



# Suicide Risk Assessment in Youth and Young Adults With Type 1 Diabetes

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## OBJECTIVE

To describe sociodemographic and clinical characteristics of youth and young adults with type 1 diabetes who endorsed suicidal ideations as part of routine depression screening and the results of their suicide risk assessments.

## RESEARCH DESIGN AND METHODS

The Patient Health Questionnaire–9 was used to assess depressive symptoms and suicide/death ideation in 550 youth and young adults with type 1 diabetes ages 10–24 years. Only individuals who endorsed suicidal/death ideations ( $n = 49$ ) completed a standardized suicide risk assessment protocol and safety planning.

## RESULTS

Nine percent of individuals endorsed suicidal/death ideation and of those, 83.4% reported clinically elevated depressive symptoms; 16% made a previous suicide attempt. No youth ( $n = 39$ ) or young adults ( $n = 11$ ) disclosed current plans or preparations for suicide, but five who expressed suicidal ideation acknowledged the lethality of insulin for an attempt. Three previously used insulin to attempt suicide. The overwhelming majority of individuals were classified as being low risk for future suicide attempt/completion. None were hospitalized as a part of the suicide risk assessment, and no suicide completions have occurred.

## CONCLUSIONS

The findings of this study provide initial insight into the behaviors and cognitions of youth and young adults with type 1 diabetes who experience suicidal and death ideations. Comprehensive suicide risk assessment and safety planning are feasible during routine type 1 diabetes clinic appointments.

The American Diabetes Association recommends screening for psychological comorbidities, including depression, as part of routine clinical care of individuals with diabetes (1). Individuals with type 1 diabetes are at higher risk for depression than the general population, and the relative risk of suicide is estimated to be 2.25 (2). Moreover, the Network for Pancreatic Organ Donors with Diabetes found that of their first 100 donors, ~8% of deaths occurred because of suicide (3). In addition to symptoms of anhedonia and depressed mood, the presence of suicidal/death ideations is highly concerning because these are associated with increased risk of suicide attempts and completion. The majority of published studies describe screening for depression and suicidal behaviors in adults with type 1 diabetes, or they

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combine individuals with type 1 and type 2 diabetes (2). Therefore, there is a need for studies on screening and assessment of suicide risk in adults with type 1 diabetes.

Studies in pediatric type 1 diabetes demonstrate that 8–27% of youth report elevated depressive symptoms (4–6), with the incidence of suicidal ideations ranging from 8% to 15% (7,8). Adolescents with type 1 diabetes are at 61% higher risk of reporting suicidal ideations, compared with individuals without type 1 diabetes (9) and youth with type 1 diabetes are 1.7 times more likely to attempt suicide (10). Data regarding suicide completions in youth with type 1 diabetes are extremely rare. At least one study found that of 78 Swedish individuals with pediatric-onset type 1 diabetes, 7 (8.9%) died by suicide (11); however, the sample combined children and adults. Studies investigating factors associated with suicide-related thoughts and behaviors in youth with type 1 diabetes are also sparse, though longer type 1 diabetes duration is associated with increased suicide-related behaviors (12). The overall purpose of this study is to describe the results of comprehensive suicide risk assessments, including suicide risk classification, in youth and young adults with type 1 diabetes, a novel contribution to the extant literature.

## RESEARCH DESIGN AND METHODS

### Participants

All individuals >10 years of age are screened annually for depressive symptoms as part of routine clinical care in the Barbara Davis Center's pediatric type 1 diabetes clinic. For the purposes of this study, a total of 550 youth and young adults with type 1 diabetes, ages 10–24 years, were screened from January 2016, the time that screening was officially implemented in clinic, to June 2017. Individuals were excluded from screening if they were <10 years of age, non-English speaking, or had developmental delays that prevented them from reading or understanding the Patient Health Questionnaire–9 (PHQ-9). Type 1 diabetes characteristics (e.g., hemoglobin A1C and date of diagnosis) and sociodemographic characteristics (e.g., age, sex, race/ethnicity) were gathered via medical chart review. This study was approved by the University of Colorado's Multiple

Institutional Review Board for the time period from January 2016 to June 2017.

### Patient Health Questionnaire–9

Individuals completed the PHQ-9, which contains nine self-reported items assessing symptoms of major depressive disorder that are consistent with the Diagnostic and Statistical Manual of Psychiatric Disorders (13). Respondents rated each symptom as occurring in the previous 2 weeks from "0" (not at all) to "3" (nearly every day). The PHQ-9 includes one suicidal/death ideation item asking if the individual has had "thoughts that you would be better off dead, or of hurting yourself in some way." Level of depressive symptom severity is categorized as minimal (0–4), mild (5–9), moderate (10–14), moderately severe (15–19), and severe (20–27). The PHQ-9 was scored during the type 1 diabetes clinic visit and if an individual's score was clinically elevated  $\geq 10$ , without endorsement of suicidal/death ideation item, the medical provider discussed the depressive symptoms with the person with type 1 diabetes and a caregiver (if appropriate) and provided a list of behavioral health resources in the community, if needed.

### Suicide Risk Assessment

If an individual endorsed the suicidal/death ideation item (i.e., score  $\geq 1$ ), a member of the suicide risk assessment team assessed the individual's risk of suicide using the standardized suicide risk assessment protocol recommended by Joiner et al. and Chu et al. (14,15), upon the completion of their clinic visit and before the individual was discharged from the clinic visit. A complete copy of the suicide risk assessment used in this study can be found in Joiner et al. and Chu et al. (14,15). The suicide risk assessment team was comprised of Barbara Davis Center employees (e.g., psychologist; clinical psychology fellow, interns, and externs; social workers; and physician) who were colocated within the Barbara Davis Center. The suicide risk assessment protocol contains questions in the following categories: desire and ideations; resolved plans and preparations; and other risk factors.

### Desire and Ideations

Suicidal ideations are defined as thinking of killing oneself, whereas death ideations comprise passive thoughts about

death. Six questions assessed whether suicidal or death ideations had occurred and if so, their frequency and duration. The occurrence of suicidal ideation was assessed by asking, "Have you been having thoughts of suicide, or killing yourself? How often? How long lasting (preoccupation)?" Death ideation was assessed by asking, "Do you think about wanting to be dead? How often? How long lasting?" (14,15).

### Resolved Plans and Preparations

Eight questions assessed the following: history of suicide attempts including the number of attempts, intention to die, and methods used; intent to kill oneself on a scale of 0 = no intent at all to 10 = definite intent; plans to kill oneself; expectation to use the plan (if there was a plan); acquisition of means to kill oneself (e.g., access to pills, firearms); and preparations to kill oneself (e.g., writing a note).

### Other Risk Factors

Eight questions assessed other risk factors including engagement in self-harm and nonsuicidal self-injury (e.g., cutting, burning, or other physical harm without the intent to die); familial suicide history; fear of death (0 = not at all afraid to 10 = very afraid); social connectedness/support; presence of thoughts that people in the individual's life think that one would be better off dead; feelings of hopelessness; recent stressful events; and coping strategies. The interviewer from the suicide risk assessment team assessed other warning signs (i.e., agitation, social withdrawal, insomnia/nightmares, or marked irritability); and whether past or current psychopathology, including major depression, bipolar disorder, or an eating disorder, has been/is present.

### Suicide Risk Assessment Classification

On the basis of the data collected from the suicide risk assessment, the decision tree as outlined by Chu et al. (15) was used to classify the individual as low, moderate, severe, or extreme risk for suicide. These categories were established on the basis of the following: whether the person is a multiple suicide attempter, elevated on resolved plans and preparations, and elevated on suicidal desire and ideation. The presence of significant risk factors was also considered and included the capability for suicide (e.g., nonsuicidal self-injury and

fearlessness about death), thwarted belongingness, perceived burdensomeness, hopelessness, family history, recent stressful life events, impulsivity, and acute indicators of risk (e.g., agitation, social withdrawal, insomnia/nightmares, marked irritability, severe affective states, and significant weight loss).

#### Actions Taken

Recommendations were provided based on risk level and at a minimum, included creating a safety plan and providing a suicide hotline number. In some cases, recommendations for adjunctive therapy were made as were follow-up phone calls to ensure safety. Per the standardized clinic protocol, individuals deemed in imminent danger of risk for suicide or unable to engage in safety planning were to be transferred to the emergency department.

#### Analytic Plan

Descriptive statistics including means, standard deviations, and ranges are provided. Data on type 1 diabetes characteristics (e.g., hemoglobin A1C and date of diagnosis) were entered by research assistants and reviewed weekly by the group of authors, whereas data specific to suicide risk assessments were reviewed and entered by members of the suicide risk assessment team (S.M., K.A.D.). No differences in how youth and young adults responded occurred unless otherwise noted. IBM SPSS Statistics 25 was used for data analysis.

## RESULTS

### Participant Characteristics of the Overall Sample

A total of 550 youth and young adults completed the PHQ-9. Demographic and type 1 diabetes-related characteristics are found in Table 1 along with descriptive statistics about PHQ-9 severity classification. Notably, 83.4% of the sample who endorsed suicidal ideations reported clinically elevated symptoms of depression (PHQ-9 scores  $\geq 10$ ), whereas 9.6% of the overall sample did.

### Characteristics of the 49 Individuals Endorsing Suicidal/Death Ideations

A total of 49 (8.9%) individuals ( $n = 38$  youth;  $n = 11$  young adults) screened with the PHQ-9 endorsed the suicide/death ideation item, which prompted the completion of a comprehensive suicide risk assessment. Frequency of scores for

the item, "[In the last 2 weeks, have you had] thoughts that you would be better off dead or hurting yourself in some way" were endorsed as follows: 75.5% ( $n = 37$ ) endorsed them as occurring "several days," 16.3% ( $n = 8$ ) occurring "more than half the days," and 8.2% ( $n = 4$ ) occurring "nearly every day." Demographic and type 1 diabetes-related characteristics for those who completed a suicide risk assessment are also found in Table 1 along with descriptive statistics about PHQ-9 severity classification.

#### Suicidal Desire and Ideations

During the suicide risk assessment interview, 50% of the 49 youth and young adults who endorsed the item on the PHQ-9 reported that they had experienced suicidal or death ideations within the previous 2 weeks. Youth reported experiencing more death ideations than young adults, whereas young adults reported experiencing more suicidal ideations than youth. In general, both groups had difficulty articulating the frequency and length of suicidal or death ideations, and of the 15 who were able to do so, ideations varied from one to four times per week to one to four times per month and lasted between a "few minutes" to 1–2 h.

#### Resolved Plans and Preparations

**History of Suicide Attempts.** Eight youth and young adults (16.3%) indicated that they had made a previous suicide attempt with only one youth making multiple attempts. Two individuals stated they had cut their wrists; one ingested pills; one planned to jump off a balcony before being interrupted; and four youth used type 1 diabetes supplies, three of whom overdosed with their insulin and the other stuck syringes in his neck "looking for his jugular."

**Past and Current Plans to Attempt Suicide.** Nine youth and young adults reported that they had devised prior plans to attempt suicide by overdosing on insulin ( $n = 3$ ); overdosing with pills ( $n = 2$ ); jumping from a high elevation ( $n = 2$ ); throat cutting ( $n = 1$ ); carbon dioxide poisoning by car ( $n = 1$ ); and electrocution ( $n = 1$ ). All youth and young adults (100%) denied having a current plan to die by suicide, and none had made any preparations for a future attempt.

**Access to Means to Attempt Suicide.** Thirty-three individuals were queried about access to means. Fourteen reported

having access to the following means: insulin ( $n = 5$ ); knives ( $n = 3$ ); pills ( $n = 3$ ); firearms ( $n = 2$ ); and jumping from a roof ( $n = 1$ ). Four youth but only one young adult acknowledged the lethality of insulin and stated that they could use it in an attempt.

**Intent to Kill Self.** The majority of youth and young adults had no (51.0%) or very low (16.3%; scores 1–3 on a scale of 0 = no intent to 10 = definite) intent to kill themselves. Ten percent of youth and young adults rated their intent as medium (scores = 4–6). Only one youth indicated high intent (score of 7). Individuals <18 years old reported greater variability in their intent to die by suicide than the young adults.

#### Other Risk Factors

**Thwarted Belongingness and Perceived Burdensomeness.** Ninety-two percent of youth and young adults reported that they felt socially connected to at least one other person. The most commonly cited sources of support were friends (65%); parents (35%); siblings (12.5%); teachers/school counselors (12.5%); and significant other (10%). A concerning number of youth and young adults (64.7%) reported that they felt like a burden to their families and that the family would be better off if they were "gone" or dead with type 1 diabetes being a common reason provided, especially in the context of family conflict.

**Capability for Suicide and Nonsuicidal Self-Injurious Behaviors.** Youth and young adults reported on a scale of 0 = not at all afraid to 10 = very afraid, an average fear of death rating as  $6.1 \pm 2.9$  with 46.7% indicating a low fear of death. Twenty-three (46.9%) endorsed engaging in self-harm at some point in their lives. The most common behaviors were cutting (61.5%), hitting/punching self (17.4%), or scratching/biting self (13.0%). Individuals <18 years of age reported more variability in self-harm methods, whereas young adults only cited cutting as a method.

**Triggers for Suicidal Ideation and Current General Stress.** Triggers for suicidal and death ideation included stress and anxiety especially about school and negative interpersonal relationships with family members or peers or ending a relationship with a significant other. Only one young adult cited type 1 diabetes as a trigger, and four were not able to identify a trigger. Eighty-five percent of youth and young adults reported

**Table 1—Participant characteristics**

	Overall sample (N = 550)	Individuals completing suicide risk assessment (N = 49)
<b>Demographic characteristics</b>		
Age (years)	15.2 ± 3.1; 10.0, 23.9	14.9 ± 3.0; 10.1, 19.8
Sex, female	261 (47.5)	29 (59.2)
<b>Race</b>		
Caucasian	411 (74.7)	37 (75.5)
African American/black	27 (4.9)	3 (6.1)
American Indian/Alaskan Native	4 (0.7)	0 (0)
Asian	2 (0.4)	0 (0)
Multiracial	25 (4.5)	2 (4.1)
Other	27 (4.9)	1 (2.0)
Unknown/not reported	54 (9.8)	6 (12.2)
<b>Ethnicity</b>		
Non-Hispanic	435 (79.1)	43 (87.8)
Hispanic/Latino	59 (10.7)	2 (4.1)
Unknown/not reported	56 (10.2)	4 (8.2)
Insurance (private)	390 (70.9)	32 (65.3)
<b>Type 1 diabetes characteristics</b>		
Duration (years)	5.9 ± 4.4; 0.02, 20.0	5.7 ± 3.7; 0.8, 16.1
Insulin pump use (yes)	292 (53.1)	30 (61.2)
CGM use (yes)	134 (24.4)	17 (34.7)
A1C % (mmol/mol)	9.3 ± 2.2; 4.6, 15.0 (78 mmol/mol)	9.4 ± 1.8; 7, 13.9 (79 mmol/mol)
<b>PHQ-9 scores and classification</b>		
Total score	4.38 ± 4.68; 0, 24	13.1 ± 5.7; 3, 24
Minimal (0–4)	349 (63.5)	4 (8.2)
Mild (5–9)	132 (24.0)	9 (18.4)
Moderate (10–14)	41 (7.5)	15 (30.6)
Moderately severe (15–19)	20 (3.6)	13 (26.5)
Severe (20–27)	8 (1.5)	8 (16.3)

Data are N (%) or mean ± SD; minimum, maximum. CGM, continuous glucose monitor.

experiencing significant amounts of stress including bullying, interpersonal conflict with parents, death of a loved one, parental divorce or their own breakup with a significant other, and school.

**Hopelessness.** On a scale of 0 = very hopeless to 10 = very hopeful, youth and young adults reported an average hope score of  $5.2 \pm 2.8$  with 61.1% reporting being hopeless defined as a score of  $\leq 5$ .

**Mental Health Treatment.** Twenty-four percent of youth and young adults reported currently seeing a therapist at the time of the suicide risk assessment with 38.6% having seen a therapist in the past. The vast majority (85.7%) were not taking psychotropic medication, but of those who were, 71.4% ( $n = 5$ ) were prescribed an antidepressant or mood stabilizer.

**Acute Symptoms of Suicidality.** Although inconsistently reported by the interviewer, a variety of acute indicators of suicidality were endorsed including agitation ( $n = 5$ ); social withdrawal ( $n = 6$ ); insomnia/nightmares ( $n = 11$ ); and marked irritability ( $n = 4$ ).

**Family History of Suicide.** A total of five youth (10.2%) reported a familial history of suicide occurring in maternal grandfathers ( $n = 2$ ), father ( $n = 1$ ), maternal cousin ( $n = 1$ , sex unknown), and  $n = 1$  relationship not reported.

#### Suicide Risk Assessment Classification

Following the risk classification recommended by Joiner et al. (14) and Chu et al. (15), 79.6% of youth and young adults were classified as low risk, 4.1% as low-to-moderate risk, 12.2% as moderate risk, and 4.1% as moderate-to-severe risk. Safety planning was successfully conducted with all youth and young adults prior to discharge from the outpatient type 1 diabetes clinic, and no youth or young adults required additional emergency evaluation or hospitalization. As of this publication, none of the youth or young adults had completed suicide.

## CONCLUSIONS

This study significantly adds to the type 1 diabetes literature by being the first to

describe a comprehensive approach to assessing suicidal risk in youth and young adults with type 1 diabetes as part of the routine clinical care. With 10.9% of the sample endorsing clinically elevated depressive symptoms and 8.9% endorsing the suicidal/death ideation on the PHQ-9, the findings of this study are consistent with rates found in other studies describing depression screening as part of routine care (16,17). In addition, the results of this study demonstrate that it is feasible to determine risk for a suicide attempt and to conduct safety planning in a specialty clinic when the suicide risk assessment team is located within the same building. The findings of this study offer valuable insight into the factors associated with suicidal/death ideation in youth and young adults with type 1 diabetes, an aspect of pediatric type 1 diabetes clinical care and research that has been neglected in the extant literature.

Suicidal ideations, engaging in self-harm (which may be the physical employment of a suicidal ideation), and death ideations are significant predictors of future suicidal behaviors, attempts, and completions (18–20). Thus, it is concerning that nearly 9% of youth and young adults in this sample endorsed them. Moreover, according to the National Comorbidity Survey Replication Adolescent Supplement (21), 33% of suicidal ideators eventually develop a suicidal plan, and 34% make an attempt, which highlights the importance of monitoring adolescents who endorse ideations even one time. Of the 49 youth and young adults who endorsed ideations, nearly 5% were 10–12 years of age, an age range in which suicidal ideations typically increase slowly (21). Almost 57% of youth and young adults who endorsed ideations were between the ages of 12 and 17 years, which is especially concerning because rate of suicidal ideations rapidly increases between these ages (21). Many youth and young adults expressed that they experienced suicidal ideations in relation to wanting to relieve the burden of type 1 diabetes from their families. This finding further highlights an urgent need to routinely assess for suicidal ideations in youth and young adults with type 1 diabetes.

Having a plan for suicide and making a prior attempt are also significant predictors of future completed suicide;

multiple attempters are at even greater risk for a completed suicide (15). Although none of the individuals assessed had a current plan for suicide or had completed suicide at the time of the final data collection, 18% had thought about a plan in the past, and 29% reported they possessed means to attempt suicide. Of the 14 individuals who endorsed having means for suicide, 14% reported having access to a firearm, which is the leading method for youth deaths by suicide in the U.S. (22). Of those who had a prior plan for suicide, 33% stated they would have used insulin in their attempt. For individuals with type 1 diabetes who reported a prior suicide attempt, 50% indicated that they had used insulin or diabetes supplies. Without prompting about the lethality of insulin by the suicide risk assessment team, 35% acknowledged it was a means for a suicide attempt, especially among youth, even though they did not currently have a plan. The extant literature on insulin as a means to attempt or complete suicide is limited to case studies (23,24) or studies that were conducted  $\geq 20$  years ago (25); therefore, more research is needed to determine the role that insulin plays in suicide plans, preparations, and attempts.

Nevertheless, insulin as a means to attempt or complete suicide is of great clinical concern because it is the necessary treatment for type 1 diabetes and must be readily accessible or always with an individual with type 1 diabetes. There is currently no standardized protocol in place for how to appropriately restrict means of insulin access in youth with type 1 diabetes and suicidal ideation, and given the easy access to means, this is an essential next step to ensuring safety. Although insulin is often immediately restricted and insulin pumps are removed from those that use them, more research is needed to determine if this action is necessary in all cases. Restriction of means for this life-sustaining yet potentially life-ending drug is therefore complex and requires assessment by a mental health professional with expertise in the psychological care of persons with type 1 diabetes.

Burdensomeness is a predictor of suicide in the general population and nearly two-thirds of individuals with type 1 diabetes with suicidal ideation report feeling burdensome to their families,

particularly due to having type 1 diabetes (26,27). Although the burden that youth and young adults feel because of type 1 diabetes has been investigated (28), no studies have investigated the role that burdensomeness plays in the occurrence of suicidal ideation, attempts, or completions in type 1 diabetes. However, social connectedness with peers or family is protective against the occurrence of suicidal ideation and attempts in adolescents and adults (29,30), and more than 90% of individuals with type 1 diabetes in this study who endorsed suicidal ideations reported having social connections with at least one other person, which may have contributed to the lack of attempts and completed suicides. In contrast, commonly reported triggers for the onset of suicidal ideations in this study included stress, anxiety about negative family and peer relationships, and interpersonal conflict, which is consistent with studies in the general population (31–33) and potential areas of targeted intervention to reduce suicidal ideations.

Nearly 50% of individuals who endorsed suicidal ideations indicated a low fear of death, a key factor in shifting suicidal desire toward suicide intent and making attempts (15). However, some youth and young adults reported that they did not fear death because they were acutely aware that they could die of short-term (e.g., severe hypoglycemia) and long-term type 1 diabetes complications, again highlighting the unique aspects of assessing suicide in this population. In fact, one individual stated, "I am not going to kill myself. I think about dying all of the time because I'm always told that if I don't [engage in type 1 diabetes self-management], I am going to die."

The majority of individuals with suicidal ideation in this study were classified as being at low risk for suicide, which allowed for safety planning to be completed in the clinical setting without requiring emergency hospitalization. However, even low risk patients should be taken seriously because this indicates maladaptive thinking and the challenges that youth and young adults with type 1 diabetes encounter.

There are several clinical and logistical aspects of suicide risk assessment that need to be considered. First, because suicidal ideations are a criterion for a diagnosis of depression, comprehensive

and ethical screening for depressive symptoms should include its assessment. However, adequate resources and time need to be available because depending on the complexity, suicidal risk assessment could be as short as 30 min or as long as 1.5 h, in our experience. Providers need to be well-trained and comfortable with being direct in their questioning. It is important to directly ask if a person is thinking about killing themselves. Asking directly will not "plant the seed" or give someone the idea to attempt suicide (34). Moreover, properly documenting all aspects of the assessment is essential (15). Safety planning is also essential (15). Having individuals sign contracts not to attempt suicide is not evidence-based and is, therefore, not recommended (15,35). Finally, suicidal ideations and nonsuicidal self-injurious behaviors, such as cutting, should always be taken seriously and never dismissed as a cry for help.

This is the first study to describe an approach to assessing suicide risk in a large sample of youth and young adults with type 1 diabetes as part of their routine clinical care, which is a significant strength of the current study. It is also the first to delineate the unique behavioral and cognitive factors associated with suicidal ideation in youth and young adults with type 1 diabetes. Moreover, these results also emphasize the benefits of establishing behavioral health care (e.g., social workers and psychologist) as standard members of the type 1 diabetes team who collaborate with the type 1 diabetes medical providers. However, this study should also be viewed in the context of its limitations. It is retrospective in nature and, therefore, is limited in scope and by the amount of data gathered (i.e., only the PHQ-9 was administered). For example, participants discussed perceived burdensomeness on their families and guilt about their type 1 diabetes and how they were burned out about having it; however, data on diabetes distress, which is distinct from depression, was not collected. In accordance with the American Diabetes Association's recommendations, clinics should consider including assessment of diabetes distress as part of screening protocols.

Taken together, this study significantly adds to the type 1 diabetes literature by providing much needed data on the

factors associated with suicidal/death ideations in youth and young adults. Although there were a few differences based on age (e.g., occurrence of suicidal vs. death ideations, variability in means), in general, there were not age differences in sociodemographic characteristics or the content of the suicide risk assessments, highlighting that the assessment of suicidal/death ideations is an urgent need in all youth and young adults with type 1 diabetes. Using a standardized framework, assessing suicide risk as part of routine pediatric type 1 diabetes care is feasible. Finally, this study highlights the paucity of research in this area and the need for more studies to address the clinical assessment and intervention of suicidal ideations in youth and young adults with type 1 diabetes.

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