

Friendship and Romantic Relationships Among Emerging Adults With and Without Type 1 Diabetes

Vicki S. Helgeson,¹ PhD, Katilyn Mascatelli,¹ BA, Kerry A. Reynolds,² PhD, Dorothy Becker,³ MBBC_H, Oscar Escobar,³ MD, and Linda Siminerio,⁴ PhD

¹Carnegie Mellon University, ²The Rand Corporation, ³Children's Hospital of Pittsburgh, and ⁴University of Pittsburgh Medical Center

All correspondence concerning this article should be addressed to Vicki S. Helgeson, PhD, Department of Psychology, Carnegie Mellon University, Pittsburgh, PA 15213, USA. E-mail: vh2e@andrew.cmu.edu

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Objective To examine whether friendship and romantic relationships of emerging adults with type 1 diabetes differed from those of a comparison group, and to determine whether these relationships were associated with psychological and diabetes health outcomes. **Methods** High school seniors with ($n = 122$) and without ($n = 118$) type 1 diabetes were assessed annually for 3 years. Friend and romantic relationship variables, psychological distress, life satisfaction, eating disturbances, and, for those with diabetes, diabetes outcomes were assessed. **Results** Those with diabetes reported less friend support but similar friend conflict compared with controls. Aspects of romantic relationships and friend relationships were associated with health outcomes, but there were more effects involving romantic relationships. On some indices, romantic support was more beneficial for controls and romantic conflict was more troublesome for those with diabetes. **Conclusions** Both friendship and romantic relationships were associated with psychological and diabetes outcomes among emerging adults.

Key words emerging adulthood; friendship; romantic relationships; type 1 diabetes.

Researchers have long recognized that the social environment influences how youth adjust to chronic illness, both psychologically and physically. Bronfenbrenner's social ecological theory (1986) emphasizes different contextual levels of the social environment, ranging from the microsystem, which emphasizes the immediate environment, to the macrosystem, which emphasizes the larger cultural context. Within the microsystem, the family has been studied most extensively as a determinant of youth adjustment to chronic illness, reflecting family systems theory (Anderson, 1990; Minuchin, Rosman, & Baker, 1978; Cohen, 1999). Within the area of type 1 diabetes specifically, the family has been studied more than any other psychosocial variable as a determinant of diabetes outcomes (Helgeson & Palladino, 2012). Given the complexity of the diabetes regimen, it is not a surprise that parents are often heavily involved in helping children manage their diabetes (Anderson, Ho, Brackett, Finkelstein, & Laffel, 1997; Helgeson, Reynolds,

Siminerio, Escobar, & Becker, 2008). Youth with type 1 diabetes have to monitor their diet, administer insulin, check blood glucose levels, exercise, and adjust insulin dosages based on these activities.

However, the social environment of youth with and without chronic illness, including type 1 diabetes, is not solely composed of parents and in fact increasingly includes peers. It is widely recognized that peer relationships are central to the lives of youth. Indeed, an important task of adolescence is to establish connections to a peer group (Collins, Gleason, & Sesma, 1997). As youth transition into adolescence, they spend an increasing amount of time with peers (Larson & Verma, 1999), and support from peers increases over the course of adolescence (Scholte, van Lieshout, & van Aken, 2001; Shroff Pendley et al., 2002). Qualitative studies of youth with diabetes show that peers are frequently mentioned as both a source of support for (Karlsson, Arman, & Wikblad, 2008;

Lehmkuhl et al., 2009) and as an obstacle to diabetes self-care (Berlin et al., 2006; Schlundt, Quesenberry, Pichert, Lorenz, & Boswell, 1994).

Despite this recognition, there is a dearth of research on the implications of type 1 diabetes for peer relationships. One study of 14-year-olds found that those with and without diabetes reported a similar number of close friends (Seiffge-Krenke, 2000), but those with diabetes reported less intimacy and affection in their friendships than those without diabetes. By contrast, another study found that youth with diabetes reported marginally more close friends and significantly more support from close friends than healthy youth (Helgeson, Reynolds, Shestak, & Wei, 2006). A meta-analytic review of the literature from 1990 to 2009 found no difference between youth with and without diabetes in peer difficulties, but only three studies could be located to examine the issue (Reynolds & Helgeson, 2011). We examined whether there were differences between youth with and without type 1 diabetes in social acceptance over the transition to adolescence and found no differences at baseline when youth were an average age of 12 years, but differences emerged over 3 years (Helgeson, Snyder, Escobar, Siminerio, & Becker, 2007). Social acceptance remained the same over time for controls, but declined for youth with diabetes.

There also is little attention paid to the implications of peer relationships for adjustment to type 1 diabetes. Palladino and Helgeson (2012) conducted a literature review on the implications of peers for diabetes self-care and glycemic control and found more evidence that peer conflict was harmful than that peer support was helpful. Interestingly, this conclusion is consistent with research on healthy adults (see Lincoln, 2000, for a review). However, Palladino and Helgeson (2012) also noted that researchers are less likely to examine peer conflict compared with peer support and recommended that future research include both measures.

One limitation of Palladino and Helgeson's (2012) review was that it examined only the connection of peer relationships to diabetes outcomes. There is additional research on youth with type 1 diabetes that examines the implications of friend relationships for psychological well-being. One study showed that a combined index of family and friend support was related to better psychological well-being (Skinner, John, & Hampson, 2000), but another study of adolescents aged 12–19 years found no relation of friend support to well-being (de Dios, Avedillo, Palao, Ortiz, & Agud, 2003). One study found that adolescent—but not child—perception of peer support predicted fewer internalizing and externalizing problems (Varni, Babini, Wallander, Roe, & Frasier, 1989). In our earlier research on the same

participants in the present study, we found a marginal relation of friend support to well-being at baseline (average age 12 years) for youth with and without diabetes but did not find that friend support predicted changes in psychological well-being over the course of the year (Helgeson, Reynolds, Escobar, Siminerio, & Becker, 2007). Instead, conflictual relationships with friends were related to poor psychological well-being at baseline and predicted a deterioration in well-being over the year, again confirming the importance of peer conflict.

A specific peer relationship that has received little attention in the area of chronic illness is romantic relationships. During the older stages of adolescence and the early stages of adulthood, romantic relationships take on increasing significance in the lives of youth. It is unclear what the implications of chronic illness are, if any, for the development and maintenance of those relationships. One study of college students found no difference between those with and without asthma on dating anxiety but found that dating anxiety predicted poorer mental health in the group with but not the group without asthma (Eddington, Mullins, Fedele, Ryan, & Junghans, 2010). In the area of diabetes, Seiffge-Krenke (1997) followed 14-year-olds with and without type 1 diabetes for 4 years and found that those without diabetes were more likely to develop a romantic relationship and to do so sooner than those with diabetes. In addition, those without diabetes had closer romantic relationships than those with diabetes. By contrast, a longitudinal study by Maslow, Haydon, McRee, Ford, and Halpern (2011) found that young adults (ages 24–32 years) with a childhood-onset chronic illness, such as cancer or diabetes, were just as likely to be married and have children as their healthy counterparts. Young adults with and without chronic illness reported similar levels of relationship satisfaction as well. In our earlier examination of the participants in the present study, we found no differences between those with and without diabetes in the presence of a romantic relationship at age 12 years, but those without diabetes were more likely than those with diabetes to have an other-sex friend (Helgeson et al., 2007). Clearly, more research needs to be conducted on this issue.

Thus, in the present study we distinguish between the positive and negative aspects of peer relationships and examine both friendships and romantic relationships. We examine these relationship issues during a period of development when peer relationships are in a state of fluctuation—the transition from adolescence to emerging adulthood. Emerging adulthood is defined as the period of development that occurs between the ages of 18 and 25 years (Arnett, 2000). It lies beyond adolescence but before

many responsibilities associated with adulthood (i.e., work, marriage, children) are assumed. Many of the events that occur during this period of time involve social environment transitions, such as moving out of parents' homes, attending college, taking a job, and becoming involved in more serious romantic relationships. Thus, it is especially important to understand how peer relationships are associated with health at this key juncture in youths' lives. These social environment transitions pose unique challenges in the case of type 1 diabetes, as these youth have to make decisions about how much to disclose about diabetes in these new relationship contexts, how much to involve relationship partners in the care of diabetes, and how to manage diabetes in new social environments.

In sum, there were three aims of the present study that we examined in the context of a 3-year longitudinal study of youth with and without type 1 diabetes as they transitioned from high school into emerging adulthood. First, we examined whether there were differences between emerging adults with and without type 1 diabetes in support from and conflict with friends over the course of the 3 years. Second, we examined whether there were differences between emerging adults with and without type 1 diabetes in support from and conflict with romantic partners at each wave of the study. For each of these two aims, we also examined whether there were sex differences and whether sex moderated any group differences in these relationship variables because sex differences in relationships are common (McNelles & Connolly, 1999; Singleton & Vacca, 2007), and interactions between sex and relationship variables have been found in previous research on youth with diabetes (Helgeson et al., 2007). We made no specific predictions with respect to group differences in peer relationship or romantic relationship variables for either aim because previous research is contradictory on this issue.

Third, we examined the extent to which support from and conflict with friends and romantic partners were associated with psychological outcomes for those with and without diabetes, as well as diabetes outcomes for those with diabetes.¹ These analyses are limited to participants

who were involved in a romantic relationship. We examined three psychological outcomes: psychological distress, life satisfaction, and disturbed eating behavior. We examined psychological distress and life satisfaction partly because we wanted to reflect outcomes with a negative and positive valence and partly because these are two important psychological outcomes with which to be concerned in emerging adulthood. We examined disturbed eating behavior because those with diabetes—especially females—are at increased risk for eating disturbances compared with those without diabetes (Jones, Lawson, Daneman, Olmsted, & Rodin, 2000) and the transition to college has been associated with increases in eating disturbances (Vohs, Heatherton, & Herrin, 2001). In terms of diabetes outcomes, we examined self-care behavior and glycemic control (i.e., HbA1c).

We hypothesized that conflict would be a more robust correlate of outcomes than support (i.e., would be associated with a greater range of outcomes), and expected conflict with friends and romantic partners to be independent correlates of outcomes when both variables were in the equation. For psychological functioning, we examined whether these relations were moderated by the presence of diabetes. Because those with diabetes might be more sensitive to changes in their social environment, we hypothesized that relations would be stronger for those with than without diabetes—especially conflictual relations.

Method

Participants

Participants were 118 emerging adults with type 1 diabetes and 122 emerging adults without type 1 diabetes, who were an average age of 18 years at study start and in their senior year of high school. As shown in Table I, the majority of both groups were white, and approximately half the sample was female. Social status was measured with the four-factor (education, occupational status) Hollingshead index (1975). The mean score shows that the average social status reflected the lower end of technical workers, medium business, and minor professionals. There were no group differences on any demographic variable except social status and body mass index. Thus, all analyses controlled for these two variables.

Procedure

Institutional review board approval was obtained from the relevant institutions. Participants were recruited from an earlier study on adjustment to adolescence (see Helgeson, Snyder, Escobar, Siminerio, & Becker, 2007).

¹ In a previous paper (Helgeson et al., 2014), we reported the relations of friend support and friend conflict on the same outcomes examined in this paper article among emerging adults, but there are 5 five important differences between the two papers. The previous paper (a) examined friend support and conflict in the context of parent relationships, (b) did not examine romantic relationships, (c) included the full sample because analyses were not restricted to participants who had romantic relationships, (d) did not include the T3 assessment that is included here, and (e) did not examine group differences in friend or romantic relationships. The overlap in findings is noted in the discussion section.

Table 1. Participant Demographics

	Diabetes (<i>n</i> = 118)	Controls (<i>n</i> = 122)
Sex	53% female	53% female
Race	93% White	93% White
Hollingshead social status ^a	42.38 (11.16)	46.45 (13.70)
Household structure (% live with mom and dad)	75	76
T1 Age	18.13 (.40)	18.03 (.50)
T1 Body mass index*	25.76 (4.16)	24.07 (4.71)
T1 Insulin delivery method	56% pump	
T1 Time since diagnosis (years)	11.04 (3.10)	
T2 Full-time college (%)	75	74
T2 Working (%)	49	52
T2 Living at home (%)	38	37

Note. Sex, race, social status, household structure, and birthdate were collected from the original study when participants were an average age of 12 years (Helgeson, Snyder, Escobar, Siminerio, & Becker, 2007).

*Health status difference $p < .05$.

They were an average age of 12 years when initially recruited for the original study. Those with diabetes were recruited from the Children's Hospital of Pittsburgh's diabetes clinic, and those without diabetes were recruited from physicians' offices and area malls. Recruitment details are described elsewhere (see Helgeson et al., 2007). When participants were in their senior year of high school, they were invited to participate in the present study. Of the 132 participants with diabetes who were recruited for the original study, 89% ($n = 118$) provided consent to participate in this study. Of the 131 participants without diabetes who were recruited from the original study, 93% ($n = 122$) provided consent to participate in this study. If participants were <18 years, we obtained parental consent and child assent. When participants turned 18 years, they were reconsented.

On receipt of consent forms, youth were emailed a link to a confidential online questionnaire to complete (Time 1 [T1]). Youth were emailed a link 1 year later (Time 2 [T2]) and 2 years later (Time 3 [T3]) to complete similar online questionnaires. Questionnaires assessed friend relationships, romantic relationships, psychological distress, life satisfaction, disturbed eating behavior, and, for youth with diabetes, self-care behavior. Retention over the course of the 3-year study was high. For those with diabetes, 118 completed T1, 117 completed T2, and 113 completed T3. For those without diabetes, 122 completed T1, 121 completed T2, and 117 completed T3. Because some participants did not have online access, paper questionnaires were completed by 12% of the sample at T1, 12% at T2, and 20% at T3. There were no differences in demographic or medical variables between participants who completed the questionnaire online or via paper.

Instruments

Relationship Variables

Friend support was measured with the Berndt and Keefe (1995) friendship questionnaire, which has been shown to have excellent reliability and validity. We used the intimacy, instrumental support, and emotional support subscales, which showed high internal consistency at each wave of assessment (alphas ranged from .83 to .91 for diabetes and from .82 to .90 for controls) to create a friend support index. The internal consistency of the index was .91, .92, .91 for T1, T2, T3, respectively, for diabetes and .90, .91, .91 for T1, T2, T3, respectively, for controls. *Friend conflict* was measured with the Test of Negative Social Exchange (Ruehlman & Karoly, 1991), which has high test-retest reliability and high internal consistency. We used the impatience, insensitivity, interference, and rejection subscales to create a friend conflict index. The internal consistencies for the individual scales ranged from .72 to .89 for diabetes and .65 to .85 for controls across the three waves of assessment. The internal consistency of the index for diabetes was .93 at T1, .91 at T2, and .87 at T3 and for controls was .88 at T1, .88 at T2, and .90 at T3.

Romantic support was measured by the previously described Berndt and Keefe (1995) subscales from their friendship questionnaire, with wording tailored to the romantic partner. The internal consistency of the individual subscales ranged from .69 to .92 across the three assessments for diabetes and from .71 to .93 across the three assessments for controls. The internal consistency of the romantic support index was .90, .81, and .91, at T1, T2, and T3, respectively, for diabetes and .93, .92, and .87, at T1, T2, and T3, respectively, for controls. *Romantic conflict* was measured with the previously described subscales from the Test of Negative Social Exchange (Ruehlman & Karoly, 1991), with wording tailored to romantic partner. The internal consistencies for the individual scales ranged from .65 to .95 across the waves of assessment for diabetes and from .66 to .89 for controls. The internal consistency of the romantic conflict index for diabetes was .93 at T1, .93 at T2, and .91 at T3 and for controls was .83 at T1, .88 at T2, and .86 at T3. We measured romantic support and conflict with adapted versions of the friendship scales for two reasons: (1) to facilitate comparison of romantic and friend relationships, and (2) it was easy to adapt the wording to romantic partners, as items seemed equally applicable to friend and romantic relationships.

Before our examination of the links of friend support, friend conflict, romantic support, and romantic conflict to

outcomes, we examined the intercorrelations of these four variables to make sure there was not too much empirical overlap. At T1, friend support and conflict were correlated, $r = -.19$, $p < .01$; romantic support and conflict were correlated, $r = -.22$, $p < .05$; friend and romantic support were correlated, $r = .34$, $p < .01$; and friend and romantic conflict were correlated, $r = .54$, $p < .001$. With the exception of the latter correlation, these relations were modest. A similar pattern of correlations held at T2 and T3.

Psychological Distress

We had three measures that tapped areas of psychological distress. We used the Center for Epidemiologic Study Depression Inventory (Radloff, 1977; T1 diabetes $\alpha = .90$, T1 controls $\alpha = .88$; T2 diabetes $\alpha = .93$, controls $\alpha = .92$; T3 diabetes $\alpha = .92$, controls $\alpha = .91$); the UCLA Loneliness Scale, Version 3 (Russell, 1996; T1 diabetes $\alpha = .82$, controls $\alpha = .86$; T2 diabetes $\alpha = .84$, controls $\alpha = .88$; T3 diabetes $\alpha = .86$, controls $\alpha = .87$); and the abbreviated form (four-item) of the Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983; T1 diabetes $\alpha = .67$, controls $\alpha = .73$; T2 diabetes $\alpha = .75$, controls $\alpha = .77$; T3 diabetes $\alpha = .79$, controls $\alpha = .72$). All of these scales have well-established reliability and validity and have been widely used with young adults. The three scales were correlated .53 to .70 at T1, .57 to .71 at T2; and .37 to .68 at T3 (all p values $< .001$). Because they were conceptually similar and moderately to highly correlated, and because we sought to reduce the number of analyses to guard against type I error, we standardized the three scales within the sample and averaged them into a single psychological distress index.

Life Satisfaction

We used the five-item Satisfaction with Life Inventory (Diener, Emmons, Larsen, & Griffin, 1985), which consists of statements rated on a 7-point scale (1 = strongly disagree; 7 = strongly agree). Internal consistencies were high at all waves of assessment (T1 diabetes $\alpha = .89$, controls $\alpha = .91$; T2 diabetes $\alpha = .91$, controls $\alpha = .92$; T3 diabetes $\alpha = .87$, controls $\alpha = .89$).

Disturbed Eating Behavior

We administered two subscales from the valid and reliable Eating Disorder Inventory (Garner, 1990): drive for thinness (excessive concern with dieting, preoccupation with weight; T1 diabetes $\alpha = .93$, controls $\alpha = .89$; T2 diabetes and controls $\alpha = .91$; T3 diabetes $\alpha = .92$, controls $\alpha = .90$) and bulimia (uncontrollable eating/bingeing episodes; T1 diabetes $\alpha = .83$, controls $\alpha = .79$; T2 $\alpha = .88$, controls $\alpha = .80$; T3 diabetes $\alpha = .91$, controls $\alpha = .83$). Three

items from the drive for thinness scale were removed because they are biased by the presence of diabetes (Steel, Young, Lloyd, & Macintyre, 1989). Their inclusion in previous research has artificially inflated the presence of eating disturbances among people with diabetes. Because the two scales were correlated at each assessment ($r = .65$, $.66$, and $.54$, respectively), we combined them into an *eating disturbance index*.

Diabetes Outcomes

For emerging adults with diabetes, *self-care* was measured with the 14-item Self-Care Inventory (La Greca, Swales, Klemp, & Madigan, 1988; Lewin et al., 2009), which was updated by adding eight more contemporary items (Helgeson et al., 2008). Respondents are asked how well they followed their physicians' recommendations on a 5-point scale (1 = never to 5 = always/very often) for glucose testing, insulin administration, diet, exercise, and other diabetes behaviors reflecting domains regarded as important by the American Diabetes Association. Items were summed and the average was taken. Internal consistency for this index was good (T1: $\alpha = .85$; T2: $\alpha = .88$; T3: $\alpha = .86$). Average scores were moderately high at each assessment (T1 = 3.78, T2 = 3.69, T3 = 3.75), indicating that participants generally saw themselves as exhibiting good self-care. The range of values for the scale was 2–5.

Glycemic control was measured using the participants' most recent HbA1c, which was requested from each participant's current physician. Higher numbers indicate poorer glycemic control. Average HbA1c was 8.97 at T1 (range: 6.2–13.7), 9.08 at T2 (range: 6.5–13.8), and 9.02 at T3 (range 6.3–16.2). The most recent HbA1c was taken an average of 1.27 months before T1 (71% within 3 months), 0.17 months before T2 (70% within 3 months), and 0.52 months before T3 (88% within 3 months). Note that not all participants had an HbA1c taken in the past year. Specifically, of the 118 persons with diabetes, 107 (91%) had an HbA1c at T1 and 92 (78%) at T2 and T3.

Overview of the Analyses

To examine Aim 1, we used a group by sex by time repeated measures analysis of covariance, with controls for social status and baseline body mass index, to examine changes in friend support and friend conflict over the 3 years. Group and sex were between-subjects factors, and time was the within-subjects factor. The means for friend relationship variables at each wave of assessment for males and females within diabetes and control groups are shown in Table II.

Table II. Means and Standard Deviations for Friend and Romantic Relationship Variables at Each Assessment

	Time 1						Time 2						Time 3						
	Controls			Diabetes			Controls			Diabetes			Controls			Diabetes			
	Male	Female	n	Male	Female	n	Male	Female	n	Male	Female	n	Male	Female	n	Male	Female	n	
FRIEND	n = 56	n = 65	n = 55	n = 63	n = 55	n = 65	n = 56	n = 65	n = 55	n = 62	n = 62	n = 55	n = 63	n = 51	n = 62	n = 55	n = 63	n = 51	n = 62
Friend support	3.74 (0.70)	4.14 (0.75)	3.56 (0.77)	3.96 (0.90)	3.65 (0.76)	4.01 (0.77)	3.46 (0.81)	3.97 (0.77)	3.46 (0.81)	3.97 (0.77)	3.46 (0.81)	3.72 (0.69)	3.95 (0.81)	3.48 (0.71)	3.63 (0.96)	3.72 (0.69)	3.95 (0.81)	3.48 (0.71)	3.63 (0.96)
Friend conflict	1.63 (0.57)	1.46 (0.44)	1.48 (0.54)	1.49 (0.61)	1.53 (0.53)	1.47 (0.50)	1.56 (0.61)	1.59 (0.66)	1.56 (0.61)	1.59 (0.66)	1.56 (0.61)	1.65 (0.64)	1.39 (0.41)	1.52 (0.55)	1.63 (0.65)	1.65 (0.64)	1.39 (0.41)	1.52 (0.55)	1.63 (0.65)
ROMANCE	n = 30	n = 33	n = 27	n = 26	n = 23	n = 39	n = 23	n = 39	n = 19	n = 29	n = 19	n = 20	n = 38	n = 22	n = 28	n = 20	n = 38	n = 22	n = 28
Romantic support	4.16 (0.72)	4.58 (0.61)	4.23 (0.77)	4.50 (0.52)	4.49 (0.49)	4.60 (0.60)	4.39 (0.53)	4.39 (0.56)	4.39 (0.53)	4.39 (0.56)	4.39 (0.56)	4.41 (0.61)	4.65 (0.49)	4.58 (0.43)	4.28 (0.80)	4.41 (0.61)	4.65 (0.49)	4.58 (0.43)	4.28 (0.80)
Romantic conflict	1.34 (0.36)	1.37 (0.40)	1.24 (0.41)	1.38 (0.66)	1.36 (0.37)	1.32 (0.47)	1.41 (0.56)	1.50 (0.69)	1.41 (0.56)	1.50 (0.69)	1.41 (0.56)	1.60 (0.56)	1.39 (0.52)	1.42 (0.61)	1.50 (0.67)	1.60 (0.56)	1.39 (0.52)	1.42 (0.61)	1.50 (0.67)

To examine Aim 2, we conducted separate two-way (group by sex) analyses of variance on romantic support and romantic conflict at each wave of assessment. Because romantic relationships were not stable (i.e., only 20% of participants were in a romantic relationship at all three waves of assessment), we could not use a repeated measures analysis of variance to examine changes in romantic support or conflict over time. Such an analysis would have been limited to the 49 participants who reported a romantic relationship at all three waves of assessment. The means for romantic relationship variables at each assessment are shown in Table II.

For Aim 3, we conducted hierarchical multiple regression analyses. Although we had longitudinal data, romantic relationships were unstable. Thus, it did not make sense to use T1 relationship variables to predict T2 health outcomes, when the T1 romantic relationship is unlikely to exist at T2. Thus, we conducted cross-sectional regression analyses, focusing on T2 and T3, the two periods after the transition out of high school. We examined T2 health outcomes by entering social status, body mass index, group (control vs. diabetes), and sex on the first step of the equation. We entered T2 friend support, T2 friend conflict, T2 romantic support, and T2 romantic conflict on the second step of the equation, followed by the interactions of each variable with group on the third step. We conducted parallel analyses at T3. The three psychological outcomes were typically moderately related: distress and life satisfaction were correlated $r = -.57, p < .001$, for diabetes and $r = -.60, p < .001$, for controls; life satisfaction and eating disturbance were correlated $r = -.33, p < .001$, for diabetes and not related $r = -.12, n.s.$, for controls; distress and eating disturbances were correlated $r = .49, p < .001$, for diabetes and $r = .43, p < .001$, for controls. Because we included all four independent variables in these analyses, the T2 analyses were limited to the 110 participants who had a romantic relationship at T2 and the T3 analyses were limited to the 108 participants who had a romantic relationship at T3. When interactions were significant, the final equation included all three steps. When no interactions were significant, the final equation included two steps.

With 108–110 participants, four covariates and four independent variables in the regression analysis, we had adequate power (.80) to detect an increment to R^2 as low as .08 to .10 for main effects and interactions. However, our power to detect the same increments to R^2 for glycemic control and self-care behavior with 37–46 participants was quite low (0.22 and 0.32, respectively). We would not have had adequate power to examine interactions with both group and sex in any of the analyses, but

we conducted an exploratory analysis that examined interactions with sex and found only a single interaction in all of the analyses. Therefore, we did not include the interactions with sex in the final analyses presented below.

Results

Group by Sex by Time Comparisons in Friend Relationship Variables

The group by sex repeated measures analysis of covariance revealed a main effect of group, $F(1, 220) = 4.98, p < .05$, such that controls reported more friend support ($M = 3.86, SE = 0.06$) than those with diabetes ($M = 3.66, SE = 0.06$). There was a main effect of sex, $F(1, 220) = 16.96, p < .001$, that was qualified by an interaction between sex and time, $F(2, 219) = 3.28, p < .05$. Although females reported more support than males at all waves of assessment, the rate of decline was slightly larger for females (means are 4.04, 3.99, 3.80; all SEs 0.07) than males (means are 3.64, 3.52, 3.58; all SEs 0.08). There were no effects involving group, sex, or time on friend conflict.

Group by Sex Comparisons on Romantic Relationship Variables

Group was not associated with T1 support, but sex was, $F(1, 110) = 8.09, p < .01$. Females reported more support from romantic partners ($M = 4.54, SE = 0.09$) than males ($M = 4.19, SE = 0.09$). There were no effects of group or sex at T2. At T3, there was an interaction between group and sex, $F(1, 99) = 4.50, p < .05$, as shown in Figure 1. There were no group differences in romantic support for males (controls: $M = 4.41; SE = .14$; diabetes: $M = 4.58; SE = 0.09$), but control females reported more romantic support ($M = 4.65; SE = 0.08$) than females with diabetes reported ($M = 4.28; SE = 0.15$). There were no effects of group or sex on romantic conflict at T1, T2, or T3.

Effects of Relationship Variables on Psychological Health and Diabetes Outcomes

The results of the regression analyses are shown in Table III (psychological outcomes) and Table IV (diabetes outcomes). The tables show the change in R^2 at each step in the equation, as well as the total R^2 (bottom of table). Standardized β s are shown for the final equation.

Psychological Outcomes

For T2 psychological distress, there was a main effect of sex, a main effect of friend support, and a main effect of romantic conflict, such that being female, having less friend support, and having more romantic conflict were associated with greater T2 psychological distress. There

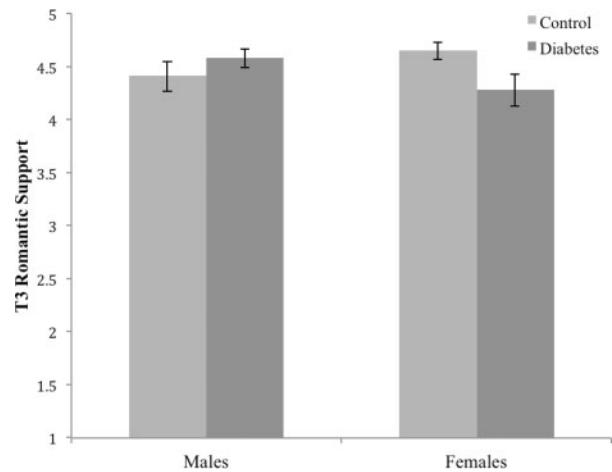


Figure 1. Female controls reported more support from romantic partners than females with type 1 diabetes at T3. There is no difference in romantic support between males with and without type 1 diabetes at T3.

were no interactions of friend or romantic relationship variables with group. At T3, there were main effects of sex, friend support, friend conflict, romantic support, and romantic conflict, such that being female, having less friend and romantic support, and having more friend and romantic conflict were associated with greater T3 psychological distress. However, there also was an interaction between group and romantic support, such that romantic support was related to lower distress for the control group ($\beta = -.29, p < .05$) but higher distress for the diabetes group ($\beta = .30, p < .05$).

For T2 life satisfaction, there were main effects of sex and romantic support, and a significant group by romantic support interaction. Similar to the interaction above, romantic support was related to higher life satisfaction for controls ($\beta = .39, p < .01$) but was unrelated to life satisfaction for those with diabetes ($\beta = -.17, n.s.$). Similarly, at T3, there was a main effect of romantic support that was qualified by an interaction with group. Romantic support was related to higher life satisfaction for the control group ($\beta = .50, p < .001$) but not the diabetes group ($\beta = -.22, n.s.$).

Sex (females higher than males) was associated with T2 disturbed eating behavior and romantic conflict. At T3, there was a main effect of sex, an interaction between group and romantic support, and an interaction between group and romantic conflict. Romantic support was unrelated to disturbed eating behavior for the control group ($\beta = -.14$) but was related to more disturbed eating behavior among the diabetes group ($\beta = .46, p < .01$). Romantic conflict was unrelated to disturbed eating behavior for the control group ($\beta = .03, n.s.$) but

Table III. Multiple Regression: Predicting Psychological Outcomes (Standardized β s, Change in R^2 at Each Step, and Total R^2)

	Distress				Life satisfaction				Eating disturbance			
	T2 n = 110		T3 n = 108		T2 n = 110		T3 n = 108		T2 n = 110		T3 n = 108	
	β	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2
Social status	.15+		.10		-.13		-.04		.20*		.15+	
BMI	-.02		.08		.02		-.16		-.07		.16+	
Group	.02		.08		-.15		-.08		-.01		.08	
Sex	.36***		.23**		-.21*		-.07		.47***		.50***	
		0.13		0.09		0.05		0.06		0.26		0.22
Friend support	-.29***		-.24*		.09		.10		-.05		-.15	
Friend conflict	.07		.24*		-.00		-.14		.02		.04	
Romantic support	.01		-.26*		.41**		.48***		-.04		-.13	
Romantic conflict	.36***		.31*		-.06		-.08		.35***		-.01	
		0.27		0.37		0.14		0.19		0.15		0.04
Group \times Friend support	-		.00		.23+		.10		-		.02	
Group \times Friend conflict	-		.05		.00		.08		-		-.01	
Group \times Romantic support	-		.42*		-.37*		-.53***		-		.44**	
Group \times Romantic conflict	-		.16		.06		-.30+		-		.39*	
Total R^2		0.40		0.53		0.26		0.34		0.41		0.32

+ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table IV. Multiple Regression: Predicting Diabetes Outcomes (Standardized β s, Change in R^2 at Each Step, and Total R^2)

	Self-Care				HbA1c			
	T2 n = 46		T3 n = 50		T2 n = 33		T3 n = 37	
	β	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2
Social status	-.22		.04		-.23		.01	
BMI	-.10		-.36**		.00		-.10	
Sex	.01		.14		.01		.22	
		0.04		0.09		0.02		0.04
Friend support	.07		-.29*		.04		-.06	
Friend conflict	.13		-.22		-.01		-.06	
Romantic support	.18		-.28+		.11		.17	
Romantic conflict	-.15		-.54**		.32		.36	
Total R^2		0.06		0.30		0.11		0.10
		0.10		0.39		0.13		0.14

+ $p < .10$; * $p < .05$; ** $p < .01$.

related to greater eating disturbances for the diabetes group ($\beta = .51$, $p < .05$).

Diabetes Outcomes

There were no significant correlates of self-care behavior at T2. At T3, lower body mass index (BMI), less friend support, and less romantic conflict were related to better self-care. There were no significant correlates of glycemic control at either T2 or T3, but the sample sizes were sharply reduced here, as 22% of participants did not see

a physician during the past year or did not see a physician who measured their glycosylated HbA1c.

Discussion

The results of this study showed that emerging adults with and without diabetes are highly similar in some aspects of peer relationships while differing in other aspects. Participants did not differ substantially in the amount of conflict with peers and romantic partners, but those

with diabetes had less friend support than controls. Additionally, females with diabetes reported less romantic support than control females—but only at the last assessment. In addition, aspects of romantic relationships and, to some extent, friendships were associated with psychological outcomes, with findings being stronger for romantic relationships than friendships and with romantic support being linked to more positive outcomes for controls than those with diabetes.

The first aim of this study was to determine whether there are differences between emerging adults with and without type 1 diabetes in support from and conflict with friends. There were some similarities and some differences. Those with diabetes reported less support from friends than those without diabetes across the three assessments, but there were no group differences in conflict with friends. The existing literature has been inconsistent on this issue, but that literature has predominantly focused on adolescents. This is the first study, to our knowledge, to examine whether there are differences in aspects of friendship between emerging adults with and without type 1 diabetes. One explanation for the difference in support might have to do with support expectations. Emerging adults with diabetes might have higher expectations of support because they have received high levels of support from family members in regard to their diabetes (Anderson et al., 1997; Helgeson et al., 2008). If this is the case, there may not be actual group differences in receipt of support from friends, but those with diabetes could perceive friends as more likely to fall short of expectations. By contrast, it also is possible that diabetes interferes with friend relationships in some way that makes them less supportive. Perhaps, those with diabetes spend less time with friends and more time with family compared with those in the control group. Emerging adults with diabetes may find it more difficult to become close to friends during this time of transition, as they have to negotiate the task of disclosing diabetes to a new group of people. It may take time to feel that friends understand their illness. Less time with and investment in friends could impede the development of supportive friend relationships. Future research should investigate these potential explanations.

The second aim of the research was to examine potential differences in support and conflict within romantic relationships for those with and without diabetes. Again, there were no group differences in conflict. There was evidence at the last assessment that females with diabetes found their romantic relationships to be less supportive than females without diabetes. These findings are consistent with Seiffge-Krenke (1997), who found that youth with diabetes had less close romantic relationships than

their healthy counterparts—but our findings were limited to females and only to females at the last wave of assessment. The findings from this study suggest that females with diabetes may not have the same relationship advantages as their control counterparts during the early stages of emerging adulthood, whereas males with diabetes are not so distinct from their peers. Because this finding appeared at only the last wave of assessment, however, future research needs to replicate this result and examine whether the finding persists into the later stages of emerging adulthood.

The third aim of the study was to examine the ways in which support from and conflict with both friends and romantic partners were associated with psychological outcomes for those with and without diabetes. Our hypothesis that aspects of both friendships and romantic relationships would account for unique variance in outcomes was supported. Our hypothesis that conflict with romantic partners and friends would be more likely to be associated with psychological outcomes than support received modest support. Friend conflict was related to higher distress at T3, and romantic conflict was related to higher distress at both T2 and T3, higher disturbed eating behavior at T2, and poorer self-care behavior at T3. By contrast, friend support was associated with lower levels of distress at both T2 and T3, but poorer self-care for those with diabetes at T3. Romantic support was associated with lower levels of distress at T3 and higher life satisfaction at T2 and T3, but all of these findings were qualified by interactions with group. Because these analyses were restricted to participants in a romantic relationship, we note that these findings do not generalize to those not involved in a romantic relationship. These findings are partly consistent with previous research on this sample specifically (Helgeson et al., 2007) that found friend conflict, but not support, predicted changes in well-being for youth with and without diabetes, as well as previous research in general (Palladino & Helgeson, 2012) that shows conflict is a more robust correlate of outcomes than support.

The finding that friend support was related to poorer self-care behavior may seem surprising at first glance. However, there is not a lot of evidence in the literature that friend support is related to good diabetes outcomes (see Palladino & Helgeson, 2012, for a review). In addition, previous research on this sample at a younger age revealed that friend support was related to poor glycemic control (Helgeson, Siminerio, Escobar, & Becker, 2009) and friend support at age 12 years predicted a deterioration in glycemic control 7 years later (Helgeson, Palladino, Reynolds, Becker, Escobar, & Siminerio, 2014). Another study showed that friend support magnified the relation

between diabetes stress and poor glycemic control (Hains et al., 2007). We have previously argued that friend support may signify immersion in friendships, sociability, or be a marker of vulnerability to peer influence (Helgeson et al., 2013; Palladino & Helgeson, 2012). Being very involved with friends may detract from self-care behavior either because of time constraints or because people with diabetes perceive that taking care of themselves would interfere with their friendships.

The implications of romantic relationships, especially support, were more complex due to interactions with group. Romantic support interacted with group with respect to four outcomes: T3 distress, T2 and T3 life satisfaction, and T3 disturbed eating behavior. In each case, there were either associations to good outcomes or no associations for controls and associations to poor outcomes or no associations for those with diabetes. Specifically, romantic support was associated with lower levels of distress and higher levels of life satisfaction, but only for controls. Romantic support was associated with increased distress and higher levels of disturbed eating behavior for those with diabetes. By contrast, romantic conflict interacted with group with respect to one outcome. Conflict with a romantic partner was associated with greater disturbed eating behavior, but only for those with diabetes. Thus, it seems as if those with diabetes do not accrue some of the benefits of romantic relationships that young adults without diabetes experience, and that the negative aspects of these relationships are more potent correlates of poor outcomes in the presence of diabetes.

One explanation for this pattern of findings is that the complexity of the diabetes management regimen interferes with the development and functioning of romantic relationships. It may be more difficult to disclose and discuss diabetes with a romantic partner than a friend, as the relationship is one in which you expect to have a higher level of investment. The finding that romantic support was related to more distress and increased eating disturbances only for those with diabetes is telling in this regard. It is possible that emerging adults with diabetes who report high romantic support find the practice of managing the disease with a highly invested partner to be taxing. Romantic partners would be more invested than friends, but be less helpful or knowledgeable about diabetes compared with young adults' families. General support from a romantic partner may not translate into support that is helpful in regard to diabetes. In fact, having a close relationship with a romantic partner may place additional burdens on the individual with diabetes. Taking care of diabetes also might interfere with the more intimate and sexual aspects of romantic relationships. Future research

needs to examine more closely the nature of romantic relationships in the context of a chronic illness such as diabetes.

It is also worth noting that support and conflict with friends and romantic partners was somewhat more likely to be associated with T3 than T2 outcomes. Given that T2 was the first year after high school, and T3 the year following, this is not necessarily what we would have predicted. Because the majority of our sample spent the first year after high school in college, presumably more distanced from their familiar family environments and relying more heavily on their peer networks, it would be reasonable to expect that support and conflict within those peer relationships would be more strongly associated with outcomes at this initial transition than 1 year later when their surroundings had stabilized. Alternately, one can imagine how that additional year of separation from the family environment could solidify the importance and subsequent impact of those peer relationships. In other words, young adults who are 2 years out from high school may be even more reliant on their peers, and this stability allows for peers to exert more influence on their well-being. Future research should focus on the process by which adolescents come to rely more on peers than parents and the impact of this shift on psychological and physical health.

For those with diabetes, the prominence of peer relationships in the navigation of emerging adulthood has particular importance for clinical care. The transition to adulthood is often characterized by moving away from the protective and familiar family setting that has been involved in diabetes care to a more independent existence in an environment that increasingly centers on peers. Thus, practitioners need to be aware of the unique ways in which relationships with friends and romantic partners may impact those with diabetes. Specifically, risks may exist when these relationships are conflictual or not supportive. Clinicians may be able to address these concerns by screening for problems with peer relationships and with targeted discussions about transitioning to adulthood that focus on creating a plan for the development and maintenance of healthy peer relationships. Interventions that aim to educate peers about diabetes might help to increase relationship closeness or alleviate relationship strains. Additionally, interventions that focus on emerging adults with diabetes could provide instruction on how to most effectively mobilize support that could aid in the daily care regimen.

Before concluding, we acknowledge several limitations of this research. First, the vast majority of participants were White and middle class, limiting the extent to which these findings can be generalized to other cultural and social

status groups. Moreover, this demographic information was collected at study start when an average age of 12 years. Consequently, information on household structure and parent social status may not accurately characterize the current status of participants. We also note that the youth with diabetes in our study were diagnosed, on average, over a decade before this investigation, so these findings might not generalize to recently diagnosed youth. There are also several measurement limitations. We recognize the self-report nature of our measures, especially those pertaining to friendships and romantic relationships, as a limitation. Participant self-report of self-care behavior is also limited in that participants are asked to report on how well they adhere to physician instructions, but we have no way of knowing whether their perceptions of physician instructions are accurate. Our relationships variables were general, to facilitate comparison with a control group, but future research should examine aspects of diabetes-specific support and conflict in the context of friend and romantic relationships. We also had substantial missing data in terms of HbA1c because not all of participants saw a physician in the past year or necessarily saw a physician who measured HbA1c. As reported previously, youth who were less likely to have an HbA1c were more likely to be seeing a general family practice or internal medicine physician than an endocrinologist (Helgeson et al., 2013). Youth who were seeing generalists also were from a lower socioeconomic status family. Thus, the findings regarding glycemic control may not be representative of emerging adults with diabetes. These missing data also reduced our power to detect significant effects. Our finding that conflict was associated with more outcomes than support is limited to participants reporting a romantic relationship, and does not generalize to those who reported no such relationship. Finally, the cross-sectional analyses used to examine outcomes constitute an additional limitation. As previously mentioned, the unstable nature of romantic relationships in our sample led us to conduct cross-sectional regression analyses to examine friends and romantic partners concurrently. Therefore, we cannot make any longitudinal claims about support and conflict in these relationships predicting outcomes over time. Our data on romantic relationships are novel and in need of replication, especially because those relationships were relatively transient at this age. Future research might use ecological momentary assessment measures of romantic relationships to better capture the fluctuation in these relationships during emerging adulthood.

The present research has made several important contributions to the literature on emerging adults with type 1 diabetes. This is one of the first studies to examine the

implications of romantic relationships for health among this group. We showed that aspects of both friend and romantic relationships were associated with changes in health outcomes for this age-group. Those with diabetes were similar to the comparison group in many respects, but key differences emerged, suggesting that the perceptions of and implications of these relationships are somewhat different for those with than without type 1 diabetes. There is evidence that emerging adults with diabetes are lacking some aspects of peer relationships that are normative for their age-group—especially females. On some indices, those with diabetes were less likely to benefit from the supportive aspects of romantic relationships and more likely to be troubled by the conflictual aspects of romantic relationships. Emerging adults with type 1 diabetes may be in a more socially precarious position than their healthy counterparts in which their chronic illness creates additional challenges in navigating the transition to adulthood.

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