased affective flexibility (Hollenstein & Lewis, 2006) and reduced warmth and engagement (Waters et al., 2020), whereas other studies find a moderate level of suppression to be adaptive within difficult social tasks such as conflict (Van der Giessen & Bögels, 2018).

Adolescent Disclosure and Type 1 Diabetes Management

Type 1 diabetes management involves a complex regimen of blood glucose checks, insulin administration, and regulation of diet and exercise to keep blood glucose in the normal range (Chiang et al., 2018). Managing blood glucose levels (HbA1c) is critical for preventing both short-term health problems (e.g., extreme hypoglycemia) and long-term health complications (e.g., kidney disease; see Sherwani et al., 2016). Adolescence can be a particularly challenging time for diabetes management as both adherence to diabetes regimens and physiological management often deteriorate during this period (see Borus & Laffel, 2010). However, Type 1 diabetes management during adolescence can be strengthened through greater parental knowledge about self-care behaviors (Berg et al., 2017).

One way in which parents gain knowledge about their adolescent's diabetes management is through voluntary adolescent self-disclosure about diabetes problems (Osborn et al., 2013), which in turn is linked with better self-management, fewer depressive symptoms, and lower HbA1c (indicating blood glucose levels closer to medical recommendations; see Berg et al., 2017; Tucker et al., 2018). Global parenting behaviors such as collaboration and warmth have been associated with lower HbA1c and more positive mental health outcomes during observed interactions (e.g., conflict discussions) in samples in which the adolescent has Type 1 diabetes, whereas control and hostility have been associated with higher HbA1c (Gruhn et al., 2016; Jaser & Grey, 2010). However, given that specific parental responses to adolescent emotions and behaviors are better predictors of child and adolescent outcomes than more global aspects of relationship quality in the general developmental literature (Fabes et al., 2001; Main et al., 2019), it is important to examine how specific parental responses to adolescent disclosures about Type 1 diabetes are associated with future adolescent disclosures in this population.

The Importance of Timing

Dynamic systems theory asserts that parent–child dyads have a tendency to get "stuck" in affective cycles, with each partner approaching social interactions with expectations about each other's affective responses (e.g., Hollenstein et al., 2013). Though a handful of studies in the general developmental literature have examined parental emotion-related responses to adolescent disclosures during real-time interactions (Disla et al., 2019; Main et al., 2019; Martin et al., 2018), none to our knowledge have tested the extent to which a parents' concurrent affective state at the time of disclosure changes (or does not change), and how this influences the timing of future disclosures within an interaction. For example, if a parent expresses increased anger following their adolescents' disclosure, this elevation in anger would be expected to discourage the adolescent from further disclosure (Tilton-Weaver, 2014). Prior studies have used lagged sequential analysis to determine whether occurrence of one person's emotion (e.g., anger) is more likely to occur immediately following the partner's expression of anger (see Butler, 2011). However, examining the degree to which parents' level of anger changes following a disclosure relative to their overall tendency to express anger is important because individuals vary considerably in their emotional baseline (e.g., Liu et al., 2017).

One study used a dynamic, transactional approach to investigate how parents facilitate adolescent disclosure in the context of Type 1 diabetes management using a daily diary method (Berg et al., 2017). This study found that on days when adolescents disclosed to mothers about diabetes, adolescents experienced better daily self-management and fewer daily diabetes-related self-regulation failures. On a longer timescale, during years when mothers' and fathers' knowledge and disclosure to fathers were above a person's own average level, adolescents had lower Hb1c and higher self-care (Berg et al., 2019). However, it remains unclear how parental responses to adolescent diabetes-related disclosures on a momentary level (i.e., during parent–adolescent conversations) predict subsequent adolescent disclosures. These micro-level (e.g., second-to-second) behaviors critically shape the progression of the conversation along with the emotional and behavioral consequences of the conversation. Further, assessing mutual influences between parents and adolescents at the micro level has important implications for developing interventions that target specific relationship dynamics (Beveridge & Berg, 2007) because micro-level behaviors are more amenable than global behaviors as targets for intervention. Given the importance of disclosure for adolescent health in this population, understanding how parental affective responses facilitate or inhibit future disclosures during real-time discussions about challenges related to diabetes management can inform interventions aimed at promoting disclosure to parents during this important developmental period.

The Present Study

The present study used an observational approach to examine how contingent parental affective responses to adolescent disclosures in real-time affect the timing of future disclosures during parent–adolescent conversations about diabetes-related conflicts in a diverse sample of adolescents with Type 1 diabetes and their parents. We tested whether changes in parents' level of affect (positive, anger, sadness, anxiety, and expressive suppression) following adolescent

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disclosures affected the timing of subsequent disclosures during conversations. Specifically, we examined whether parents' affect level increased, decreased, or stayed the same relative to their emotional baseline (i.e., average level of affect during the discussion) and whether these changes (or lack thereof) predicted the lag time to adolescents' subsequent disclosures. We hypothesized that adolescents would take longer to disclose again when parents responded to adolescent disclosures with higher levels of anger, sadness, and anxiety. We also hypothesized that adolescents would take less time to disclose again when parents responded with higher levels of positive affect. Given the mixed literature on the role of parental expressive suppression, we did not have specific hypotheses about the direction of the effect of increased versus decreased expressive suppression on the timing of future disclosures.

Method

Participants

Participants included 84 adolescents with Type 1 diabetes mellitus (81% Latinx; 58% female), $M\ (SD)_{age} = 12.74\ (1.79)$ years, and their parents (86% mothers) who participated in a multisite study of family communication about Type 1 diabetes during adolescence; 71 dyads had observational data available for analysis. One dyad was excluded because they did not speak to each other during the discussion task and an additional four were excluded because the lag times to subsequent disclosures were longer than 30 s. We excluded disclosures whose lag time was longer than 30 s from the prior disclosure to more closely tie the parents' response to the prior disclosure and to avoid distortion of the findings caused by outliers. Therefore, 66 dyads were included in the present study. Adolescents and parents were recruited at their Pediatric Endocrinology Clinic in a small city in an agricultural region of Central California ($N = 38$ families) and in a large metropolitan area in Southern California ($N = 46$ families). Adolescents were eligible if diagnosed with Type 1 diabetes for at least 1 year, were 10–15 years of age at the time of participation (when diabetes management typically declines; Spaans et al., 2020 and parent–adolescent conflict increases; Collins & Laursen, 2004), could read and speak English or Spanish, and had no condition to prohibit study completion (e.g., severe intellectual disability). Primary caregivers' education ranged from some high school or less (26%) to a master's degree (3.5%), with the majority of primary caregivers having obtained less than a college degree (69%).

Procedure

The study was approved by the appropriate institutional review boards, with parents providing informed consent and adolescents providing written assent. Procedures involved an in-person session that consisted of surveys and a video-taped conflict discussion. When Spanish versions of measures were not available, the measure was translated and back-translated from English to Spanish by bilingual staff. Parents and adolescents completed the assessments in the language in which they were most comfortable, with 69% of parents and all but one adolescent completing the assessment in English. Parents were paid $20 for completing the laboratory procedures and surveys, and adolescents were given a $20 gift card; participants also received parking vouchers.

Parents and adolescents independently identified a topic they frequently argued about in the past month related to the adolescent's diabetes management using the Diabetes Family Conflict Scale (Hood et al., 2007), which asks participants to indicate how much they argued in the past month about 20 topics related to diabetes management (e.g., "remembering to check blood sugars") on a scale of 1 (*never*) to 3 (*almost always*). The topic rated most highly by both parents and adolescents was chosen as the topic to discuss, and parents and adolescents subsequently were recorded while they discussed this topic for 10 min without a researcher present. A researcher provided the following instructions to guide the discussion:

> A little while ago, each of you read through a list of topics that parents and teens with diabetes often talk about. You each identified the topics that you have talked about during the last month and rated which ones made you feel most upset. You both chose [topic] as a "hot" topic for the last month. For the next 10 minutes, I would like for you to discuss with each other what the topic is and how it makes you feel. Try to focus on the other person's feelings and point of view during your discussion. We would like for both of you to contribute to the discussion. We will come back in after the time is up.

Participants were given a card with three questions for them to address to remind them of the purpose of the task: (a) What is the topic? (b) How does it make each of you feel? Why? (c) What might be a good solution? After providing these instructions to the dyad, recording began, and the researcher left the room. The researcher knocked on the door to indicate 9 min had elapsed and reentered the room after 10 min had elapsed. Families completed the discussion in their preferred language, and videos were coded by bilingual research assistants.

Measures

Observed Adolescent Disclosure

Discussions were coded for adolescent disclosure using modified versions of the Couples Interaction Coding System (Marsh et al., 2002) and the Supportive Behavior Coding System (Allen et al., 2001). A conflict discussion was chosen as an ecologically valid measures of parent–adolescent communication processes (Eisenberg et al., 2008), and prior research has shown that this task elicits spontaneous disclosures (e.g., Main et al., 2019). Adolescent statements were coded as disclosures if the adolescent communicated something that the parent would not have automatically known and that would not necessarily come up in everyday conversation (Marsh et al., 2002) or that could have been kept secret (Allen et al., 2001; see Disla et al., 2019, for more details about the coding scheme). Adolescent statements were also coded as disclosures if the adolescent verbalized their inner states (i.e., statements that informed the parent about what they were feeling). Self-disclosure may be assessed by asking the question "did this person share personal information or did they disclose information that they could've kept secret?" For example, "Kids at school tease me about my diabetes" and "It's embarrassing when you bring up my diabetes in front of my friends" are statements that would be coded as disclosure. Each discussion was divided into adolescent and parent conversation turns. Each adolescent conversation turn was rated for whether disclosure occurred for that turn. The onset and offset time of each disclosure within each conversation was recorded to allow examination of temporal

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contingencies between adolescent disclosures and parent affective responses. Each conversation turn was treated as a new potential opportunity for disclosure; therefore, if a topic that had been discussed previously was later elaborated upon, this was coded as a separate instance of disclosure.

Codes were recorded using Mangold INTERACT (Version 16). The lead author trained two research assistants to reach 75% agreement on training videos over a 3-month period prior to the start of coding. Weekly calibration checks were held to discuss any disagreements and to minimize coder drift. Interrater reliability was calculated for agreement on the presence or absence of each disclosure within a 5-s window and was checked across 30% of the videos. Observers had very high agreement on the presence or absence of disclosures (97%).

The lead author served as the "gold standard" to which the other observers' codes were compared; thus, the lead author's codes were included in the final analyses for videos that were coded by two observers.

Parent Affective Responses to Disclosures

The videotaped discussions were coded by a team of two undergraduate research assistants trained by a graduate student author for parent affective responses using the Coding Expression of Emotion observational coding system (Thomson et al., 2018). This coding scheme captures parents' emotional expression in four different categories: positive affect, anger/frustration, sadness/hurt, anxiety/worry and parents' expressive suppression during the interaction. Positive affect consisted of conveying positive feelings to the partner including happiness, affection, joy, affiliative humor, enthusiasm, positive surprise, love, and satisfaction. Indicators included genuinely happy smiles with eye crinkles (i.e., the Duchenne smile; Ekman et al., 1990), slight smiles that express openness, warmth and caring, affection, cheerful tone of voice, and laughter and shared humor. Anger/frustration captured active and harsh emotions directed at/about the adolescent, the progress of the discussion, or others. Indicators included angry facial expressions (e.g., scowls, glaring, clenched teeth, domineering expressions), loud/raised and hostile voice tone, and aggressive displays. Sadness/hurt was coded as softer negative emotion including dejection, resignation, pessimism, and hopelessness. Indicators included sad facial expressions (e.g., lip corners pulled down, pouting, drooping eyelids, crying), sad posture (e.g., hanging head, shoulders drooping), and sad voice tone (e.g., slow, sad timbre, whiny tone, deep sighs). Anxiety/worry captured individuals' expressions of anxiety, nervous anticipation, fear, or worry. Indicators included eyebrows pulling up and inwards, lip or cheek biting, nervous smiles/laughter, rapid eye movements, tapping fingers or legs/feet, fidgeting, frequent touching of the face, and speech disturbances (e.g., stammering). Expressive suppression was coded as the degree to which an individual was trying to control their expression of emotion, regardless of how successful these control attempts were or the degree to which they were expressing different emotions. Expressive suppression was indicated by attempts to conceal involuntary expressions might be present, such as covering the mouth, looking away or hiding one's face from the partner, clasping or sitting on their hands, tight closed mouth, biting lips, holding breath. To receive a higher score of expressive suppression, there was a basic sense that people were not breathing, blinking, swallowing, talking, and moving as they would normally (i.e., nonconsciously, automatically) and postures, body movements, facial, and vocal expressions seemed unnatural or disjointed. Parents were also scored higher in expressive suppression when their verbal dialogue did not match the emotion expressed, such as strongly complaining with a big smile and sweet voice or communicating they are very hurt with a flat, affective voice tone.

Similar training procedures to the disclosure coding described above were followed. Research assistants observed how parents' emotions were expressed and rated them by considering the frequency, duration and intensity of relevant facial expressions, voice tone/pitch, and nonverbal behavior (e.g., gestures, postures, and body movement) using a 1–7 Likert-type scale (*low* = 1–2, *moderate* = 3–5, *high* = 6–7). A graduate student trained the undergraduate coders to reach 75% reliability across all codes, and weekly meetings were held to discuss discrepancies in order to prevent coder drift. Intraclass correlation was used to calculate interrater reliability across 25% of the sample. The average intraclass coefficient for parent codes was 0.85 (range = 0.75–0.92), indicating good reliability.

For each disclosure, the parent's affective response was identified as the difference between the parent's affect rating immediately following the disclosure and the parent's average rating for each affect type across the conversation. This approach allowed us to capture whether and to what degree the parent's affect level for each affect code increased or decreased relative to the parent's general affective expressivity for each affect category while also allowing us to control for parents' overall level of each affect type (i.e., parents' emotional baseline).

Adolescent-Reported Disclosure to Parents

Adolescents completed a diabetes-specific disclosure scale that was developed and validated by Osborn et al. (2013). Adolescents reported on disclosure to mothers and fathers separately; the score for the parent that participated in the conflict discussion was used in the present study. Disclosure was measured with three items (e.g., "I spontaneously tell my [mother/father] about what is going on with my diabetes management, without [him/her] asking") and was rated on a 1 (*strongly disagree*) to 5 (*strongly agree*) scale and averaged; higher scores reflect higher disclosure. Reliability in this sample was $\alpha = .79$.

Covariates

Several variables were included as covariates in the analyses to determine whether parent affective responses to adolescent disclosures in the moment predicted the timing of future disclosures above and beyond other demographic and global variables. Adolescent age and gender were included as covariates because prior literature has shown that girls are more likely to disclose than boys (Soenens et al., 2006) and adolescent disclosure declines with age (Keijsers et al., 2009). Adolescent self-reported disclosure to parents was also included as a covariate to control for adolescents' general tendency to disclose to parents. Blood glucose was indexed using glycosylated hemoglobin (HbA1c) obtained from clinical records. HbA1c represents the average blood glucose over the prior 2 or 3 months, with higher levels indicating blood glucose levels that are less consistent with medical recommendations. The HbA1c value closest to the study appointment (M_{diff} = 25 days) was used in analyses.

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Whether the adolescent was on a continuous glucose monitor was also included as a covariate since adolescents on continuous glucose monitors generally have better diabetes management. Finally, higher parental education was correlated with shorter lag times to subsequent disclosures and has been found to be positively associated with Type 1 diabetes management in youth (Gallegos-Macias et al., 2003), so primary caregiver education level was also included as a covariate in the analyses.

Transparency and Openness

We follow Journal Article Reporting Standards (Kazak, 2018) for quantitative research and report all data exclusions, manipulations, and measures in the study in order to increase the reproducibility of our findings. The sample size was determined based on prior research using observational data with parent–child samples with chronic illness (see Jaser & Grey, 2010). All data, materials, and analysis code for this study are available by directly contacting the corresponding author. Data were analyzed using STATA 17.0 MP. This study's design and its analysis were not preregistered.

Results

Multilevel generalized linear mixed model (GLMM) was used to test whether parent affective responses to adolescent disclosures predicted the lag time to subsequent disclosures. Behavioral coding of adolescent disclosure and parent affect resulted in two streams of data. Parents' time series consisted of 30-s epochs of affect ratings (positive, anger, sadness, anxiety, and suppression) on a scale of 1–7, and adolescents' time series consisted of a continuous stream of mutually exclusive states of disclosing or not disclosing (0 = no disclosure, 1 = disclosure). The dependent variable in all analyses was the lag time to subsequent adolescent disclosures in seconds. To identify lag times, first, each instance of disclosure for each adolescent was identified. Next, the number of seconds from the offset of the previous disclosure to the onset of the next disclosure was calculated. This procedure was repeated for each dyad until the last disclosure the adolescent made in the conversation. This resulted in a total of 813 data points (see Disla et al., 2019, for a similar analytic approach in a parent–adolescent sample).

Descriptive statistics of study variables are reported in Table 1. Pearson's, Spearman's rank, or biserial correlations of the mean level of all parents' affect categories and continuous, ordinal or binary covariates were tested to ensure there were no multicollinearity issues in the GLMM model.

To examine whether increased or decreased parent affect in response to adolescent disclosures predicted shorter or longer lag times to subsequent adolescent disclosures, a multilevel GLMM using a negative binomial distribution was conducted with all affect categories included in a single model. Because the dependent variable (lag time) was a count variable whose distribution was overly dispersed (i.e., its variance was larger than the mean) and closely approximated that of a negative binomial distribution both visually and numerically (Land et al., 1996), a negative binomial distribution was considered appropriate. Using a multilevel modeling framework, family ID was used as a SUBJECTS variable to take into account the repeated nature of the independent (parent affective response) and dependent (disclosure lag times) variables for each dyad. Parent affective responses were included in the model as fixed effects, and intercept was allowed to vary across subjects in the GLMM model.

Table 1
Descriptive Statistics of Study Variables

Variable	Min	Max	*M* (*SD*)
Parent affective responses to disclosures			
Positive	− 2.150	1.500	−.033 (.376)
Anger	− 1.950	2.200	−.010 (.536)
Sadness	− 1.400	1.850	−.010 (.395)
Anxiety	− 2.800	1.800	−.020 (.517)
Expressive suppression	− 2.550	1.850	−.032 (.508)
Adolescent disclosure			
Disclosure frequency	1	51	16.27 (11.48)
Lag time to subsequent disclosures (seconds)	1.000	30.000	8.122 (7.578)
Disclosure to parent (adolescent report)	1.000	5.000	3.987 (1.078)
HbA1c	5.800	11.800	8.647 (1.159)

Note. Min = minimum; Max = maximum. For parent affective responses to disclosures, negative values indicate the parent expressed less of that affect following an adolescent disclosure, and positive values indicate the parent expressed more of that affect following a disclosure than average. *N* of data points = 813.

Results of the model are presented in Table 2. The effect of each coefficient on the exponent of the predicted outcome can be interpreted as the difference in the effect size for the mean level of each parent affective response, controlling for covariates. Incidence rate ratio (IRR) was reported in the model, with IRR > 1 indicating a one-unit increase in parent affective response associated with expected increased length of time before future disclosures, while holding all other variables in the model constant. Consistent with hypotheses, when parents responded to adolescent disclosures with higher levels of anger, adolescents took longer to disclose again (IRR = 1.140, $p = .036$). In contrast to our hypothesis, adolescents

Table 2
Generalized Linear Mixed Negative Binomial Model Results for Parent Affective Responses Predicting Lag Times to Subsequent Adolescent Disclosures

Variable	IRR(*SE*)	*p*	95% CI
Fixed effects			
Intercept	11.267(5.605)	<.001	[4.250, 29.872]
Positive response	1.239(0.071)	.027	[1.025, 1.499]
Anger response	1.140(0.120)	.036	[1.009, 1.289]
Sadness response	0.969(0.087)	.729	[0.813, 1.155]
Anxiety response	1.034(0.070)	.624	[0.905, 1.181]
Expressive suppression response	0.902(0.059)	.115	[0.794, 1.025]
Disclosure to parent	0.971(0.043)	.505	[0.890, 1.059]
Socioeconomic status	0.988(0.024)	.630	[0.942, 1.037]
Adolescent age	1.026(0.026)	.305	[0.977, 1.078]
Adolescent gender (0 = male, 1 = female)	0.923(0.087)	.395	[0.768, 1.11]
Continuous glucose monitor (0 = no, 1 = yes)	1.159(0.106)	.107	[0.969, 1.387]
Hba1c	0.953(0.034)	.177	[0.888, 1.022]
Random effects			
Variance of the intercept	0.024(0.192)	.908	[0.005, 0.227]

Note. CI = confidence interval; IRR = incidence rate ratio. Disclosure number is included in the model as a repeated effect.

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took longer to disclose when parents responded with more positive affect (IRR = 1.239, $p = .027$). There were no significant differences in lag time to subsequent disclosures as a function of parent sadness, suppression, or anxiety. We also tested for interactions between parent affective responses and adolescent gender and HbA1c predicting the lag time to subsequent disclosures; no interactions were significant.

Discussion

The present study examined whether parent affect in response to adolescent disclosure predicted the timing of subsequent disclosures in a sample of parent–adolescent dyads in which the adolescent had Type 1 diabetes. This study is innovative because it tested whether specific parental affective responses to adolescent disclosures in the moment predicted the timing of subsequent disclosures in a diverse, at-risk population. We found that when parents responded to adolescent disclosures with higher levels of anger and positive affect relative to their mean levels, adolescents took longer to disclose again. Findings have implications for interventions aimed at promoting adolescent disclosure and positive aspects of parent–adolescent communication more broadly, particularly with families coping with chronic illness.

Associations Between Parent Affective Responses and Subsequent Adolescent Disclosures

As hypothesized, adolescents took longer to disclose when their parents responded to their previous disclosures with higher levels of anger relative to their emotional baseline. Adolescents may have taken longer to disclose to their parent after their parent responded with anger because they attributed the increased anger to their disclosure and feared potential behavioral and/or emotional consequences in response to further disclosures. Indeed, adolescents often cite this fear as a reason for nondisclosure to parents (Smetana et al., 2009). This finding is consistent with previous research on adolescent disclosure using self-report which has linked negative parental reactions, such as anger, to reductions in adolescent disclosure over time (Tilton-Weaver et al., 2010). Our results indicate that similar dynamics can be observed in real-time parent–adolescent interactions in matters of seconds. Importantly, the present findings reflect the effect of specific parental affective responses to adolescent disclosures in the moment, rather than global features of parent–adolescent conversations or negative affect more broadly as demonstrated in prior research (Disla et al., 2019; Main et al., 2019).

Somewhat surprisingly, adolescents also took longer to disclose when parents responded with increased positive affect to their previous disclosures. It is possible that if parents responded to adolescents' disclosures with humor, adolescents may have perceived increases in this form of parental positive affect immediately following a disclosure as not taking their feelings or the content of what they were disclosing seriously, leading to less disclosure over time. It is also possible that when parents responded to adolescent disclosures with positive affect, this communicated approval of the content of their disclosure, which may have the (likely unintended) effect of subtly discouraging adolescents from disclosing something in the future about which the parent may disapprove. It is important to note that positive affect was coded as general positive emotion (e.g., humor, joy, affection). Disla et al. (2019) found that positive emotion-related behaviors conveying validation and interest were associated with quicker subsequent disclosures during mother–adolescent conflict discussions, whereas positive affect more broadly (which mainly consisted of humor, affection, and enthusiasm) was associated with longer lag times to subsequent disclosures. Although humor, affection, validation, and interest are generally positive features of parent–adolescent interactions, during conflict discussions, these emotional responses may serve different functions. For example, the use of humor within this context may convey a lack of seriousness or appreciation for the other person's perspective. As with negative emotion, this finding indicates the importance of examining discrete positive affective responses to disclosures.

When parents responded to adolescent disclosures with higher levels of sadness, anxiety, or expressive suppression, this did not affect the timing of subsequent disclosures. The effect of parental expressions of these emotions may have been more context or relationship dependent. Specifically, adolescents may sometimes have taken longer to disclose following parental sadness or anxiety as a way of disengaging from negative parental emotions, whereas others may have disclosed more quickly as a form of reassurance to the parent. Regarding expressive suppression, some adolescents may have picked up on the parents' attempts to suppress their emotions and viewed this as an opportunity to disclose more as a way of coregulating the parent's emotions, whereas others may have been unaware that their parents were experiencing an emotional response to their disclosure.

Limitations and Future Directions

Though the study is innovative in its use of observational methodology to test dynamic, micro-level associations between adolescent and parent behavior in a diverse, at-risk population, there are several limitations that warrant mentioning. First, though the sample size was large compared to other observational studies with samples with Type 1 diabetes and the large number of within-subjects observations is a significant strength, some of our between-subjects analyses may have been underpowered to detect differences. Though the diversity of the sample is a strength, explicit examination of links between cultural factors (e.g., language, cultural values) and family dynamics in the context of Type 1 diabetes management is an important future direction. Second, adolescent disclosure was examined as a categorical variable (i.e., did the adolescent disclose or not), but identifying whether parental affective responses to disclosures affected the depth of subsequent disclosures is an important area of future research, as parental responses to disclosures are associated with depth of disclosures about distressing experiences in the general population (Martin et al., 2018). Third, though the use of observational coding of adolescent disclosure and parent affect are strengths of the present study as their use avoids self-report bias, outside observers almost certainly bring their own experiences and perceptions to analyze interpersonal interactions (Boyko, 2013). The use of multiple coders partially avoids this limitation, but the inclusion of parent and adolescent perceptions of emotional expressions and disclosures during these interactions is an important area of future work to untangle these questions. Finally, though both mothers and fathers were included in the study, the majority of participants were mothers because mothers are most likely to be involved in their adolescents' diabetes care (Quittner et al., 1998). Oversampling of

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fathers would allow for testing differences in response dynamics between mothers and fathers.

Conclusions and Implications

This study sheds light on the ways in which parent affective responses to adolescent disclosure in the context of managing Type 1 diabetes influence real-time adolescent disclosure to parents about their diabetes in a diverse population. Examining micro-level dynamics during parent–adolescent interactions could be integrated within future work testing associations between such dynamics and physical health over longer timescales (e.g., developmentally over months or years). Assessments of trends in diabetes management longitudinally would provide a greater understanding of links between parental responses, disclosure, and health over time. The observational methodology and use of dynamic statistical techniques will facilitate targeted interventions with parents and adolescents managing Type 1 diabetes and potentially other chronic illnesses. Specifically, parents can be encouraged to focus on regulating their emotions, particularly anger, in the context of discussing diabetes-related issues with their adolescent. Developing interventions and building on existing interventions (e.g., Graves et al., 2015) that emphasize interpersonal aspects of managing emotions in the context of diabetes management is important to promote positive outcomes in this population.

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