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Identity and Treatment Adherence in Predominantly Ethnic Minority Teens and Young Adults with Type 1 Diabetes

Persis V. Commissariat, Ph.D.¹, Lori M. Laffel, M.D., M.P.H.¹, Jeffrey S. Gonzalez, Ph.D.^{2,3}

¹Section on Clinical, Behavioral, and Outcomes Research, Pediatric, Adolescent, and Young Adult Section, Joslin Diabetes Center, Harvard Medical School, Boston, MA 02215, USA

²Ferkauf Graduate School of Psychology, Yeshiva University, Bronx, NY 10461, USA

³Departments of Medicine (Endocrinology) and Epidemiology & Population Health, New York Regional Center for Diabetes Translation Research, Albert Einstein College of Medicine, Bronx, NY 10461, USA

Abstract

Background: The demands of diabetes care can place substantial burden on youth with type 1 diabetes (T1D), who must manage their treatment in conjunction with the developmentally typical tasks of adolescence. How diabetes affects the normative task of identity development deserves further exploration.

Methods: A sample of 83 participants (ages 13–21) completed a qualitative interview about life with diabetes and a battery of validated psychosocial measures. Individual interviews were analyzed using content analysis to create criteria for whether a teen had incorporated their T1D in relation to their identity. Convergent validity was assessed by comparing identity groups on various validated measures of psychosocial characteristics and health-related outcomes. ANCOVAs were used to determine whether identity status had a significant relationship to health outcomes.

Results: Results indicated that youth who were categorized as incorporating their T1D into their identities demonstrated significantly greater perceived social competency ($p=0.014$), greater diabetes-specific self-esteem ($p<0.001$), better self-care ($p=0.002$), and more life satisfaction ($p=0.001$) than those who had not incorporated T1D. Incorporation was also associated with better glycemic control ($p=0.003$). Identity remained significantly associated with the above psychosocial and health-related outcomes even when controlling for covariates of gender and method of insulin delivery ($ps<0.01$).

Corresponding Author: Persis Commissariat, Ph.D., Joslin Diabetes Center, 1 Joslin Place, Boston, MA 02215, Phone: 617-732-2603, Fax: 617-309-2451, persis.commissariat@joslin.harvard.edu.

AUTHOR CONTRIBUTIONS

P.V.C. and J.S.G. designed the research study. P.V.C. performed the research, analyzed the data, and wrote the manuscript. L.M.L. contributed to data interpretation and edited the manuscript. J.S.G. contributed to data interpretation, edited the manuscript, and supervised the research. All authors provided critical feedback and helped shape the research, analysis, and manuscript. All authors have approved the final version of the manuscript for submission.

CONFLICTS OF INTEREST

The authors report no potential conflicts of interest.

Conclusions: Successful incorporation of diabetes is associated with better biomedical and psychosocial outcomes in teens with T1D. Further research is warranted to assess influences on identity as well as how to encourage and support incorporation in this at-risk population.

Keywords

identity; type 1 diabetes; adherence

Background

Type 1 diabetes mellitus (T1D) is the most common chronic disease that demands substantial self-care and added responsibility among adolescent youth. Treatment for T1D requires substantial effort on the part of the patient and family. Blood glucose levels are managed by manual insulin administration through multiple daily insulin injections or an insulin pump and frequent monitoring of blood glucose levels through finger-sticks or continuous glucose monitoring. Insulin replacement requires extensive knowledge of insulin calculations, bodily reactions to insulin, the effect of physical activity on glucose levels, and nutritional therapy in order to normalize blood glucose levels and maintain normal growth and development.

The demands of management for T1D, along with the expected turmoil of adolescence, combine to create a perfect storm in teens. The adolescent stage has also long been labeled as the period in which identity formation and development becomes a major normative task^{1,2}, as the teen struggles to manage and integrate multiple physical, hormonal, cognitive, emotional, and behavioral changes into a developing sense of self. Erikson's work describes identity development as youths' attempt to create a stable, meaningful, unique definition of who they are now and will be in the future, in relation to others, and across different roles and situations¹. Additionally, the influence of environmental factors, psychological issues, and personal traits during this time has the potential to affect the identity the teen creates for himself or herself. Research has found that diabetes management is particularly difficult during adolescence, a developmental period associated with substantially deteriorating glycemic control^{3,4}. However, effective management of T1D should not be based solely on glycemic control or specific management behaviors. Given that diabetes care requires an intensive and demanding daily routine, successful management often requires incorporation of diabetes into youths' social and personal worlds. The integration of diabetes as part of daily life and sense of self includes various psychosocial considerations, including coping with the new illness in daily life, adapting to the new behaviors and symptoms associated with T1D, and maintaining positive relationships with family and peers⁵.

One particular area requiring further exploration in the acceptance and management of T1D in youth is identity development. Youth with T1D must manage this major developmental task of adolescence while simultaneously managing the burdens of the emotional and lifestyle challenges associated with their diabetes. Charmaz (1991) suggests two ways in which individuals conceptualize and experience a chronic illness in relation to their identities: "incorporating" vs. "containing" the illness. Those who incorporate their illness accept it as part of who they are, take it into account in their daily life, and are able to find

ways to include the illness as part of their sense of self; those who contain their illness may try to keep their illness hidden, worry about stigma, or try to continue their lives in a way that preserves their pre-illness identity⁶, thus attempting to maintain a sense of self unburdened by illness and often ignoring daily self-management needs. A chronic illness, such as T1D, can be viewed as a loss of the previous self⁷, making the need to examine its impact on ongoing identity development particularly important. Previous research has shown that a more positive, accepting identity with diabetes was related to less depressive symptoms, more adaptive functioning, increased adherence to treatment, and fewer diabetes-related problems^{8,9}. Thus, teens and young adults with T1D must be able to find ways to fit their illness and its intensive management into their lives without sacrificing their happiness, social lives, relationships, goals, or sense of self.

Social relationships also become increasingly important during adolescence as teens start becoming more independent from their parents and relate more to their peers¹⁰. Adolescents tend to spend most of their time with peers, both in school and during extracurricular activities¹¹. Peer acceptance is an important factor in developing personal connections and friendships; however, teens with T1D can struggle with their diabetes identity and management around peers and friends if they feel stigmatized or are worried about negative reactions from others that indicate a lack of acceptance^{12–14}. Peer reactions to diabetes, both experienced and perceived, may be important in predicting acceptance of diabetes as well as adherence to treatment. For example, peers can potentially exert a negative influence on diabetes management if a teen's concern about peer reactions is viewed as more important than healthy management¹⁵.

Taking together both personal and social factors associated with identity, Charmaz (2000) describes three processes that are highly relevant to identity development with T1D. In "Becoming and Being Ill", the person must redefine the self as a person with an illness. In "Managing Illness", the person must merge the concepts of the illness and the self through understanding the experience of living with the illness and how the body changes with the new illness. In "Stigma and Stigma Control", the person must learn how to manage actual and perceived stigma surrounding their illness¹⁶. We hypothesize that teens and young adults with T1D who are less successful with these processes of identity change, and instead resist allowing their illness to become part of their sense of self, may struggle with treatment adherence, glycemic control, and quality of life.

The current study uses a mixed-methods approach of qualitative interviews and self-report batteries to explore the significance of illness identity in adolescents with T1D and uses quantitative methods to: 1) identify differences between those who incorporate vs. those who do not incorporate diabetes in his/her identity on a battery of validated self-report measures of self-worth and social competency, perceived negative reactions from friends toward diabetes, and diabetes-specific social support from friends and 2) evaluate how successful incorporation of T1D into one's identity is related to outcomes of diabetes-specific self-esteem, self-management, glycemic control, and quality of life. We hypothesize that those who incorporate will endorse higher social competency and self-worth, fewer perceived negative reactions, and more diabetes support from friends than those who do not incorporate their diabetes. We also hypothesize that those who incorporate will demonstrate

higher diabetes-specific self-esteem, more self-management behaviors, better glycemic control, and better quality of life.

Methods

Participants

Eighty-five adolescents with T1D, out of 89 approached, were recruited during their prescheduled, standard diabetes care appointment at the pediatric endocrinology clinic of an urban, academic medical center. The center primarily serves residents of a poor, racially and ethnically-diverse county in the United States. In 2017, the poverty rate of families within the county was estimated at approximately 27% compared to 11% nationwide, with a median family income of \$41,484 compared to \$70,850 nationwide¹⁷; approximately 56% of county residents identified as Hispanic/Latino compared to 18% nationwide¹⁸. To be included in the study, participants had to be between age 13 and 21 and diagnosed for at least 1 year. Exclusion criteria included the inability to speak, read, or write in English and any medical or psychiatric diagnoses (e.g. severe intellectual disabilities, terminal illnesses) that would affect ability to consent or participate. Youth were approached based on their potential eligibility, as determined by a study nurse who reviewed medical charts in advance of the scheduled appointment and confirmation from the participants' physician or nurse practitioner on the day of the appointment. HIPAA authorization was obtained in person, prior to administering the interview or self-report measures.

Procedures

Two separate interviewers were blinded to study participants' medical information. Participants completed both interview and surveys in a single study session, and were then entered into a raffle for a \$25 gift card in groups of 10 participants each. At the completion of the study, a raffle was held for all 85 participants for a \$50 gift card. The Albert Einstein College of Medicine Institutional Review Board approved all study procedures prior to participant enrollment. Written informed consent from the parent or participant (if over 18 years old) and assent from the child participant (if under 18 years old) were obtained in person, prior to administering the interview or self-report measures.

The study session lasted approximately 40 minutes in length. Each participant began the study session with an audio-recorded, semi-structured interview conducted by one of two trained study staff. Teens were given the option of having a parent in the room during the interview based on their comfort; however, this information was not systematically tracked. The semi-structured interview, created and revised by P.V.C. and J.S.G., consisted of five open-ended questions designed to lead a discussion on the participant's general feelings about his/her diabetes, the treatment regimen, the effect of diabetes on social life, and experience of living with diabetes. The interview can be found in previously published work by the authors¹⁹. Follow-up questions provided clarification or prompted more detailed responses. Following the interview, participants completed a battery of self-reported surveys, which included validated measures of social support, diabetes-specific self-esteem, social competency, peer attributions, and adherence. Participants provided demographic and health-related information.

Measures

Demographics and Treatment Variables.—Self-reported demographic variables included age, gender, ethnicity/race, duration of diabetes, and insulin delivery method. Medical record review confirmed diagnosis and duration of T1D, and provided the most recent A1c value, taken at the clinic visit on the day of study enrollment.

The Texas Social Behavior Inventory Short Form A (TSBIA).—The TSBIA Short Form²⁰ consists of 16 items to measure general perceived social self-worth and social competency in interactions with others. Response options utilize a five-point Likert Scale (from 0 = Not at all characteristic of me to 4 = Very much characteristic of me). Higher scores indicate higher social competence and/or social self-worth. Reliability in the current sample yielded a Cronbach's alpha of 0.69.

Friend Attribution Questionnaire.—The Friend Attribution Questionnaire¹⁴ consists of seven hypothetical social situations in which the teen with T1D must maintain diabetes self-care (e.g., need to check a blood glucose level while friends are waiting to leave). Five questions follow each situation, utilizing a five point Likert scale (from 1 = strongly disagree to 5 = strongly agree) in order to determine a Negative Friend Attribution score. Higher scores indicate greater negative perception of friend responses. Reliability in the current sample yielded a Cronbach's alpha of 0.95.

Diabetes Social Support Questionnaire – Friends (DSSQ-Friends).—The DSSQ-Friends²¹ measures friend support for diabetes treatment in youth. Adolescents rated both the frequency of supportive behaviors (“How often do your friends...” from 0 = never to 5 = at least once a day) on 28 items and the degree of supportiveness felt (“How does it feel when...?” from –1 = not supportive to 3 = very supportive) on 28 items. The analyses in the current study used the combined score of Frequency x Supportiveness. Higher scores indicate more social support from friends for diabetes care. Reliability in the current sample yielded a Cronbach's alpha of 0.98.

Diabetes Specific Self-Esteem Scale (DSSE).—The DSSE consists of 10 items designed to capture the degree of self-satisfaction or self-approval in relation to the medical and social management of diabetes in everyday life²². Response options utilize a four-point Likert scale (from 1 = Strongly Disagree to 4 = Strongly Agree). Higher scores indicated higher diabetes-specific self-esteem. Reliability in the current sample yielded a Cronbach's alpha of 0.87.

Self-Care Inventory – Revised.—The SCI-R²³ consists of 15 items to assess patients' perceptions of the degree to which they adhere to treatment recommendations for their diabetes self-care. Response options utilize a five-point Likert scale (from 1 = Never to 5 = Always). Higher scores indicate more perceived self-care behaviors. Reliability in the current sample yielded a Cronbach's alpha of 0.85.

The Diabetes Quality of Life Questionnaire for Youths (DQOL-Y).—The DQOL-Y²⁴ was created for youth, and composed of a 17-item Diabetes Life Satisfaction scale, a 23-

item Disease Impact scale, and an 11-item Disease Related Worries scale using five-point Likert scales. Higher scores on each scale correspond to more life satisfaction, more disease impact, and more disease related worries, respectively. Reliability in the current sample yielded a Cronbach's alphas of 0.91 for life satisfaction, 0.83 for disease impact, and 0.88 for disease worries.

Data Analyses

Qualitative Data Analysis.—The current study analyzed qualitative interviews in three main phases in order to determine identity status. In phase one, the initial 40 interviews were analyzed using an exploratory approach by three trained coders, and then grouped into overarching themes of living with diabetes¹⁹. Preliminary findings of the qualitative portion were subject to analyst triangulation to ensure that the results met the standards of a multidisciplinary group²⁵. In phase two, coders worked to create “criteria” for identity status in the full sample upon reaching saturation of themes. Informed by Charmaz's extensive work in the ways in which one experiences a chronic illness⁶, we sought to broadly determine whether each participant's interview responses were indicative of incorporation versus non-incorporation of diabetes. Based on the analysis of themes, criteria for incorporation included all of the following:

1. Acceptance of illness and its associated treatment
2. Disclosure of diabetes status and/or knowledge of diabetes with others
3. No evidence of perceived-stigma, embarrassment or hiding of diabetes status or treatment

In phase three, three coders applied the newly created criteria to the remainder of the sample to determine identity status for the remaining 45 interviews. Participants who did not meet criteria for incorporation were simply categorized as “non-incorporating”, though theoretically similar to Charmaz's description of those “containing” an illness⁶. This decreased the final sample size from 85 to 83 adolescents, as two interviews did not provide enough information to determine identity status. All discrepancies were resolved through extensive discussion and adjudication. Inter-rater reliability was calculated by computing the mean of Cohen's kappa for each coder pair to provide an overall index of agreement ($\kappa = .834$)²⁶.

Quantitative Data Analysis.—For the quantitative data analysis, the sample was divided into those who had been identified through their interviews as incorporating their T1D vs. those who had not met criteria for incorporating their T1D in their identities. Groups were compared on psychosocial characteristics of social competency, social support, and perceived negative friend reactions, as well as health outcomes of diabetes-specific self-esteem, glycemic control, self-care, and QoL (life satisfaction, disease impact, and disease worry). Significance was determined by a p-value of less than 0.05.

First, psychosocial and biomedical variables were analyzed to explore differences between incorporating and non-incorporating groups and assess convergent validity for qualitative findings. Distribution of residuals for each survey measure within identity groups was

assessed prior to comparing groups. Measures that demonstrated a normal distribution of residuals were analyzed using parametric tests, while survey measures with a non-normal distribution of residuals were analyzed using both parametric and non-parametric tests. Means were compared using T-tests and Wilcoxon Mann-Whitney tests as indicated for parametric vs. non-parametric distributions, respectively. Second, Pearson and Spearman correlations, T-tests, and Wilcoxon Mann-Whitney tests compared demographic characteristics to psychosocial and health outcomes to determine potential confounders. Third, ANCOVAs and non-parametric Kruskal-Wallis analyses determined whether identity status was related to the health outcomes of diabetes-specific self-esteem, self-care, quality of life (life satisfaction, disease impact, disease worry), and A1c in univariate analyses. Finally, ANCOVAs in multivariable models, controlling for demographic covariates, determined whether identity status remained a significant influence on health outcomes. Of note, measures that demonstrated a non-normal distribution of residuals were assessed using both parametric (T-tests, ANCOVA) and non-parametric (Wilcoxon Mann Whitney, Kruskal-Wallis) tests. However, overall results did not differ between analyses; therefore, parametric results are presented in text and tables for ease of interpretation.

Results

Demographic characteristics are summarized in Table 1. Participants were 83 adolescents (53% female, 81% non-white) with type 1 diabetes ((M±SD) age 15.9±2.1 years, T1D duration 6.7±3.7 years, 55% using an insulin pump). Notably, the sample was composed of predominantly ethnic minorities (81%), with 47% classifying themselves as Hispanic/Latino and 29% classifying themselves as Black; 59% reported their parents were born outside the U.S. Overall, glycemic control in this sample was suboptimal, with a mean A1c of 10.1±2.3 percent.

Differing Characteristics of Incorporating vs. Non-Incorporating Participants

In this sample, 58% (n=48) of participants were classified as incorporating their diabetes. Biomedical and psychosocial characteristics were compared between incorporating and non-incorporating groups. As parametric and non-parametric results were comparable, only T-test results are presented. Results of psychosocial measures indicated that those categorized as incorporating their diabetes showed significantly greater perceived social competency (p=0.014). There was no difference between groups in social support or perceived negative reactions from friends. Results are presented in Table 2.

In regard to health outcomes, those who were identified as incorporating their illness showed significantly higher self-esteem (p=0.0002), greater self-care (p=0.002), more life satisfaction (p=0.001), and better glycemic control (p=0.003). No differences were found between groups in illness-specific impact or worries. Results of T-tests are presented in Table 2.

Associations of Demographic and Treatment Variables with Psychosocial Measures and Health Outcomes

Age, gender, T1D duration, race, and insulin method were each assessed for significant correlations with psychosocial and health outcomes. Gender was significantly related to all Quality of Life subscales, with females reporting lower life satisfaction ($p < 0.001$), more disease impact ($p = 0.003$), and more disease worries ($p = 0.005$) than males. Insulin method was also significantly related to all QoL subscales, with teens on pumps reporting more life satisfaction ($p = 0.008$), less disease impact ($p = 0.002$) and fewer disease worries ($p = 0.046$) than those on injections. In addition, those treated with insulin pump therapy demonstrated better glycemic control (A1c $9.5 \pm 2.1\%$) than those on injections (A1c 10.8 ± 2.5) ($p = 0.015$). However, there were no significant differences between incorporating and non-incorporating groups with respect to age, gender, race, T1D duration, and insulin method. Gender and insulin method were used as covariates in ANCOVAs of health outcomes.

The Relationship of Identity with Health Outcomes

Separate ANCOVAs were used to assess whether the relationship between identity and health outcomes was preserved when gender and insulin method were included in each analysis. Results showed that identity remained significantly associated with diabetes-specific self-esteem ($p = 0.0003$), life satisfaction ($p < 0.0001$), self-care ($p = 0.0081$), and glycemic control ($p = 0.0025$) in each multivariable model. Notably, the incorporating group reported significantly higher diabetes-specific self-esteem ($p = 0.0004$), greater Life Satisfaction ($p = 0.0016$), more self-care behaviors ($p = 0.0044$), and demonstrated better glycemic control (A1c 9.5% vs. 10.9% , $p = 0.006$) than the containing group. Disease impact and disease-related worries did not differ between identity groups. See Table 3 for details.

Discussion

The current study utilized a mixed-methods approach to understand how illness identity for young persons with T1D relates to health outcomes. The qualitative results of this study highlight two possible ways in which diabetes is viewed by youth: by incorporating the illness into the self, or keeping the illness outside of the self. Our criteria for incorporation suggest more overall self-confidence and social skills, allowing for T1D to be viewed as routine, while those who had not incorporated their diabetes appear to view diabetes as a burden or embarrassment. The current study highlighted three major components of incorporation: 1) acceptance, 2) vocalizing diabetes experience and knowledge, and 3) self-care in the face of perceived stigma. Quantitative results confirmed that when T1D was viewed as part of the self (i.e., incorporation), teens felt more confident in their ability to manage diabetes, endorsed greater life satisfaction, and engaged more regularly in self-care than those who externalized T1D from the self (i.e., non-incorporation). Notably, teens who had incorporated their diabetes demonstrated significantly better glycemic control, with A1cs more than 1% lower than those who had not incorporated their diabetes.

Previous research has also considered the importance of incorporation in T1D. One qualitative study found that when participants were able to “normalize” their diabetes as just part of their overall health, they no longer defined themselves by diabetes; instead, they were

able to describe themselves as “a person with diabetes” rather than “diabetic”²⁷. Notably, the way in which a person copes with diabetes in order to normalize the illness may affect the impact of diabetes on daily life and the self, as well as engagement in treatment and overall physical health. Past research has found that active coping was related to better metabolic control²⁸, while avoidant coping was related to poorer glycemic control²⁹. Bury³⁰ suggests two potential approaches for normalizing an illness: adjusting lifestyle and identity to include the illness (similar to incorporating) or maintaining pre-illness lifestyle and identity, often ignoring needed self-care tasks to minimize negative impact (similar to non-incorporation). For example, teens who incorporated their illness were able to adjust to a daily life that included adherence behaviors and accept diabetes as part of the self.

Subsequent to the current study’s mixed-methods approach, the Illness Identity Questionnaire (IIQ)⁸ was validated in teens and young adults with T1D, ages 14–25. The IIQ measures the degree to which a person has identified diabetes as part of his/her sense of self. Acceptance of the illness, as self-reported by teens and young adults with T1D, was related to better psychosocial functioning and biomedical outcomes.

Although the current study compared two categories of identity, we theorize illness-related identities may exist on a continuum, with the potential for modification. Indeed, during childhood and adolescence, there may be many occasions in which incorporation of diabetes may be especially challenging. For example, youth may experience stigma in the face of diabetes self-care when entering a new school or in new social situations. Barriers to incorporation may be repeatedly presented and overcome as new situations arise and new coping strategies are employed. Therefore, anticipatory guidance and support in clinical practice may help youth to better accept their diagnosis, cope with stressors presented in new situations, and maintain self-care behaviors.

The current study suggests that incorporation is associated with greater perceived social competency; however, incorporation was not associated with less perceived negative reactions from friends or more social support for diabetes, as initially hypothesized. This suggests that one’s self-perception may have a greater effect on his or her ability to incorporate diabetes as part of oneself than how one believes others perceive him- or herself. If teens demonstrate high self-worth and confidence in their abilities to interact with others (social competence) while managing T1D, they may not elicit negative reactions from others. It is also possible that they may not perceive negativity from others because of their own protective processes that enhance feelings of self-worth in social situations. In addition, these teens may not endorse more social support because they do not feel they *need* greater support from friends for their diabetes self-care, reducing the need to seek out such relationships with others. Similarly, those who did not incorporate their T1D also may not experience negative reactions or disclose the absence of social support for self-care, likely because they do not openly engage in self-care for their diabetes around others. Thus, while the influence of peers on diabetes care remains an important consideration during adolescence^{10,11,15,31,32}, there may be an opportunity to encourage incorporation in youth with T1D through a focus on enhancing different aspects of self-perception rather than perceptions of peer reactions. For example, a role playing intervention may help increase perceived social competency by teaching youth how to acknowledge their diabetes and

perform self-care tasks in an unobtrusive manner when with peers and in various social settings. Such interventions can be performed in both research and clinical practice. Incorporation may be encouraged by targeting more general aspects of self-perception, such as general self-esteem, self-worth, and self-efficacy. One qualitative study utilized this approach by asking teens with T1D to write daily narratives about their experiences and emotions living with diabetes during a 9-day diabetes camp³³. These authors reported that the self-expression promoted in these daily narratives was related to positive changes in self-confidence and the ability to self-manage, potentially enhancing encouraging the view of diabetes as “a piece of the self”³³.

The current study also observed a significant association with Life Satisfaction in those who had incorporated their T1D compared to those who had not incorporated. It is possible that the very nature of incorporation, and its inherent acceptance of T1D, suggests a less negative attitude in response to T1D care and thus more positive and/or less burdensome engagement with T1D. Interestingly, the current study showed no significant relationship between identity and Disease Impact or Disease-related Worries. This may be related to coping styles of the two identity groups: participants who incorporated their T1D may feel less negative impact and worry because they have positively accepted and managed their diabetes, while those who did not incorporate may also feel less negative impact and worry because they keep diabetes as external to their sense of self and try not to let it disrupt or interfere with their lives.

Additional research is warranted to better understand the factors associated with identity to determine how to encourage incorporation. For example, supportiveness of family and peers, age of transition to self-care, and inherent personality traits, among other factors, likely impact one’s acceptance of type 1 diabetes. Generally, it may be preferable for clinicians to begin addressing negative emotions and influences related to diabetes identity at diagnosis in order to normalize the illness and encourage youth and their families to share their diabetes status with others, allowing for a more seamless performance of self-care tasks without perceived social barriers. During follow-up care, clinicians may be able to aid in the identification of negative emotions and behaviors counter to diabetes incorporation, allowing for timely referral for psychosocial support.

There are limitations to the current research that should be noted. First, the use of qualitative interviews and self-reported surveys may have bias related to social desirability. Additionally, the interview environment may have impacted responses as interviews were conducted in the clinic setting. Participants were given the option of having a parent present during the interview; however, this was not systematically tracked. Additionally, the participant sample was primarily of minority ethnic background, limiting generalizability. However, the sample of primarily minority youth should be considered a notable strength of this study given the larger population of youth with T1D tends to be predominantly Caucasian^{34–36}. Findings may also not be generalizable to young persons beyond the age range assessed in our sample. Next, the study was cross-sectional in nature, indicating associations rather than causality; it is likely that many of our findings may be bidirectional. More research is needed to determine how identity changes over time, and identity’s impact on T1D-related outcomes as identity develops. Finally, it is important to note that certain

family factors were not assessed. Since the purpose of this study was to assess the self, friend-related factors were studied due to their relevance to identity development in this age range. However, family structure, background, and support are important factors in diabetes care and should be acknowledged as potentially affecting identity development and thus, included in future studies.

The results of the current study emphasize the potential opportunity to utilize illness identity as a means to optimize psychosocial and biomedical outcomes, given its potential for modification. The challenge remains to determine how and when to intervene in order to encourage successful incorporation of diabetes into the self during childhood and adolescence, which can then persist into adulthood. Routine screening for barriers to incorporation may also allow for more timely intervention in clinical practice. Future longitudinal research is needed to determine the long-term impact of identity on health outcomes.

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Table 1.

Demographics (N=83)

	% or M $\pm$ SD	Range
Age (years)	15.9 $\pm$ 2.1	13 – 21
Sex (% female)	53	
Race		
Hispanic/Latino	47	
Black	29	
White/Caucasian	19	
Asian	4	
Other	1	
Duration of Illness (years)	6.7 $\pm$ 3.7	1 – 15
Insulin Regimen (% pump)	55	
A1c (%)	10.1 $\pm$ 2.3	6.50 – 15.60

Table 2.

Psychosocial and Biomedical Differences between Incorporating and Non-Incorporating Groups

	Incorporating (n=48) (M±SD)	Non-Incorporating (n=35) (M±SD)	<i>p</i>
Psychosocial Characteristics			
Social Competency	40.2±7.4	35.8±8.8	0.014
Social Support *	5.0±4.0	3.6±3.8	0.119
Negative Friend Reactions	8.3±2.7	9.6±3.0	0.052
Health Outcomes			
Diabetes-Specific Self-Esteem	26.7±5.7	21.9±5.1	<0.001
Self-Care	62.8±14.6	51.9±16.6	0.002
QoL Life Satisfaction	64.2±12.5	54.8±12.4	0.001
QoL Disease Impact *	53.3±12.6	56.4±12.1	0.261
QoL Disease Worries *	20.5±10.1	23.17±7.8	0.202
A1c *	9.4±2.1	11.0±2.4	0.003

* Measures were assessed using both parametric and non-parametric tests. Due to comparable results, T-test results are presented for ease of interpretation

Table 3.

Associations between Identity and Health Outcomes

			Identity Statistics**	
	Incorporating (n=48) (M±SE)	Non-Incorporating (n=35) (M±SE)	F value	p
Diabetes-Specific Self-Esteem	26.6±0.8	22.1±0.9	13.67	0.0004
Self-Care	62.5±2.2	52.3±2.6	8.62	0.0044
QoL Life Satisfaction	63.8±1.7	55.4±1.9	10.74	0.0016
QoL Disease Impact *	53.8±1.7	55.7±1.9	0.53	0.4700
QoL Disease Worries *	20.8±1.3	22.8±1.5	1.08	0.3013
A1c *	9.5±0.3	10.9±0.4	7.88	0.0063

* Measures were assessed using both parametric and non-parametric tests. Due to comparable results, ANCOVA results are presented for ease of interpretation.

** Covariates controlled for in this analysis included gender and insulin method