# Benefits and Detriments of Friend and Peer Relationships among Youth with Type 1 Diabetes: A Review

Meredith Van Vleet & Vicki S. Helgeson

Carnegie Mellon University

Date Submitted: June 16, 2016

Author Notes

This research was supported by a grant from the National Institutes of Health (N1DDK, 1DP3DK103999).

**Abstract**

Adolescence is an important developmental period associated with greater prominence of peer relationships and poorer glycemic control among youth with type 1 diabetes. In this review, we summarize the literature on friend and peer support and conflict during this period and their links to psychological well-being and diabetes outcomes. We identified 34 articles on this topic from a previous review, and literature searches in PsycINFO and MEDLINE. Overall, studies revealed general friend support was linked with greater psychological well-being and (to a lesser extent) better self-care, but was unrelated to glycemic control. Research focused on diabetes-specific friend support was inconclusive. General friend conflict was associated with poorer psychological well-being, but findings were mixed for diabetes outcomes. Research examining links between diabetes-specific friend conflict and psychological and diabetes outcomes was inconsistent. In sum, the literature on friend and peer relationships and their links to psychological well-being and diabetes outcomes is mixed. Future research can benefit from making finer distinctions in the conceptualization and measurement of friend and peer relationships, examining potential moderator variables, probing mechanisms underlying links between friend and peer relationships and outcomes, and by considering the broader social context (family relationships) in which such relationships are situated.

Key Words: TYPE 1 DIABETES, ADOLESCENT, TEEN, FRIEND, PEER, SUPPORT, CONFLICT, SELF-CARE, ADHERENCE, COMPLIANCE, WELL-BEING, GLYCEMIC CONTROL

# Benefits and Detriments of Friend and Peer Relationships among Youth with Type 1 Diabetes: A Review

Adolescence is an interesting developmental stage in which individuals begin to establish independence from parents, and peer and friend relationships take a more prominent role. Extensions of attachment theory stipulate that while children turn to their parents for sources of support, belonging and behavioral norms, individuals gradually transfer some of these responsibilities to their peers during adolescence (Allen & Land, 1999). Correspondingly, research has found adolescents spend more time with their peers (Larson & Verma, 1999), and have strong desires to develop a close friend group at this age (Collins, Gleason, & Sesma, 1997). Because friendships and peer relationships become more important in adolescence, such relationships are likely to influence adolescents' well-being and behavior. For adolescents with type 1 diabetes, these relationships may not only impact psychological well-being, but also self-care behavior.

Self-care regimens for individuals coping with type 1 diabetes are exceptionally complex, involving frequent blood glucose testing, administering insulin, monitoring one's diet, and consistent exercise. Adherence to this regimen prevents hypoglycemia or hyperglycemia in the short term and serious complications (including heart disease, kidney disease, nervous system disease, and lower limb amputation) in the long-term (Hood, Peterson, Rohan, & Drotar, 2009). In childhood, the brunt of these self-care responsibilities is often managed by parents. As children mature into adolescents, they begin to take a more active role in their self-care. This is often a difficult transition for adolescents (Holmes et al., 2006). Not surprisingly, research has found glycemic control is poorer at this developmental stage (Greening, Stoppelbein, Konishi, Jordan & Moll, 2007).

Given that peer and friend relationships assume a new importance during adolescence when self-care and glycemic control become problematic for individuals with type 1 diabetes, it is important to investigate the influence of such relationships on well-being and self-care. Friends or peers may exert positive influences on well-being and self-care by providing emotional support intended to make adolescents feel loved, cared for, and good about themselves or by providing instrumental support, such as offering advice or physical assistance when needed. Such support may be directed toward the adolescents' diabetes or more general (not specifically related to diabetes). Conversely, peers and friends can also exert negative influences on well-being and self-care if they are a source of conflict. Peers may directly interfere with adolescents' self-care. Conflict that is unrelated to diabetes in friendships and peer relationships may also elicit psychological distress and indirectly impair self-care. In other words, friendships and peer relationships are likely to be sources of support and conflict, which can either facilitate or hinder well-being and self-care. We review work in this area and summarize relations of friend or peer relationships to psychological well-being and diabetes outcomes.

## Literature Search

We identified peer-reviewed journal articles investigating links between friend or peer relationships and psychological and diabetes outcomes among adolescents with type 1 diabetes. Following procedures outlined in a previous review in this area (Palladino & Helgeson, 2012), we selected 1990 as the earliest year of publication for our literature review. Self-care recommendations became much stricter at this time, because of findings from the Diabetes Control and Complications Trial (DCCT, 1993). Thus, research focused on diabetes self-care before this time period is not comparable to more recent research. First, we identified articles previously discussed in a literature review conducted by one of the co-authors which focused on

links of friend and peer relationships to diabetes self-care and glycemic control (Palladino & Helgeson, 2012). Second, we identified additional articles focused on these topics that were published since the previous review article was written (from 2010 – 2016). Third, we built on this previous review by identifying articles that examined relations of friend and peer relationships to *psychological* outcomes among adolescents with diabetes. Thus, in total, articles were included in our review if they occurred between 1990 and 2016, involved a sample of adolescents or emerging adults with type 1 diabetes (under 25 years old), and studied links between peer or friend relationships and psychological health outcomes, diabetes self-care or glycemic control.

Searches were conducted in PsycINFO and MEDLINE. Search terms used included (a) either 'peer' or 'friend', (b) 'adolescents', 'teens', or 'children', (c) 'diabetes', 'diabetic', or '1DDM', and (d) 'self-care', 'adherence', 'compliance', 'A1c', 'glycemic control', 'depression', 'well-being', 'adjustment' or 'stress'. All articles needed to include at least one keyword from each of the groups described above. This yielded a total of 162 separate literature searches. In addition to the 24 articles identified in a previous review of this literature (Palladino & Helgeson, 2012), 34 additional articles were identified in the literature searches. After further review of these 34 articles, 8 met criteria for inclusion in our review. Articles most often did not fit inclusion criteria because they did not include measures of friend or peer support or conflict. This resulted in a total of 34 articles included in our review.

## The Current Review

Below we review findings from studies investigating links of friend or peer relationships to psychological well-being and diabetes outcomes among children and adolescents with type 1 diabetes. First, we present studies that focus on friend or peer support. We organize these studies

according to whether they assess *general* friend or peer support (support that is not specific to diabetes self-care contexts) or *diabetes-specific* support (e.g., support focused on diabetes self-care). It should be noted that, unless otherwise specified, the support scales used in the reviewed studies involved aggregates of both emotional support (support intended to make recipients feel better emotionally) and instrumental support (support involving provision of tangible assistance or advice) such that the effects of one form of support could not be distinguished from the other. Second, we summarize research that examines friend or peer conflict. As with the previous section, we differentiate between studies that examine general friend conflict from those that investigate links between diabetes-specific friend conflict and outcomes. We focus on two sets of outcomes: psychological well-being (e.g., depression, perceived stress, risk behaviors) and diabetes outcomes (self-care, glycemic control). Unless noted otherwise, studies are cross-sectional and do not include covariates in analyses.

**General Support from Peers and Friends**

Below we review literature examining relations of general peer or friend support (support not specific to diabetes contexts) to psychological and diabetes outcomes. Unless otherwise specified, all studies either employed the Perceived Social Support from Friends Questionnaire (Procidano & Heller, 1983) or Berndt and Keefe's (1995) friendship questionnaires to assess friend support.

**Psychological outcomes.** Ten studies examined relations between general friend or peer support and psychological outcomes. Of these studies, five revealed links between general peer support and less psychological distress. In a sample of 64 children (ages 7-15) attending diabetes camp, more positive peer relations (feeling less lonely, more socially adequate, and having higher peer status) were linked with better diabetes adjustment (Kager & Holden, 1992).

Similarly, in a sample of 66 adolescents (*M* age = 14 years), general perceived peer support, measured with 4 items from the Norbeck Social Support Questionnaire (Norbeck, Lindsey, & Carrieri, 1983) reworded to reflect all of one's friend and peer relationships, was related to better diabetes adjustment (Thomas, 1997). A survey study of 34 children (6 - 12.4 years old) and 41 adolescents (12.5 – 16 years old) found less friend support was related to greater internalizing and externalizing symptoms (Varni, Babini, Wallander, Roe & Frasier, 1989). Children's peer support accounted for 46% of the variance for internalizing symptoms and 35% of the variance for externalizing symptoms, and adolescent peer support explained 54% of the variance for internalizing symptoms and 25% of the variance for externalizing symptoms. In longitudinal work, general friend support reported in one's senior year of high school predicted decreases in perceived stress (but not depression) one year later among a sample of 117 emerging adults (Helgeson et al., 2014a).

The fifth study was a longitudinal investigation that linked greater combined peer and family support with less depression six months later, controlling for sex, socioeconomic status (SES), and illness duration (Skinner & Hampson, 2000). Increases in combined family/peer support from year 1 to year 2 were also linked with less depression and greater well-being at the 6 month follow-up. However, given that the authors combined peer support and family support into a composite measure, the effects of support from peers cannot be disentangled from support provided by family.

Three studies revealed more complicated relations between general friend support and psychological outcomes. In an ecological momentary assessment (EMA) study (Helgeson, Lopez & Kamarck, 2009), adolescents between the ages of 13 and 16 first completed baseline measures of general friend support. Then, over the course of 4 days adolescents reported every 2 hours

whether they interacted with a friend and the extent to which the interaction was enjoyable or upsetting. Baseline measures of general friend support and an aggregate of daily enjoyable interactions with friends were unrelated to psychological outcomes. However, sex interacted with adolescents' aggregates of enjoyable interactions over the 4-day period in predicting depressive symptoms. Specifically, enjoyable interactions with friends were more strongly linked with fewer depressive symptoms for females than males. A longitudinal study of adolescents (11– 13 years) found no association between general friend support and psychological well-being one year later, controlling for body mass index (BMI), pubertal stage and parents' social status (Helgeson, Reynolds, Escobar, Siminerio, & Becker, 2007). Again sex and general friend support interacted in predicting psychological well-being. In this case, friend support was more strongly linked with better psychological well-being for *males* than females in this study. Further longitudinal work with the same sample at age 17 found that friend support interacted with parent control in predicting alcohol use one year later (Helgeson et al., 2014a). When parent control was high, alcohol use increased from year 1 to year 2— except when emerging adults reported high friend support. This suggests that friend support buffered the negative relation of parent control to alcohol use.

Two studies revealed no association between friend or peer support and psychological outcomes. In a study involving the same emerging adult sample described in the previous paragraph, general friend support at age 12 was unrelated to depressive symptoms, alcohol use or smoking at age 19 (Helgeson et al., 2014b). Because friends are likely to change between age 12 and age 19, it may not be surprising that friend support at age 12 did not predict outcomes at age 19. Another study, involving a sample of 74 adolescents who varied widely in age (12-18 year),

found general peer support was unrelated to depression, controlling for sex, SES, and illness duration (Skinner & Hampson, 2000).

***Summary.*** Overall, there is evidence that general friend support is associated with enhanced psychological well-being, but findings are not consistent across studies and some relations are complicated. Important to note, though, is that one of the five studies that found general friend support to be related to psychological health combined friend and family support into a single measure—obscuring the unique effects of friend support and family support. Three studies revealed more complicated relations between friend support and psychological well-being. Two found that sex played a role in the relations between friend support and psychological well-being, but this role was inconsistent across the two studies. Finally, one found parent control played a role in the link between friend support and psychological well-being. Taken together, the literature in this area provides suggestive evidence that general friend support is linked with psychological well-being among youth with diabetes. This research, however, hints that individual differences or environmental factors (sex, parent control) may play a role in the relation between friend support and psychological outcomes.

**Diabetes outcomes.** Seven studies examined the association of general friend or peer support to diabetes self-care. Support was related to better self-care in three of these studies. Specifically, greater general peer support was related to better dietary adherence, but unrelated to insulin administration or blood glucose testing in a sample of adolescents who were 12 to 18 years old (Skinner & Hampson, 1998). Likewise, in a follow-up of this sample, peer support was combined with family support and was linked to one aspect of self-care. Specifically, greater combined peer/family support, as well as increases in peer/family support were linked with better dietary adherence but were unrelated to insulin administration or blood glucose testing 6 months

later (Skinner & Hampson, 2000). As mentioned earlier, the combined peer/family support measure is problematic in interpreting these findings. In an investigation by Thomas (1997) involving two samples of adolescents, one found (n = 89; *M* age = 14 years) no association between general peer support and diabetes self-care outcomes, but the second (n = 66) linked greater general peer support to greater diabetes compliance, but not adherence when placed under social pressure (as measured in questionnaires). General peer support was also unrelated to adolescents' daily reports of exercise, injection regularity, dietary adherence, or frequency of testing one's blood glucose in telephone interviews over the course of six days.

More complex relations between friend support and self-care emerged in two investigations, the latter of which involved multiple publications and analyses. Baseline measures of friend support and enjoyable friend interactions were unrelated to self-care in the EMA study previously described (Helgeson, Lopez, & Kamarck, 2009). However, sex interacted with enjoyable friend interactions in predicting self-care, such that enjoyable interactions were more strongly linked to better self-care for females than males. In a sample of emerging adults, greater general friend support in one's senior year of high school had no relation to self-care one year later, but friend support interacted with parent control in predicting self-care (Helgeson et al., 2014a). Friend support helped to buffer the impact of low parent controlling behavior on self-care; that is, friend support predicted better self-care in the absence of parent controlling behavior. Two other longitudinal investigations involving the same sample found no relationship between general friend support at age 12 and self-care at age 13 (Helgeson et al., 2007) or 19 (Helgeson et al., 2014b).

Nine studies investigated the relation of general friend support to glycemic control. General friend or peer support was unrelated to glycemic control in six of these studies

(Helgeson et al., 2007, 2014a; Helgeson, Lopez, & Kamarck, 2009; Kager & Holden, 1992; Thomas, 1997 Study 1 and Study 2). General friend support was related to *poorer* glycemic control in three studies. In a longitudinal study, friend support was related to poorer glycemic control in cross-sectional analyses, but did not predict *changes* in glycemic control over the course of two years (Helgeson, Reynolds, Siminerio, Escobar, & Becker, 2008). In a follow-up of this sample, the same pattern emerged. Friend support was related to poorer glycemic control over the span of 4 years (controlling for age, method of insulin treatment, pubertal stage, parent SES, and BMI), but did not predict *changes* in glycemic control over this time period (Helgeson, Siminerio, Escobar, & Becker, 2009). In a different evaluation of these same youth, general friend support at age 12 was associated with poorer glycemic control 7 years later (Helgeson et al., 2014b).

***Summary.*** There is little evidence that general friend support is associated with better diabetes outcomes. Three studies found friend support was related to better self-care, but all three studies showed links to only one of several self-care behaviors and one of these studies combined friend and family support into a single measure. Two studies painted more complicated relations between general friend support and self-care, suggesting other individual difference variables or environmental factors (i.e., sex, parental control) play a role in this relation. Collectively, these studies provide weak evidence that general friend support is related to better self-care.

There is no evidence that general friend support is protective in terms of glycemic control. Six of nine studies found no association between general friend support and glycemic control, and three studies found opposite relations. These three studies imply that friend support is problematic for glycemic control.

**Diabetes-Specific Support from Friends and Peers**

Next we summarize research examining relations of diabetes-specific support from friends and peers to psychological and diabetes outcomes. Measures of diabetes-specific support were more heterogeneous than general measures of support. Two studies adapted the Diabetes Family Behavior Checklist (Schafer, McCaul, & Glasgow, 1986) for use with peers. Several studies measured diabetes-specific support with the Diabetes Social Support Inventory (La Greca, Auslander et al., 1995). Unless noted otherwise, studies reviewed below used one of these two measures.

**Psychological outcomes.** Little work has examined links between diabetes-specific support provided by friends and psychological health outcomes. Skinner and Hampson (1998, 2000) found no association between diabetes-specific peer support and depression. Likewise, diabetes-specific friend support was also unrelated to well-being in a sample of 55 Spanish adolescents who varied widely in age (12-19 years; de Dios, Avedillo, Palao, Ortiz, & Agud, 2003). Work by Thomas (1997) revealed a complex, indirect link between diabetes-specific peer support (measured with the diabetes peer support subscale of a modified version of the Diabetes Family Behavior Scale; McKelvey et al., 1993) and psychological well-being. In an investigation involving 66 adolescents (*M* age = 14 years), greater comfort with reaching conflict resolutions with friends predicted disclosing more about diabetes to peers which, in turn, predicted greater diabetes-specific warmth and caring from peers and, ultimately, better diabetes adjustment (Thomas, 1997).

***Summary.*** Two of the three studies investigating relations of diabetes-specific support to psychological outcomes found no associations. The other revealed a complex, indirect link involving comfort with resolving conflict with friends and diabetes self-disclosure. Overall, this

work suggests that links between diabetes-specific support and psychological outcomes may be indirect, but more work is needed in this area before conclusions can be drawn.

**Diabetes outcomes.** Twelve studies investigated the impact of diabetes-specific friend support on diabetes outcomes. Five empirical studies and two qualitative studies suggest associations between diabetes-specific support and better self-care. Qualitative work found adolescents who had better compliance reported that their friends 'silently' supported their self-care (accommodated diabetes self-care, provided reminders about self-care) or had no effect on their self-care (Kyngas, Hentinen, & Barlow, 1998). Other interview work suggested peer acceptance of diabetes helped teenagers integrate their self-care demands into their daily routine (Karlsson, Arman, & Wikblad, 2008).

In quantitative work, a study of 96 adolescents (ages 10-16 years) with poor metabolic control (HbA1c > 8%), found peer support was linked with better diabetes management after controlling for externalizing symptoms, family and provider relations, and age (Naar-King, Podolski, Ellis, Frey, & Templin, 2006). Likewise, illness-specific friend support was also related to better adherence in a sample of 300 Finnish adolescents coping with diabetes and other chronic illnesses (Kyngas & Rissanen, 2001). However, the researchers did not distinguish between adolescents who had diabetes and adolescents who had other chronic illnesses in this study. Skinner and Hampson (1998) linked diabetes-specific peer support with better blood glucose monitoring, but not insulin administration. Consistent with these findings, Bearman and La Greca (2002) found diabetes-specific friend support was unrelated to *overall* adherence, but that friend support specifically focused on blood glucose testing was related to more frequent blood glucose monitoring. In Thomas' (1997) dissertation work, Study 2 revealed several complex, indirect links between perceived diabetes-specific peer support and diabetes self-care

outcomes. Specifically, comfort with conflict resolution with peers predicted greater diabetes disclosure, which predicted diabetes-specific peer warmth and caring which, in turn, predicted greater compliance. Similarly, through the paths of comfort with conflict resolution and diabetes disclosure, diabetes-specific peer warmth and caring predicted less diabetes mismanagement, greater adherence in social pressure situations, and greater injection regularity.

However, five studies found no association between diabetes-specific friend or peer support and self-care. Two studies with wide age ranges found diabetes-specific support was unrelated to adherence (La Greca, Auslander et al., 1995; Pendley et al., 2002). When asked to imagine a series of adherence scenarios, adolescents' (ages 10 – 18 years old) diabetes-specific friend support was unrelated to anticipated self-care difficulties in scenarios (Hains et al., 2007). In Study 1 of Thomas' dissertation work (1997), diabetes-specific peer support was unrelated to self-care or frequency of blood glucose testing in a sample of 89 adolescents. Finally, an intervention designed to increase peer support and diabetes knowledge had no impact on self-care (Greco, Pendley, McDonell, & Reeves, 2001). However this sample was quite small ($n$ = 21).

Six studies examined associations between diabetes-specific support and glycemic control, and this work has produced mixed results. Two studies found no association between diabetes-specific support and glycemic control (de Dios et al., 2003; Thomas, 1997). Other work found no association between diabetes-specific peer support (measured by questionnaire) and glycemic control, but found adolescents who reported more peers in their diabetes support team had better glycemic control (Pendley et al., 2002).

More complicated relations between diabetes-specific friend support and glycemic control were revealed in three studies. In Study 2 of Thomas' dissertation work (1997), an

indirect path was revealed between diabetes-specific peer warmth and caring and glycemic control, such that comfort with conflict resolution with friends predicted greater diabetes self-disclosure to friends, which led to greater diabetes-specific peer warmth and caring which, in turn, predicted better glycemic control.

Hains and colleagues (2007) found no direct association between friend support and glycemic control. However, friend support moderated the link between diabetes stress and glycemic control in a peculiar way. Rather than buffering or weakening the relation between diabetes stress and poor glycemic control, the relation was *stronger* when friend support was high. Another unanticipated finding was a link between satisfaction with diabetes-specific school support (which included one item measuring support from friends in class) and poorer glycemic control 6 months later (Lehmkuhl & Nabors, 2008). In addition, glycemic control at baseline interacted with friend support in predicting glycemic control at follow-up, such that friend support was related to better glycemic control at follow-up only for those who had lower HbA1c at study start. It is important to note, though, that this study did not control for baseline measures of glycemic control. Furthermore, since the support measure also included support provided from others who were not friends (e.g., nurses, teachers), it cannot be determined the extent to which this complicated link reflects support provided by friends versus support provided by others.

***Summary.*** Research investigating links between diabetes-specific friend support and self-care is mixed. Five empirical studies and two qualitative studies suggest friend support is associated with better self-care. One of these studies revealed a complicated, indirect link involving comfort with conflict resolution and diabetes self-disclosure in diabetes-specific peer support predicting self-care. Yet, diabetes-specific support provided by friends and peers was unrelated to self-care in four other studies, and an intervention that increased peer support found

no effect on self-care. In sum, findings from this work provide weak evidence at best that diabetes-specific friend support is associated with better self-care.

Overall, the literature found diabetes-specific friend support was unrelated to glycemic control. Three studies revealed no link between support and glycemic control. One study revealed a link between a less traditional measure of diabetes-specific friend support (but not a traditional self-report measure) and better glycemic control. Three other studies revealed complex, indirect, or unexpected associations between friend support and glycemic control. One study found that comfort with conflict resolution and diabetes self-disclosure predicted peer support which, in turn, predicted glycemic control. One study found that when friend support was high, diabetes stress was more strongly associated with poorer glycemic control which is opposite of stress-buffering predictions. Finally, one study found that diabetes-specific friend support predicted better glycemic control for those who had better glycemic control at the beginning of the study. In sum, empirical evidence linking diabetes-specific friend support to glycemic control is scarce and inconsistent.

**General Conflict with Peers and Friends**

Studies investigating links between general friend conflict and outcomes are described below. These investigations measured friend conflict with the Test of Negative Social Exchange (Ruehlman & Karoly, 1991) or the negative subscales from the Berndt and Keefe Friendship Questionnaire (1995) to assess general friend conflict, unless stated otherwise.

**Psychological outcomes.** Research has revealed somewhat consistent links between general friend conflict and poorer psychological health. Of the five studies to examine links between general friend conflict and psychological outcomes, four found conflict was associated with greater psychological distress. In longitudinal work with adolescents, general friend conflict

was linked with poorer psychological well-being and declines in well-being one year later (Helgeson et al., 2007). Poorer peer relationships (measured with 2 items from the Quality of Life Scale for Children and Adolescents; Wu, Liu, & Meng, 2006) were also linked with more depression in a study of 136 children (ages 8-19) with diabetes in China (Guo et al., 2012). Daily upsetting interactions with friends were related to more depressed mood, anxiety and anger in an EMA study of adolescents (Helgeson, Lopez & Kamarck, 2009). Sex also interacted with aggregate measures of upsetting interactions with friends in predicting depressive symptoms. Specifically, conflict was more strongly associated with more depressive symptoms for female than male adolescents. In longitudinal work (Helgeson et al., 2014a), general friend conflict among high school seniors was related to increases in depressive symptoms, perceived stress, alcohol use, binge drinking, a greater drive for thinness, and more bulimic symptoms one year later. Parent support buffered the negative effects of general friend conflict on bulimic symptoms. That is, friend conflict was linked with increases in bulimic symptoms when parent support was low. However, other work involving this same sample found general friend conflict reported at age 12 was unrelated to depression, stress or risk behavior at age 19 (Helgeson et al., 2014b). Again, in this study, it may be unreasonable to expect that friends at age 12 are the same friends at age 19.

***Summary.*** Taken together, the findings from this work provide moderate evidence that general friend conflict is linked with a variety of indicators of psychological distress, including depressive symptoms, perceived stress, negative mood, and poorer well-being. Two studies revealed that individual differences and environmental factors (i.e., sex and parental support) influenced the relations between general friend conflict and psychological distress. Overall, empirical work indicates general friend conflict is associated with psychological distress.

**Diabetes outcomes.** Four studies examined links between general friend conflict and diabetes self-care. In one study (Helgeson, Lopez, & Kamarck, 2009) cross-sectional measures of general friend conflict were related to worse self-care among a sample of adolescents between 13 and 16 years old. However, EMA data obtained in this study revealed no associations between aggregates of upsetting interactions with friends over a 4-day period and diabetes self-care. In a 7-year longitudinal sample of emerging adults (Helgeson et al., 2014b), general friend conflict at age 12 predicted poorer self-care at age 19. Two longitudinal investigations of the same sample showed no links between general friend conflict and self-care one year later among 12-year-old adolescents (Helgeson et al., 2007) or 17-year-old adolescents (Helgeson et al., 2014a).

Only 4 studies investigated links between general friend conflict and glycemic control. Two studies revealed associations between general friend conflict and poorer control. One longitudinal study of adolescents found general friend conflict predicted decreases in glycemic control over four years (Helgeson et al., 2009). Other work revealed a cross-sectional link between greater friend conflict and poorer glycemic control (Helgeson, Lopez & Kamarck, 2009). Furthermore, sex interacted with friend conflict in predicting glycemic control, indicating that friend conflict was especially predictive of poorer glycemic control for females compared to males. Yet, EMA data from this same study found no association between an aggregate measure of upsetting interactions with friends and glycemic control. Two longitudinal investigations found general friend conflict was unrelated to glycemic control one year later (Helgeson et al., 2014a) or seven years later (Helgeson et al., 2014b).

***Summary.*** Only five studies have examined links between general friend conflict and diabetes outcomes. The work in this area is limited in part by the fact that all of the data come

from one laboratory, with 3 of the 4 publications being based on the same dataset sampled at different points in time. Although work in this area has been longitudinal and statistically sophisticated, links between conflict and self-care are inconsistent. Half of this work has linked conflict with poorer self-care, while the other half has found conflict was unrelated to self-care. Therefore it is difficult to interpret findings from this literature as a collective. At best, this work provides suggestive evidence that friend conflict impedes diabetes self-care.

Likewise, the four studies from the same lab examined links between general friend conflict and glycemic control. Two studies (involving the same sample of emerging adults) found associations between general friend conflict and poorer glycemic control, and two studies found no such links. Overall, these findings provide only suggestive evidence that general friend conflict is related to poorer glycemic control.

**Diabetes-Specific Conflict with Friends and Peers**

Next we review the literature linking diabetes-specific conflict with peers and friends with psychological and diabetes outcomes. The vast majority of this research was qualitative in nature and did not include measures of diabetes-specific conflict. Instead the literature largely investigated psychological and diabetes outcomes of adolescents who perceived conflict with their friends and peers.

**Psychological outcomes.** Research examining links between diabetes-specific friend conflict and psychological health outcomes has been sparse. When asked to predict how their friends and peers would react in hypothetical diabetes adherence scenarios, adolescents who reported their friends and peers would react negatively also reported higher overall diabetes stress (Hains et al., 2007). Relatedly, adolescents (ages 10-18) who reported higher diabetes-

specific interpersonal/peer stress also reported higher *overall* diabetes stress (Berlin, Rabideau, & Hains, 2012). To the best of our knowledge, no other work has examined such links.

***Summary.*** Only two cross-sectional studies examined relations between diabetes-specific friend conflict and psychological outcomes. Both studies suggest a relation between diabetes-specific friend conflict and psychological distress, but more research is needed in this area for conclusions to be drawn.

**Diabetes outcomes.** Eight studies (five qualitative and three quantitative) investigated relations between diabetes-specific friend conflict and self-care. The five qualitative studies indicated that adolescents often perceive peers as an obstacle to their self-care. In interviews with a small sample ($n$ = 20) of adolescents adjusting to a new insulin pump, peer interactions were commonly reported as problematic for self-care (Berlin et al., 2006). Likewise, teenagers commonly reported situations involving peers (especially interpersonal peer conflict and eating at school) as obstacles to their dietary adherence (Schlundt et al., 1994). Similarly, when a sample of adolescents was interviewed about their friends' behavior in self-care contexts, describing one's friends as dominant was associated with poor adherence (Kyngas et al., 1998). Work focused on identifying barriers to diabetes management found that adolescents (13- 17 years old) and parents of adolescents reported peer interactions as one such important barrier. However, parents of children (8 – 12 years old) did not find peer interactions to be a barrier to self-care (Cox et al., 2014). A study assessing interest and feasibility of a peer-mentoring program for adolescents with diabetes echoed these findings. One third of their sample of adolescents (ages 13-18) reported social barriers to their self-care—particularly embarrassment over testing their blood glucose in social settings. In contrast, young adults (ages 19-25) in this study reported no such barriers (Lu et al., 2015).

In quantitative work, a study in which adolescents were presented with scenarios in which they had to choose between being adherent or acting in a way to satisfy peers, older adolescents (ages 15 – 17) chose less adherent responses than younger adolescents (ages 11 – 14) or children (ages 8 – 10), despite the fact that they had more advanced problem-solving skills. Moreover, older adolescents also recognized that they *should* be adherent in the scenarios, even though they chose otherwise (Thomas, Peterson, & Goldstein, 1997). Relatedly, adolescents who predicted that their friends and peers would react negatively in hypothetical self-care scenarios also anticipated more adherence difficulties (Hains et al., 2007). Additional work found that adolescents who had greater extreme peer orientation (EPO; an individual difference variable involving greater susceptibility to peer pressure) also had poorer self-care (Drew, Berg, & Wiebe, 2010).

Five studies investigated links between diabetes-specific friend conflict and glycemic control. One study found adolescents who identified peer interactions as a barrier to their self-care also had poorer glycemic control (Cox et al., 2014). Similarly, adolescents who expected friends and peers to react negatively in hypothetical self-care scenarios had poorer glycemic control (Hains et al., 2007). This association was mediated by greater anticipated adherence difficulties and diabetes stress. In related work, higher EPO was associated with poorer glycemic control (Drew et al., 2010). The quality of one's relationship with one's parents moderated this link, indicating that adolescents who had better relationships with their parents and lower EPO had better glycemic control. However, one study found no association between diabetes-specific interpersonal/peer stress and glycemic control (Berlin et al., 2012). Likewise, another study found no association between choosing to be non-adherent in scenarios pitting adherence against peers' desires and glycemic control (Thomas et al., 1997).

***Summary.*** As a collective, work examining associations between diabetes-specific friend conflict and diabetes outcomes has been qualitative. Six studies investigating associations between diabetes-specific friend conflict and self-care suggest that greater conflict is associated with poorer self-care. Three of these studies suggest that age is likely to play a role in the relation of diabetes-specific friend conflict to self-care, indicating older adolescents' peer interactions are more problematic to their self-care than those of children or emerging adults. Less consistent relations were found when it came to diabetes-specific friend conflict and glycemic control. Of the five studies investigating links between diabetes-specific conflict and glycemic control, two suggest conflict with friends and peers is related to poorer control and two revealed no link between conflict and glycemic control. One study indicated that relationships with parents and susceptibility to peer pressure both matter in predicting glycemic control. This research provides very weak evidence that diabetes-specific friend conflict is associated with poorer glycemic control, and hints that other important individual differences and environmental factors (EPO, relationships with parents) play a role in the link between conflict and glycemic control.

## Discussion

Although relationships with friends and peers are thought to play a large role in adolescence, little work has examined associations between such relationships and psychological well-being and diabetes outcomes for adolescents with type 1 diabetes. To date, the work in this area suggests that general friend support may be beneficial to adolescents' psychological well-being and (less consistently) self-care. There are several reasons why this may be the case. Support received from friends may buffer against stress (Cohen & Wills, 1985), which is detrimental to health and well-being. Friend support may also communicate feelings of acceptance, belonging and social competence, which may in turn improve psychological well-

being. These proposed improvements in self-perceptions and reductions in stress may boost one's perceived ability to carry out self-care responsibilities, and lead to actual implementation of self-care.

Surprisingly, the research reviewed suggests general friend or peer support is either unrelated to glycemic control or may be detrimental to adolescents' glycemic control. Making sense of this counterintuitive pattern is more difficult. Adolescence is characterized as a time of fluctuations in glycemic control (Greening et al., 2007). This has been explained as both a result of poorer self-care (La Greca, Swales, Klemp, Madigan, & Skyler, 1995) and biological changes (Goran & Gower, 2001). These fluctuations may partially explain the lack of consistent links between friend support and glycemic control, but they do not explain why support would be associated with *poorer* glycemic control. One potential explanation is that when adolescents have high quality, supportive friendships they become immersed in their friendships to the point that they simply become distracted from their self-care routines, resulting in poorer glycemic control over time. On the other hand, general friend support could have negative consequences on glycemic control because the support provided is of low quality. Friends are likely to have less practice in providing support than the adults in adolescents' lives. As a result, support attempts by friends may be clumsy, may be perceived as unhelpful, or unintentionally undermine effective self-care and glycemic control.

Friend or peer support focused on adolescents' diabetes was unrelated to psychological outcomes. This may be the case because, unlike general forms of support, diabetes-specific support draws attention to the adolescent's illness, and may make adolescents feel different from their friends. While general forms of support are likely to communicate feelings of acceptance and belonging (and fitting in with one's friends), diabetes-specific support may unintentionally

single out adolescents with diabetes. Given that adolescents with type 1 diabetes often express a desire to feel 'normal', this type of support may be a double-edged sword (Commissariat, Kenowitz, Trast, Heptulla, & Gonzalez, 2016). Moreover, friends may not be the most knowledgeable of network members when it comes to providing instrumental diabetes-specific support. Ill-informed or miscarried support from friends may make adolescents feel misunderstood and undermine well-being.

Similar to results involving general measures of support, diabetes-specific support was inconsistently linked with better self-care. Half of this work found that support was beneficial for overall self-care, while half found support was beneficial specifically for blood glucose monitoring (but not other forms of self-care). Studies examining links between diabetes-specific support and glycemic control were inconclusive. As mentioned above, this may be the case because other adolescents may not have the necessary knowledge to provide effective diabetes-specific support.

Thus, the degree to which adolescents share their diabetes knowledge with their friends (and the accuracy of the knowledge shared) is likely to contribute to the effectiveness of friend diabetes-specific support. This idea was most strongly supported by Thomas' work (1997), which focused on the role of diabetes self-disclosure in peer relationships and its influence on psychological and diabetes outcomes. This work showed that diabetes-specific peer support influenced diabetes adjustment, self-care and glycemic control via self-disclosure. That is, general peer support predicted greater diabetes self-disclosure which predicted greater diabetes-specific peer support and, in turn, psychological and diabetes outcomes. When peer relationships are more supportive, adolescents may disclose more to their friends about their diabetes. This disclosure leads friends to provide more diabetes-specific support, which then leads to greater

psychological well-being, self-care and glycemic control. Related qualitative work also highlights the importance of self-disclosure in the route from diabetes-specific peer support to self-care. In a diabetes camp study, adolescents with diabetes and their peers indicated that peers needed more diabetes knowledge and coaching in order to better help with self-care (Lehmkuhl et al., 2009). Relatedly, Commissariat and colleagues (2016) found that the majority of adolescents in their sample indicated that they were happy that they shared diabetes information with their friends, because friends became more involved in their self-care afterward (reminded them to test their blood glucose or take their insulin). These patterns hint that friends may be a valuable source of diabetes-specific support, once they are equipped with appropriate diabetes knowledge. An important vehicle through which peers are likely to acquire this knowledge is self-disclosure. Future research should further examine self-disclosure as a key antecedent to effective diabetes-specific friend support.

General friend conflict was consistently linked with psychological distress. Friend conflict is likely to be a strong source of stress, in and of itself, which may exhaust psychological resources in dealing with other ensuing stressors (diabetes related or not). Arguments or tensions with friends may communicate feelings of rejection, or not fitting in, which may undermine self-esteem. These sources of conflict may be internal (perceived or imagined) or external (explicitly communicated by friends) to adolescents. Being placed in situations in which adhering to one's self-care regimen is inconsistent with friends' plans or desires is also likely to be, itself, a source of frustration and distress.

Regarding diabetes outcomes, half of the literature found general conflict was related to poorer self-care and glycemic control while the other half found conflict was unrelated to self-care and glycemic control. Conflict with friends may lead to worse self-care and glycemic

control simply because conflict may captivate adolescents' attention and distract from their normal self-care routines. Conflict is also likely to be stressful, and detract from adolescents' abilities to problem-solve in self-care contexts. Indeed, properly caring for oneself while one is dealing with the additional burden of friend conflict is likely a difficult cognitive and emotional challenge.

In comparison to the research focused on general friend conflict, the literature focused on diabetes-specific friend conflict was smaller and more qualitative in nature. Although qualitative work strongly suggests that diabetes-specific friend conflict is related to poor psychological health and poor diabetes outcomes, surprisingly few studies directly assess diabetes-specific friend conflict to examine these associations. This work found diabetes-specific conflict was linked with greater psychological distress. On the other hand, diabetes-specific conflict was less consistently linked with diabetes outcomes. Half of the literature found no association, while half revealed links between conflict and poorer self-care and glycemic control. One reason why diabetes-specific friend conflict may lead to poorer self-care and glycemic control is intentional non-adherence. When friends' wishes or plans conflict with self-care responsibilities, adolescents may intentionally stray from their self-care routines in order to appease friends. Work in this area hints that adolescents (but not children or emerging adults) may be more likely to fall prey to peer pressure in such scenarios. Again, the work reviewed in this area has been largely qualitative. More empirical work is needed in order to draw conclusions.

**Moderator Variables**

One reason for the inconsistent findings across the review is that there are several potential variables that may moderate the relation of friend support and conflict to psychological and diabetes outcomes. A sizeable portion of the studies reviewed indicated that relations often

depended on individual difference variables or environmental factors. In particular, several studies found that sex moderated these links, typically showing that links between friend relationships and outcomes were stronger for females than males. The combination of these findings hints that females' psychological well-being and self-care are more influenced by support and conflict provided by friends and peers than males.

There are several possible explanations for these findings. First, friends may play a larger role in the lives of female than male adolescents. Second, friends may be more involved in the diabetes care of female than male adolescents. Related work suggests that females with diabetes receive more diabetes-support, regardless of who is providing the support, than males (Bearman & La Greca, 2002; La Greca, Auslander et al., 1995; Skinner & Hampson, 1998; Skinner, John, & Hampson, 2000). Alternatively, females may be more influenced by their friends' or peers' opinions, acceptance, or hostility than males. Finally, it is possible that these sex differences are a reflection of friends' or peers' gender. Research has found that friendships between two females are characterized by more intimacy than friendships involving two males (Barry, Madsen, Nelson, Carroll, & Badger, 2009; Bauminger, Finzi-Dottan, Chason, & Har-Even, 2008; Linden-Andersen, Markiewicz, & Doyle, 2009; Swenson & Rose, 2009). Thus, females may be more influenced by their friendships and peer relationships because they have higher quality friendships (with other females) than males (who are more likely to have friendships with other males). These are all unanswered, intriguing questions awaiting future research.

Parent relationships are another potential moderator. Several studies reviewed indicated that adolescent relationships with friends and parents should not be considered in isolation. Positive aspects of one relationship domain appear to offset problems in the other. This makes sense, given that mid-adolescence is characterized as a period in which attachment needs and

behaviors are gradually transferred to one's closest peers and romantic relationships (Allen & Land, 1999). Future research should track the degree to which parent and peer relationships work together in impacting psychological well-being and diabetes outcomes over time during this important developmental stage.

Age is also an important variable to consider in examining the links between peer and friend relationships and psychological well-being and diabetes outcomes. This review covered studies that involved children as young as 6 years old through emerging adults as old as 19 years old. Clearly, friends play a different role in the lives of children, early adolescents, and emerging adults. As adolescents grow older, their peer relationships are likely to become more complex and qualitatively different from their peer relationships in childhood. Although none of the studies directly assessed age as a moderator in the link between friend conflict and diabetes outcomes, interesting patterns emerged, hinting that age influences the link between friend conflict and diabetes outcomes. Several studies indicated that adolescents perceive more social barriers to self-care, while children (Hains et al., 2007) and emerging adults do not (Lu et al., 2015). When posed with scenarios in which their self-care needs were pitted against the wishes of their peers, older adolescents reported that they would go along with their peers or friends more often than younger adolescents-- despite having more advanced problem-solving skills and a clearer understanding of the consequences of failing to adhere to their self-care regimens (Thomas et al., 1997). This set of findings suggests that peer influence on self-care may peak in older adolescence, and subside over time. However, a substantial amount of work is needed in this area examining differences in these age groups and changes in the relation between peer interactions and diabetes outcomes over time.

Other individual differences are also likely to moderate associations of relationships with friends and peers to well-being and diabetes outcomes. Socioeconomic status (SES) may influence this link. Lower SES homes may include single-parent families or two parents who work long hours. If parents are absent from the home after school, adolescents may be more likely to spend those hours with friends and peers. Over time, adolescents from lower SES households may become more influenced by support and conflict within their friendships than adolescents from higher SES households. Other personality characteristics (e.g., optimism, neuroticism) are also likely to influence the strength of links between relationships with friends and psychological well-being and diabetes outcomes. Few of these potential moderator variables have been explored, leaving this an exciting avenue for future research.

**Directions for Future Research**

Several advancements are needed to strengthen this neglected research area. First, finer distinctions need to be made in the measurement of friend and peer support and conflict. None of the work reviewed distinguished instrumental support from emotional support provided by friends and peers, despite the fact that La Greca and colleagues (1995) found that peers were a greater source of emotional support than instrumental support. Instead, measures aggregated across multiple forms of support. This may explain some of the inconsistent links revealed between support and outcomes. If only emotional support is beneficial to well-being and diabetes outcomes, combining emotional support and instrumental support into a single measure may have obscured the link between emotional support and outcomes. Examining the effects of both general and diabetes-specific support in the same study would also allow researchers to determine if one form of support is more predictive of well-being and self-care than the other. This work could inform researchers designing interventions aimed to improve peer support. For

instance, in the only investigation to simultaneously measure both general and diabetes-specific peer support, Thomas (1997) found general peer support led to greater disclosure, which predicted greater diabetes-specific peer support, and psychological and diabetes outcomes, in turn. This chain of relationships suggests it may be most advantageous for interventions to first focus on fostering general peer support before turning attention to diabetes-specific peer support.

Future research should also make finer distinctions regarding the relationships in which friend and peer support and conflict occur. First, very few studies distinguish between relationships with peers versus friends. One study reviewed differentiated between friend relationships and peer relationships in some of their measures (but not all), and found no difference in how adolescents expected peers versus friends to react in self-care scenarios (Hains et al., 2007). Peers are others of the same age with whom adolescents may interact on a normal basis, but with whom they do not share a special bond or feel an affiliation. Friends, on the other hand, are others with whom adolescents choose to spend time, and with whom they feel an emotional connection. Because adolescents are likely to care more about their friendships than relationships with peers, it seems likely that friends should matter more to one's psychological well-being and self-care than relationships with peers. On the other hand, adolescents may group others who are of the same age and who are unhelpful or a source of conflict into the category of 'peer' rather than 'friend'. If this is the case, researchers may find that peers are the primary source of general and diabetes-specific conflict, and such relationships are likely to have a negative impact on psychological well-being, self-care and glycemic control. Friends, on the other hand, may be more supportive and assimilate adolescents' diabetes self-care needs into their plans. Friendships may even grow as a result of other adolescents' positive or benign

responses to adolescents' self-care. In other words, peers may become a primary source of conflict, while friends may become a key source of support.

Empirical attention should also focus on understanding more specific friend and peer relationships and their impact on psychological and diabetes outcomes. When it comes to peer relationships, it may be difficult for adolescents to imagine a particular person or group of people when asked to imagine their 'peers' (in comparison to when they are asked to think of their friends). Future research should consider studying more specific peer groups, such as classmates, teammates or after-school activity groups to improve the quality of participant responses and add new depth to this research area.

Among adolescents' friendships, two warrant special empirical attention. Best friends and romantic partners are likely people with whom adolescents feel particularly close. They are also likely to be the first people adolescents turn to for support or belonging. For these reasons, conflict with best friends and romantic partners are also likely to be especially difficult. Thus, support and conflict from best friends and romantic partners in particular are likely to influence psychological well-being and diabetes outcomes. However, only one study has examined relations of romantic partner support and conflict to psychological and diabetes outcomes (Helgeson et al., 2015), and no research to date has examined relationships with best friends and their associations with psychological and diabetes outcomes.

Another exciting avenue for future research is to examine friend and peer relationships with other adolescents who have diabetes. Although there is a growing body of qualitative research and work developing interventions to increase peer-to-peer support among adolescents with type 1 diabetes (Boogerd, Noordam, Kremer, Prins, & Verhaak, 2014; Hanberger, Ludvigsson, & Nordfeldt, 2013; Kichler, Kaugars, Marik, Nabors, & Alemzadeh, 2013;

Markowitz & Laffel, 2011; Nordfeldt, Hanberger, & Bertero, 2010), very little work has examined the impact of peer relationships or friendships with other adolescents who have diabetes on well-being and diabetes outcomes. Relationships with friends who also have diabetes may be a tremendous source of diabetes-specific support that is of high quality. Such friends or peers know the difficulties of self-care and have the necessary knowledge to help in administration of self-care. Furthermore, they also have first-hand experience in having friends without diabetes who may intentionally or unintentionally interfere with self-care needs, validating adolescents' feelings in such circumstances. Thus, friends or peers who also have diabetes are likely to be an invaluable source of support.

In order to advance this research area, more sophisticated methods of measuring friend and peer support and conflict need to be developed. All of the work reviewed involved self-reported *perceptions* of support and conflict. More objective measures, using observational methods or a modified version of the revised class play method (Masten, Morison, & Pellegrini, 1985), would add new richness to the data and improve external validity. These more objective measures would also be advantageous in ruling out other underlying personality characteristics in explaining relations of friend and peer relationships to psychological well-being and diabetes outcomes.

Future work should investigate potential mechanisms underlying links between friend and peer relationships and outcomes. To date, Hains and colleagues (2007) and Thomas (1997) are the only researchers to have tested potential mechanisms. Hains and colleagues (2007) found that diabetes-specific conflict with peers was linked to poorer glycemic control because adolescents who perceived more peer conflict expected their peers to respond negatively to self-care demands, which increased diabetes-specific stress. Thomas (1997) found adolescents who

were comfortable with resolving conflicts with friends had greater general friend support, which led them to disclose more about their diabetes to friends, which led their friends to provide more diabetes-specific support, which ultimately predicted psychological well-being and diabetes outcomes. We suspect there are several other mechanisms that could partially explain these links. Friend support is likely to cultivate feelings of acceptance and self-esteem, which may explain links between support and psychological well-being. Diabetes-specific support may increase diabetes-specific self-efficacy either by providing tangible assistance which facilitates self-care or by instilling confidence in the adolescents' ability to take care of their own diabetes needs. This enhanced self-efficacy may, in turn, predict better self-care and glycemic control.

The mechanisms by which conflict with friends is associated with psychological and diabetes outcomes also need to be explained. Conflict with friends may lead to feelings of rejection and decreased self-esteem and, in turn, poorer well-being. Alternatively, conflict may simply consume a substantial amount of adolescents' attention and distract them from their self-care, leading to poorer self-care and glycemic control. Lansing and Berg (2014) also propose that deficits in self-regulation may underlie both poor self-management of chronic illness and interpersonal problems. All of these remain exciting untested mechanisms that may explain links between friend relationships and psychological well-being and self-care.

Finally, future work should also investigate predictors of friend support and conflict among adolescents with type 1 diabetes. Two studies have identified resiliency, agency, communion, and unmitigated agency and communion as important players in predicting general friend support and conflict. One such study found resilience (defined as high self-esteem, mastery and optimism) was associated with greater friend support, less conflict, greater likelihood of being in a romantic relationship and fewer romantic breakups among a large sample

of emerging adults with type 1 diabetes and healthy controls (Helgeson et al., 2015). The second study, involving this same sample of emerging adults, found communal and agentic traits were linked with more friend support and less conflict, while unmitigated agentic and communal traits were associated with less support and more conflict over time. Unmitigated communion also predicted poorer diabetes health over time (Helgeson & Palladino, 2012). Thomas' work (1997) also points to social competence as a potential predictor of general peer support, finding that adolescents who had more confidence in reaching conflict resolutions with friends had greater peer support. This is, to the best of our knowledge, the only work to examine predictors of friend support and conflict among adolescents with type 1 diabetes. There are many important individual differences that are likely to impact friend support and conflict that have not been examined (e.g., self-esteem, attachment security). Furthermore, predictors of diabetes-specific friend support and conflict still remain unexplored territory.

Although researchers and adolescents alike describe friends and peers as important to well-being and diabetes self-care, the empirical work that has examined the impact of these relationships to the well-being and self-care of youth with type 1 diabetes is small. The literature thus far suggests that support provided by friends and peers is associated with better psychological well-being. For diabetes outcomes, support was less consistently linked to better self-care and was either unrelated to glycemic control or related to poorer glycemic control. Conflict was associated with psychological distress, and somewhat less consistently linked to poorer self-care and glycemic control. More sophisticated work, using a variety of methods and exploring more specific relationships among peers and friends in adolescence, is needed to further expand this research area. We urge researchers to delve deeper to further understanding of these relationships, which take on new weight and meaning in adolescence. There is a wealth

of information waiting to be discovered about how these important relationships may impact the health and well-being of youth with diabetes. Much exciting work lies ahead!

References

Allen, J. P., & Land, D. (1999). Attachment in adolescence. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 319-335). New York: Guilford Press.

Barry, C. M., Madsen, S. D., Nelson, L. J., Carroll, J. S., & Badger, S. (2009). Friendship and romantic relationship qualities in emerging adulthood: Differential associations with identity development and achieved adulthood criteria. *Journal of Adult Development, 16*, 209-222.

Bauminger, N., Finzi-Dottan, R., Chason, S., & Har-Even, D. (2008). Intimacy in adolescent friendship: The roles of attachment, coherence, and self-disclosure. *Journal of Social and Personal Relationships, 25*, 409-428.

Bearman, K. J., & La Greca, A. M. (2002). Assessing friend support of adolescents' diabetes care: The Diabetes Social Support Questionnaire-Friends Version. *Journal of Pediatric Psychology, 27*(5), 417-428.

Berlin, K. S., Davies, W. H., Jastrowski, K. E., Hains, A. A., Partin, E. A., & Alemzadeh, R. (2006). Contextual assessment of problematic situations identified by insulin pump using adolescents and their parents. *Families, Systems, & Health, 24*, 33-44.

Berlin, K. S., Rabideau, E. M., & Hains, A. A. (2012). Empirically derived patterns of perceived stress among youth with type 1 diabetes and relationships to metabolic control. *Journal of Pediatric Psychology, 37*, 990-998.

Berndt, T. J., & Keefe, K. (1995). Friends' influence on adolescents' adjustment to school. *Child Development, 66*, 1312-1329.

Boogerd, E. A., Noordam, C., Kremer, J. A. M., Prins, J. B., & Verhaak, C. M. (2014). Teaming up: Feasibility of an online treatment environment for adolescents with type 1 diabetes. *Pediatric Diabetes, 15*, 394-402.

Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin, 98*(2), 310-357.

Collins, W. A., Gleason, T., & Sesma, A. (1997). Internalization, autonomy, and relationships: Development during adolescence. In J. E. Grusec & L. Kuczynski (Eds.), *Parent and children's internalization of values: A handbook of contemporary theory*. New York: John Wiley and Sons, Inc.

Commissariat, P. V., Kenowitz, J. R., Trast, J., Heptulla, R. A., & Gonzalez, J. S. (2016). Developing a personal and social identity with type 1 diabetes during adolescence: A hypothesis generative study. *Qualitative Health Research, 26*(5), 672-684.

Cox, E. D., Fritz, K. A., Hansen, K. W., Brown, R. L., Rajamanickam, V., Wiles, K. E., . . . Moreno, M. A. (2014). Development and validation of PRISM: A survey tool to identify diabetes self-management barriers. *Diabetes Research and Clinical Practice, 104*, 126-135.

DCCT. (1993). The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. *New England Journal of Medicine, 329*(14), 977-986.

de Dios, C., Avedillo, C., Palao, A., Ortiz, A., & Agud, J. L. (2003). Family and social factors related to emotional well-being in adolescents with diabetes mellitus type I. *European Journal of Psychiatry, 17*(3), 182-192.

Drew, L. M., Berg, C. A., & Wiebe, D. J. (2010). The mediating role of extreme peer orientation in the relationships between adolescent-parent relationship and diabetes management. *Journal of Family Psychology, 24*(3), 299-306.

Goran, M. I., & Gower, B. A. (2001). Longitudinal study on pubertal insulin resistance. *Diabetes, 50*(11), 2444-2450.

Greco, P., Pendley, J. S., McDonell, K., & Reeves, G. (2001). A peer group intervention for adolescents with type 1 diabetes and their best friends. *Journal of Pediatric Psychology, 26*(8), 485-490.

Greening, L., Stoppelbein, L., Konishi, C., Jordan, S., & Moll, G. (2007). Child routines and youths' adherence to treatment for type 1 diabetes. *Journal of Pediatric Psychology, 32*(437-447).

Guo, J., Whittemore, R., Grey, M., Wang, J., Zhou, Z., & He, G. (2012). Diabetes self-management, depressive symptoms, quality of life and metabolic control in youth with type 1 diabetes in China. *Journal of Clinical Nursing, 22*, 69-79.

Hains, A. A., Berlin, K. S., Davies, W. H., Smothers, M. K., Sato, A. F., & Alemzadeh, R. (2007). Attributions of adolescents with type 1 diabetes related to performing diabetes care around friends and peers: The moderating role of friend support. *Journal of Pediatric Psychology, 32*(5), 561-570.

Hanberger, L., Ludvigsson, J., & Nordfeldt, S. (2013). Use of a web 2.0 portal to improve education and communication in young patients in families: Randomized controlled trial. *Journal of Medical Internet Research, 15*, e175.

Helgeson, V. S., Lopez, L. C., & Kamarck, T. (2009). Peer relationships and diabetes: Retrospective and ecological momentary assessment approaches. *Health Psychology, 28*(3), 273-282.

Helgeson, V. S., Mascatelli, K., Reynolds, K. A., Becker, D., Escobar, O., & Siminerio, L. (2014). Friendship and romantic relationships among emerging adults with and without type 1 diabetes. *Journal of Pediatric Psychology, 40*, 359-372.

Helgeson, V. S., & Palladino, D. K. (2012). Agentic and communal traits and health: Adolescents with and without diabetes. *Personality and Social Psychology Bulletin, 38*, 415-428.

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

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

Helgeson, V. S., Reynolds, K. A., Escobar, O., Siminerio, L., & Becker, D. (2007). The role of friendship in the lives of male and female adolescents: Does diabetes make a difference? *Journal of Adolescent Health, 40*, 36-43.

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

Helgeson, V. S., Siminerio, L., Escobar, O., & Becker, D. (2009). Predictors of metabolic control among adolescents with diabetes: A 4-year longitudinal study. *Journal of Pediatric Psychology, 34*(3), 254-270.

Holmes, C. S., Chen, R., Streisand, R., Marschall, D., Souter, S., & Swift, E. E. (2006). Predictors of youth diabetes care behaviors and metabolic control: A structural equation modeling approach. *Journal of Pediatric Psychology, 31*, 770-784.

Hood, K., Peterson, C. M., Rohan, J. M., & Drotar, D. (2009). Association between adherence and glycemic control in pediatric type 1 diabetes: A meta-analysis. *Pediatrics, 124*(6), e1171-e1179.

Kager, V. A., & Holden, E. W. (1992). Preliminary investigation of the direct and moderating effects of family and individual variables on the adjustment of children and adolescents with diabetes. *Journal of Pediatric Psychology, 17*(4), 491-502.

Karlsson, A., Arman, M., & Wikblad, K. (2008). Teenagers with type 1 diabetes- A phenomenological study of the transition towards autonomy in self-management. *International Journal of Nursing Studies, 45*, 562-570.

Kichler, J. C., Kaugars, A. S., Marik, P., Nabors, L., & Alemzadeh, R. (2013). Effectiveness of groups for adolescents with type 1 diabetes mellitus and their parents. *Families, Systems, & Health, 31*, 280-293.

Kyngas, H., Hentinen, M., & Barlow, J. H. (1998). Adolescents' perceptions of physicians, nurses, parents and friends: Help or hindrance in compliance with diabetes self-care? *Journal of Advanced Nursing, 27*, 760-769.

Kyngas, H., & Rissanen, M. (2001). Support as a crucial predictor of good compliance of adolescents with a chronic disease. *Journal of Clinical Nursing, 10*, 767-774.

La Greca, A. M., Auslander, W. F., Greco, P., Spetter, D., Fisher, E. B., & Santiago, J. V. (1995). I get by with a little help from my family and friends: Adolescents' support for diabetes care. *Journal of Pediatric Psychology, 20*(4), 449-476.

La Greca, A. M., Swales, T., Klemp, S., Madigan, S., & Skyler, J. (1995). Adolescents with diabetes: Gender differences in psychosocial functioning and glycemic control. *Children's Health Care, 24*(1), 61-78.

Lansing, A. H., & Berg, C. A. (2014). Adolescent self-regulation as a foundation for chronic illness self-management. *Journal of Pediatric Psychology, 39*(10), 1091-1096.

Larson, R. W., & Verma, S. (1999). How children and adolescents spend time across the world: Work, play, and developmental opportunities. *Psychological Bulletin, 125*, 701-736.

Lehmkuhl, H., Merlo, L. J., Devine, K., Gaines, J., Storch, E. A., Silverstein, J. H., & Geffken, G. (2009). Perceptions of type 1 diabetes among affected youth and their peers. *Journal of Clinical Psychology in Medical Setting, 16*(3), 209-215.

Lehmkuhl, H., & Nabors, L. (2008). Children with diabetes: Satisfaction with school support, illness perceptions and HbA1C levels. *Journal of Developmental and Physical Disabilities, 20*, 101-114.

Linden-Andersen, S., Markiewicz, D., & Doyle, A.-B. (2009). Perceived similarity among adolescent friends: The role of reciprocity, friendship quality, and gender. *Journal of Early Adolescence, 29*, 617-637.

Lu, Y., Pyatak, E. A., Peters, A. L., Wood, J. R., Kipke, M., Cohen, M., & Sequeira, P. A. (2015). Patient perspectives on peer mentoring: Type 1 diabetes management in adolescents and young adults. *The Diabetes Educator, 41*, 59-68.

Markowitz, J. T., & Laffel, L. M. B. (2011). Transitions in care: Support group for young adults with type 1 diabetes. *Diabetic Medicine, 29*, 522-525.

Masten, A. S., Morison, P., & Pellegrini, D. S. (1985). A revised class play method of peer assessment. *Developmental Psychology, 21*, 523-533.

McKelvey, J., Waller, D. A., North, A. J., Marks, J. F., Schreiner, B., Travis, L. B., & Murphy, J. (1993). Reliability and validity of the Diabetes Family Behavior Scale (DFBS). *The Diabetes Educator, 19*(2), 125-132.

Naar-King, S., Podolski, C.-L., Ellis, D. A., Frey, M. A., & Templin, T. (2006). Social ecological model of illness management in high-risk youths with type 1 diabetes. *Journal of Consulting and Clinical Psychology, 74*(4), 785-789.

Norbeck, J. S., Lindsey, A. M., & Carrieri, V. L. (1983). Further development of the Norbeck Social Support Questionnaire: Normative data and validity testing. *Nursing Research, 32*(1), 4-9.

Nordfeldt, S., Hanberger, L., & Bertero, C. (2010). Patient and parent views on a web 2.0 diabetes portal—the management tool, the generator, and the gatekeeper: Qualitative study. *Journal of Medical Internet Research, 12*, e17.

Palladino, D. K., & Helgeson, V. S. (2012). Friends or foes? A review of peer influence on self-care and glycemic control in adolescents with type 1 diabetes. *Journal of Pediatric Psychology, 37*(5), 591-603.

Pendley, J. S., Kasmen, L. J., Miller, D. L., Donze, J., Swenson, C., & Reeves, G. (2002). Peer and family support in children and adolescents with type 1 diabetes. *Journal of Pediatric Psychology, 27*(5), 429-438.

Procidano, M. E., & Heller, K. (1983). Measures of perceived social support from friends and from family: Three validation studies. *American Journal of Community Psychology, 11*, 1-24.

Ruehlman, L. S., & Karoly, P. (1991). With a little flak from my friends: Development and preliminary validation of the Test of Negativity Social Exchange (TENSE). *Psychological Assessment, 3*, 97-104.

Schafer, L. C., McCaul, K. D., & Glasgow, R. E. (1986). Supportive and nonsupportive family behaviors: Relationships to adherence and metabolic control in persons with type 1 diabetes. *Diabetes Care, 9*(2), 179.

Schlundt, D. G., Pichert, J. W., Rea, M. R., Puryear, W., Penha, M. L. I., & Kline, S. S. (1994). Situational obstacles to adherence for adolescents with diabetes. *The Diabetes Educator, 20*(3), 207-211.

Skinner, T. C., & Hampson, S. E. (1998). Social support and personal models of diabetes in relation to self-care and well-being in adolescents with type I diabetes mellitus. *Journal of Adolescence, 21*, 703-715.

Skinner, T. C., & Hampson, S. E. (2000). Social support and personal models of diabetes as predictors of self-care and well-being: A longitudinal study of adolescents with diabetes. *Journal of Pediatric Psychology, 25*(4), 257-267.

Skinner, T. C., John, M., & Hampson, S. E. (2000). Social support and personal models of diabetes as predictors of self-care and well-being: A longitudinal study of adolescents with diabetes. *Journal of Pediatric Psychology, 25*(4), 257-267.

Swenson, L. P., & Rose, A. J. (2009). Friends' knowledge of youth internalizing and externalizing adjustment: Accuracy, bias, and the influences of gender, grade, positive

friendship quality, and self-disclosure. *Journal of Abnormal Child Psychology, 37*, 887-901.

Thomas, A. M. (1997). *Self-disclosure and peer support in adolescents with insulin-dependent diabetes mellitus* (Unpublished doctoral dissertation). University of California, Irvine.

Thomas, A. M., Peterson, L., & Goldstein, D. (1997). Problem-solving and diabetes regimen adherence by children and adolescents with IDDM in social pressure situations: A reflection of normal development. *Journal of Pediatric Psychology, 22*(4), 541-561.

Varni, J. W., Babini, L., Wallander, J. L., Roe, T. F., & Frasier, S. D. (1989). Social support and self-esteem effects on psychological adjustment in children and adolescents with insulin-dependent diabetes mellitus. *Child and Family Behavior Therapy, 11*, 1-17.

Wu, H.-R., Liu, P.-L., & Meng, H. (2006). Norm, reliability and validity of children and adolescents' QOL Scale. *Chinese Journal of School Health, 27*, 18-21.