

Associations of Disordered Eating and Diabetes Distress with HbA1c, and the Role of
Unmet Social Needs among Adolescents and Young Adults with Type 1 Diabetes

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Abstract

Associations of Disordered Eating and Diabetes Distress with HbA1c, and the Role of Unmet Social Needs among Adolescents and Young Adults with Type 1 Diabetes

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Background: Adolescents and young adults (AYA) with type 1 diabetes (T1D) face elevated risk for poor glycemic control due to both psychosocial and social determinants related factors. Disordered eating behaviors (DEBs) and diabetes distress (DD) are two key psychosocial factors linked to worse health outcomes. While DEBs and DD are well-documented contributors to poor glycemic outcomes in AYA with T1D, less is known about how these factors may be modified by unmet social needs.

Objective: To examine (1) associations of DEBs and DD with hemoglobin A1c (HbA1c), and (2) whether unmet social needs modify these relationships, in a cohort of AYA with T1D.

Methods: This cross-sectional study included 530 AYA (ages 15–23) with T1D. DEBs and DD were assessed using the Diabetes Eating Problem Survey – Revised (DEPS-R) and Problem Areas in Diabetes – Teen Version (PAID-T) surveys, respectively. Unmet

social needs were characterized using a 9-item screening tool. HbA1c and demographic measures were obtained from medical records. Linear regression models adjusted for age, sex, and diabetes duration were used to assess associations of DEBs and DD with HbA1c. Potential effect modification of associations by unmet social needs was examined using stratified analyses and models with interaction terms.

Results: Of 530 participants (mean age 19 ± 2 , 46% female, mean HbA1c $8.7\% \pm 2.2\%$, 73% non-hispanic white, 73% private insurance), 19% screened positive for DEBs and 19% reported DD. Both DEBs and DD were statistically significantly associated with higher HbA1c levels (DEBs: $\beta = 1.39$, 95% CI: 0.86–1.91, p-value: <0.0005 ; DD: $\beta = 1.94$, 95% CI: 1.42–2.46, p-value: <0.001). Stratified models showed that DD was associated with HbA1c among those without unmet social needs ($\beta = 3.02$, CI: 1.12-4.91, $p = 0.002$), but not among those reporting one or more needs ($\beta = -0.46$, CI: -3.99-3.06, $p = 0.78$) (interaction p-value=0.86). Differences in DEB-HbA1c or DD-HbA1c associations were not observed among groups defined by social needs.

Conclusion: DEBs and DD are positively associated with higher HbA1c levels in AYA with T1D. The DD-HbA1c association was observed among youth without reported social needs, although the effect modification was not statistically significant. Integrating psychosocial and social risk screening into diabetes care may support improved outcomes.

Background

Type 1 diabetes (T1D) is a chronic autoimmune condition in which the pancreas produces little to no insulin, requiring lifelong self-management using insulin therapy, glucose monitoring, and strict dietary and lifestyle adjustments (Lucier & Mathias, 2024). Achieving optimal glycemic control, often assessed by hemoglobin A1c (HbA1c) levels, is critical in reducing the risk of both acute and chronic diabetes-related complications. Clinical guidelines recommend maintaining HbA1c below 7.0% to minimize complications; however, adolescents and young adults (AYA) with T1D often struggle to meet this target (Demeterco-Berggren et al., 2023; Foster et al., 2019)

Beyond the physiological challenges of T1D, adolescence and emerging adulthood are critical transition periods marked by increasing autonomy, shifts in social and academic responsibilities, and changes in healthcare access (Weissberg-Benchell et al., 2007). These changes frequently result in inconsistent diabetes self-care behaviors, including missed insulin doses, inconsistent glucose monitoring, and irregular dietary patterns, contributing to poor metabolic control (McCarthy & Grey, 2018). Current research lacks a comprehensive understanding of how psychosocial factors, such as disordered eating behaviors (DEBs) and diabetes distress (DD), interact with socioeconomic barriers to influence glycemic control.

DEBs encompass a range of maladaptive eating patterns, including binge eating, restrictive dieting, and insulin omission. In YYA with T1D, the necessity of carbohydrate counting inherent in diabetes management can heighten the risk of developing DEBs

(Peterson et al., 2015), as high as 24.9% (compared with 13.4% among peers without diabetes), and subsequent poor glycemic control (Hanlan et al., 2013; Nip et al., 2019). DD, characterized by the emotional burden, stress, and burnout associated with diabetes management, is another common key psychosocial factor influencing glycemic outcomes. A systematic review by Hagger et al. (2016) found that approximately one-third of adolescents with T1D experience elevated DD.

While there is strong evidence on the relationships between DD, DEBs and poor glycemic control, studies have not fully explored how social factors modify the relationships. Emerging evidence suggests that social adversity (e.g., food insecurity and unstable housing) can directly impair diabetes self-management by limiting access to medications, nutritious foods, and consistent healthcare (Malik et al., 2022; Mosley-Johnson et al., 2022). Despite these consequences, it remains unclear whether structural factors interact with DEBs or DD to influence glycemic outcomes.

This study aimed to investigate associations of DEBs and DD with HbA1c among AYA with T1D and examine whether unmet social needs modify these relationships. Findings from this research may inform the development of targeted, patient-centered strategies to support improved diabetes management, guide tailored interventions, and address health disparities linked to social determinants in this population.

Methods

Study Design, Study Setting, and Study Population

This cross-sectional study utilized baseline data from the Achieving Health in Emerging Adults with Diabetes (AHEAD) Program, a collaborative initiative between Seattle Children's (SC) and the University of Washington Medicine Diabetes Institute (UWMDI). The AHEAD Program was designed to address the diabetes education, mental health, and healthcare transition needs of adolescents and young adults with diabetes. Participants were individuals aged 15 to 23 years old who were referred to and completed their first AHEAD clinic visit at either an SC or UWMDI site between July 2017 and December 2024.

The AHEAD Program provides care to individuals with all types of diabetes. Thus, those without a formal diagnosis of type 1 diabetes. Individuals with a diabetes diagnosis duration of less than one year were excluded, as the first year post-diagnosis is characterized by the honeymoon phase, fluctuating insulin requirements, and intensive lifestyle adjustments (Redondo et al., 2021). Those without complete total scores available for diabetes distress, disordered eating behaviors, and HbA1c measures were also excluded. A total of 530 were included in the current analyses.

This study was reviewed and approved by the Institutional Review Board at Seattle Children's and the University of Washington (*Study ID: STUDY0000070*), with a waiver of consent and HIPAA authorization granted due to minimal risk.

Data Collection

Data was collected at participants baseline visit through questionnaires and electronic medical records. HbA1c was measured using point of care laboratory testing and values were obtained from participants electronic medical records along with demographics (age, sex, insurance type, race/ethnicity), and insulin regimen. Psychosocial and socioeconomic characteristics were self-reported via questionnaires, which participants completed either through a secure patient portal prior to their appointment or in-person during their visit.

DEB, DD, Social Needs, and Covariates

DEBs was assessed using the Diabetes Eating Problem Survey – Revised (DEPS-R), a 16-item tool that evaluates diabetes-specific disordered eating behaviors and attitudes toward weight control (American Diabetes Association, 2023; Markowitz et al., 2010). Responses were reported on a 6-point Likert Scale (0 = Never, 5 = Always) with a score ranging from 0 to 80. A total score of 20 or higher suggests disordered eating that warrants further evaluation (Markowitz et al., 2010). In this study, the DEBs total score was dichotomized, with scores ≥ 20 indicating the presence of disordered eating (Markowitz et al., 2010).

DD was assessed using the Problem Areas in Diabetes – Teen Version (PAID-T), a validated tool designed to measure diabetes-specific emotional distress in AYAs. The PAID-T is widely used in clinical and research settings to capture the psychological burden of diabetes. It includes items such as, “Feeling sad when I think about having and living with diabetes” and “Feeling overwhelmed by my diabetes regimen” (Shapiro

et al., 2018). Responses are rated on a 6-point Likert Scale (1= Not a Problem, 6 = Serious Problem), yielding a total score range of 14 to 84. A score of 44 or higher indicates diabetes distress. (Shapiro et al., 2018). The total score was dichotomized, with scores ≥ 44 indicating the presence of diabetes distress (Shapiro et al., 2018).

Social needs were assessed using the Social Needs Questionnaire that was implemented in the SC diabetes clinics in 2020. This is a 9-item tool that evaluates key domains of social determinants of health, such as financial strain, food insecurity, housing stability, and transportation challenges. The Social Needs Questionnaire was adapted from the Accountable Health Communities Core Health-Related Social Needs Screening Tool (Billioux et al., 2017), a 10-question screening tool designed to identify unmet needs across five core domains: housing instability, food insecurity, transportation needs, utility needs, and interpersonal safety. The adapted questionnaire excludes questions on utility needs and interpersonal safety, while expanding questions in the remaining domains and incorporating an additional item on financial security: “How hard is it for you to pay for needs like food, housing, medical care, and heating?” The tool uses domain-specific response formats, including Likert scales for financial strain (0 = Not hard at all, 4 = Very hard) and food insecurity (0 = Never true, 2 = Often true), as well as Yes/No questions for transportation needs. Each domain contained a different number of questions, and a positive response to any question within a domain indicated the presence of an unmet need. Financial strain was identified if respondents reported difficulty as “Somewhat hard,” “Hard,” or “Very hard.” Food insecurity was identified if respondents indicated “Sometimes true” or “Often true” to questions about

food availability. Transportation challenges were identified if respondents answered “Yes” to experiencing difficulties with transportation. For housing stability and quality, unmet needs were identified in two ways: (1) for housing stability, if respondents selected “I have stable housing but am worried about losing it in the future” or “I do not have stable housing,” and (2) for housing quality and safety, if respondents report any issues, such as mold, inadequate heat, or water leaks. The total number of unmet needs across these four domains ranged from 0 (no unmet need) to 4 (unmet needs in all domains). We dichotomized social needs as follows: having “any unmet need” (1 or more unmet need) or “no unmet needs (0)”.

Potential covariates that may confound the relationships between DEBs, DD, and HbA1c were identified based on available past literature and directed acyclic graphs. These included age (years), sex at birth, and diabetes duration (years)

Statistical Methods

Descriptive statistics were calculated to characterize the study population sample. Unadjusted and adjusted multivariate linear regression models were used to test associations of DEBs and DD with HbA1c. Adjusted models included sex, age and diabetes duration. Adjusted models were fit among groups stratified based on the presence or absence of unmet social needs to examine whether social needs modify the relationships. In addition, we fitted models with interaction terms (interactions of the exposures, DEB or DD, with unmet social needs) to assess statistical significance of interactions.

Given that a binary classification of social needs may not fully capture the complexity or gradient of unmet needs, we conducted sensitivity analyses using two approaches. First, we modeled social needs as a continuous variable (ranging from 0 to 4). Second, we examined each domain of social need (financial strain, food insecurity, transportation challenges, and housing stability/quality) individually in separate adjusted stratified and interaction models. All statistical analysis were conducted in R Studio (v. 4.5.0).

Results

Mean age of participants was 19 ± 2 years and 46.4% of participants identified as female (Table 1). The majority of participants identified as non-Hispanic white (73.4%), followed by Hispanic/Latino (11.2%) and non-Hispanic Black (8.3%). The average diabetes duration was 9.5 ± 4.6 years, and most participants used a standard insulin pump (28.7%) or automated insulin delivery systems (27.6%) to support diabetes management.

About 19% (n=99) of participants screened positive for DEBs and a similar proportion (19%, n = 98) reported DD. Participants with DEBs, compared with participants without DEBs, were likely to identify as female, non-Hispanic white, be on multiple daily injections, or have public insurance (all $p < 0.05$). Participants with DD were more likely to use multiple daily injections compared to automated insulin systems, compared with participants without DD ($p < 0.05$).

In unadjusted linear regression models, participants with DEBs had mean HbA1c values that were 1.50% higher than those without DEBs (95% CI: 0.98 to 2.01, $p < 0.0001$)

(Table 2). After adjustment, the association remained statistically significant ($\beta = 1.51$, 95% CI: 0.98 to 2.03, $p < 0.0001$). Among participants without unmet social needs, DEBs were associated with a 1.48% increase in HbA1c (95% CI: -0.63 to 3.58, $p = 0.17$), while the association was attenuated and non-significant among those with social needs ($\beta = 1.29$, 95% CI: -2.06 to 4.65, $p = 0.41$). The interaction term between DEBs and any unmet need was not statistically significant ($p = 0.86$). In unadjusted linear regression models, participants with DD had mean HbA1c values that were 2.08% higher than those without DD (95% CI: 1.57-2.59, p -value < 0.0001) (Table 3). This association remained significant after adjustment ($\beta = 2.06$, 95% CI: 1.55-2.57, p -value < 0.0001). This association was strongest among participants without any reported social needs, where DD was associated with a 3.02% increase in HbA1c (95% CI: 1.12 to 4.91, $p = 0.0023$). In contrast, no association was observed among those with one or more unmet needs ($\beta = -0.46$, 95% CI: -3.99 to 3.06, $p = 0.78$). The interaction term between DD and any unmet need approached but did not reach statistical significance ($p = 0.09$).

Across participants stratified by transportation, nutrition, and financial needs, the associations between DEBs and HbA1c were generally positive but did not reach statistical significance (Table 4) with the exception of participants who did not report housing-related needs ($\beta = 1.94$, 95% CI: 0.27, 3.69, $p = 0.023$). All corresponding interaction terms were non-significant (all $p < 0.05$). Similar stratified analyses by individual domains of unmet needs revealed significant associations of DD with HbA1c among participants without transportation needs ($\beta = 2.27$, $p = 0.013$), without nutrition

needs ($\beta = 2.54$, $p = 0.003$), without financial needs ($\beta = 2.40$, $p = 0.009$), and without housing needs ($\beta = 2.96$, $p < 0.001$). However, these associations were not observed among participants who reported needs in these areas. None of the interaction terms reached statistical significance ($p < 0.05$), although the interaction with housing needs approached statistical significance ($p = 0.07$). When modeling unmet social needs as a continuous variable, the interaction term with DEBs remained non-significant ($p = 0.65$), while the interaction with DD approached but did not reach statistical significance ($p = 0.07$).

Discussion

In the current study, 19% of participants each screened positive for DEBs and DD. DEBs and DD were associated with 1.51% and 2.06% increases in HbA1c levels, respectively. The DD-HbA1c association was strongest among participants without any reported social needs, whereas no significant associations were observed among those with one or more unmet needs. However, interaction terms between DEBs or DD and unmet social needs were not statistically significant ($p > 0.05$)

Our findings align with a growing body of literature supporting the impact of psychosocial factors on glycemic control in this population. Research from the SEARCH for Diabetes in Youth study, a large, multi-center U.S. cohort, reported that approximately 26% of youth with T1D engaged in DEBs and youth with DEBs had higher HbA1c levels ($10.2 \pm 2\%$) than individuals without DEBs ($8.9 \pm 1.7\%$) (Nip et al., 2019). Similarly, in the Diabetes MILES Youth study of AYAs aged 13-19 years, 36% of participants reported high levels of DD, which was significantly associated with higher

A1c levels ($r = 0.34$, $p < 0.001$). Additionally, a study by Hong et al. (2021) involving 313 adolescents aged 13-17 found that DD was more strongly associated with HbA1c levels than depression. The consistency across these findings highlight the importance of integrated care approaches that go beyond medical management.

A number of recent studies linked social needs with poor diabetes outcomes and higher psychosocial burden. For example, Mendoza et al. (2018) found that food insecurity was associated with 2.37-fold higher odds of having HbA1c $>9\%$. For individuals with unstable housing, they often lack a safe, consistent place to store insulin, diabetes supplies or to prepare balanced meals. They may be preoccupied with basic shelter needs, leaving less capacity to focus on glucose monitoring or insulin timing (Keene et al., 2018). Finally, a 2020 study of diverse children with T1D (ages 9–13 in the U.S.) found that those from lower-SES families (e.g. lower household income or parental education) and racial/ethnic minority backgrounds had significantly higher DD scores than their more advantaged peers (Fegan-Bohm et al., 2020). These findings suggest that social adversity may not only impact HbA1c directly, but also shape the conditions under which psychosocial risk factors like DD and DEBs operate. In our assessment of whether any unmet social needs modified the relationships between DEBs/DD and HbA1c, we found that DD-HbA1c associations were generally stronger among those without reported social needs. Among participants experiencing challenges related to housing, nutrition, or financial stability, these relationships were weaker and did not reach statistical significance.

These findings provide important context for our observed patterns of effect modification. It is possible that, in the context of high structural burden, the added impact of psychosocial factors becomes less detectable. Another explanation is that our sample lacked sufficient power to detect statistically significant interactions. The social needs data were only available for 15% of our original analytic table (n=80) as the questionnaire was only implemented at one of the two AHEAD Program sites beginning in 2020 (Tables 5 and 6). Furthermore, low prevalence of some individual social needs may have yielded unstable estimates and wide confidence intervals when analyzed separately. All of the specific social need domains, transportation, nutrition, financial and housing, were reported by fewer than 10% of participants (Tables 5 and 6). Additionally, only a very few (n=7) reported 2 or more unmet social needs.

Our study has several limitations. First, its cross-sectional design limits the ability to determine causal relationships. While DEBs and DD were each associated with higher HbA1c, these findings reflect associations rather than directionality. Longitudinal studies are needed to better understand these temporal dynamics. Second, the use of self-reported measures introduces the possibility of reporting bias. Participants may underreport sensitive issues such as DEBs or financial strain due to social desirability or discomfort, or may experience recall bias in responding to questions about distress or unmet needs. While the DEPS-R, PAID-T, and Social Needs Questionnaire are validated tools, self-reported data are inherently subject to variability that could influence observed associations. Third, the operationalization of social needs as a binary variable ("any unmet need" vs. "no unmet needs") simplifies a multidimensional

construct. This grouping does not capture the distinct or cumulative burden of different domains such as food insecurity, housing instability, or transportation challenges. Although sensitivity analyses treated unmet needs as a continuous variable and examined individual domains, these approaches were also limited by small cell sizes and reduced power. Participants who completed the Social Needs Questionnaire are a subset of all study participants. The distributions of characteristics among this subsample was generally similar to the overall population minimizing concerns of selection bias in the stratified analyses (Tables 5 and 6). Finally, generalizability is limited by the study population. Participants were recruited from a single geographic region (Seattle, Washington) and received care at specialized diabetes clinics. This sample may not fully represent youth and young adults with type 1 diabetes in other healthcare settings or geographic areas, particularly those with limited access to diabetes specialty care. Furthermore, participants who engage in specialty diabetes programs may differ systematically from those who do not, potentially affecting the applicability of findings to broader T1D populations.

Despite these limitations, this study offers insights into the associations between psychosocial and social risk factors in glycemic control among AYA with T1D. Future research should examine whether similar associations hold in larger study populations from more diverse clinical and community-based settings, including those with varying levels of resource availability. These efforts can enhance generalizability of findings and inform more equitable models of diabetes care.

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Table 1. Participant Characteristics by Disordered Eating Behaviors and Diabetes Distress.

Variable	Overall, N = 530	Disordered Eating Behaviors (DEPS-R)		Diabetes Distress (PAID-T)	
		DEPS-R <20 N = 431	DEPS-R ≥ 20 N = 99	PAID-T < 44 N = 432	PAID-T ≥ 44 N = 98
Age (years) , Mean (SD)	19 (2)	19 (2)	20 (2)	19 (2)	19 (2)
Sex , n (%) [*]					
Female	246 (46.4)	187 (43.4)	59 (59.6)	194 (44.9)	52 (53.1)
Male	284 (53.6)	244 (56.6)	40 (40.4)	238 (55.1)	46 (46.9)
Race/Ethnicity , n (%) [*]					
Hispanic/Latino	58 (11.2)	47 (11.2)	11 (11.3)	45 (10.7)	13 (13.8)
Non-Hispanic American Indian/Alaska Native	2 (0.4)	1 (0.2)	1 (1.0)	2 (0.5)	0 (0.0)
Non-Hispanic Asian	18 (3.5)	13 (3.1)	5 (5.2)	16 (3.8)	2 (2.1)
Non-Hispanic Black	43 (8.3)	29 (6.9)	14 (14.4)	28 (6.6)	15 (16.0)
Non-Hispanic Native Hawaiian/Pacific Islander	1 (0.2)	1 (0.2)	0 (0.0)	1 (0.2)	0 (0.0)
Non-Hispanic Other	15 (2.9)	9 (2.1)	6 (6.2)	12 (2.8)	3 (3.2)
Non-Hispanic White	379 (73.4)	319 (76.1)	60 (61.9)	318 (75.4)	61 (64.9)
Diabetes Duration (years) , Mean (SD)	9.5 (4.6)	9.6 (4.7)	9.0 (4.3)	9.5 (4.7)	9.6 (4.3)
Insulin Regimen , n (%) ^{**†}					
Automated Insulin Delivery/Sensor-Augmented Pump	146 (27.6)	129 (29.9)	17 (17.3)	132 (30.6)	14 (14.3)
Multiple Daily Injections	231 (43.7)	177 (41.1)	54 (55.1)	176 (40.8)	55 (56.1)
Standard Insulin Pump	152 (28.7)	125 (29.0)	27 (27.6)	123 (28.5)	29 (29.6)
Insurance Type , n (%) [*]					
Public Insurance	141 (26.9)	104 (24.5)	37 (37.4)	107 (25.1)	34 (34.7)
Private Insurance	382 (72.9)	320 (75.3)	62 (62.6)	318 (74.6)	64 (65.3)

*p < 0.05 for DEPS-R <20 vs. DEPS-R ≥ 20; Wilcoxon rank sum test; Fisher's exact test

†p < 0.05 for PAID > 44 vs. PAID-T ≥ 44; Wilcoxon rank sum test; Fisher's exact test

Table 2. Association between Disordered Eating Behaviors (DEBs) and HbA1c

Model	Description	β Estimate	95%CI¹	p-value
Main Effects				
	DEBs ² (crude)	1.50	0.98, 2.01	<0.0001
	DEBs (adjusted) ³	1.51	0.98, 2.03	<0.0005
Stratified Models^{3,4}				
	No unmet social needs	1.48	-0.63, 3.58	0.17
	One of more unmet social needs	1.29	-2.06, 4.65	0.41

¹CI = Confidence Interval ²DEBs = Disordered Eating Behaviors (DEPS-R) \geq 20

³Adjusted for age, sex, and diabetes duration ⁴Interaction p-values: Any unmet need (p = 0.86)

Table 3. Association between Diabetes Distress (DD) and HbA1c

Model	Description	β Estimate	95%CI¹	p-value
Main Effects				
	DD ² (crude)	2.08	1.57, 2.59	<0.0001
	DD (adjusted) ³	2.06	1.55, 2.57	<0.0001
Stratified Models^{3,4}				
	No unmet social needs	3.02	1.12, 4.91	0.0023
	One of more unmet social needs	-0.46	-3.99, 3.06	0.78

¹CI = Confidence Interval ²DD=Diabetes Distress; Diabetes Eating Problem Survey – Revised (DEPS-R) ≥ 20 ³Adjusted for age, sex, and diabetes duration ⁴Interaction p-values: Any unmet need (p = 0.09)

Table 4. Specific Social Need Stratified Models for DEBs/DD and HbA1c Associations

Model	Description	N	β Estimate	95%CI ¹	p-value
DEBs²					
	Transportaion need = No	75	1.71	-0.07, 3.5	0.059
	Transportation need = Yes	6	1.40	-0.69, 3.5	0.07
	Nutrition need = No	75	1.45	-0.17, 3.07	0.08
	Nutrition need = Yes	6	2.26	-35.5, 40.1	0.59
	Financial need = No	72	1.63	-0.06, 3.3	0.059
	Financial need = Yes	8	0.77	-7.3, 9.0	0.77
	Housing need = No	74	1.94	0.27, 3.6	0.023
	Housing need = Yes	7	1.08	-14.1, 16.3	0.77
DD³					
	Transportaion need = No	75	2.27	0.49, 4.04	0.013
	Transportation need = Yes	6	1.40	-0.69, 3.50	0.07
	Nutrition need = No ³	75	2.54	0.92, 4.17	0.003
	Nutrition need = Yes ³	6	1.10	-78.4 , 80.6	0.89
	Financial need = No ³	72	2.40	0.62, 4.17	0.009
	Financial need = Yes ³	8	2.49	-7.07, 12.06	0.467
	Housing need = No ³	74	2.96	1.15, 4.40	0.0001
	Housing need = Yes ³	7	-1.49	-22.7, 19.1	0.79

¹CI = Confidence Interval ²DEBs = Disordered Eating Behaviors; Diabetes Eating Problem Survey – Revised (DEPS-R) ≥ 20 ³DD=Diabetes Distress; Diabetes Eating Problem Survey – Revised (DEPS-R) ≥ 20 ⁴Adjusted for age, sex, and diabetes duration. ⁵Interaction p-values: DEBs; number of needs (p = 0.65), transportation (p = 0.42), nutrition (p = 0.94), financial (p = 0.56), housing (p = 0.86), DD; number of needs (p = 0.07), transportation (p = 0.65), nutrition (p = 0.14), financial (p = 0.40), housing (p = 0.07).

Table 5. Participant Characteristics by Disordered Eating Behaviors Among Participants Who Completed Social Needs Questionnaire.

Variable	Disordered Eating Behaviors (DEPS-R)			p-value ¹
	Overall, N = 80	DEPS-R < 20 N = 65	DEPS-R ≥ 20 N = 15	
Age (years) , Mean (SD)	19 (1)	19 (1)	19 (1)	0.57
Sex , n (%)				0.42
Female	30 (37.5)	23 (35.4)	7 (46.7)	
Male	50 (62.5)	42 (64.6)	8 (53.3)	
Race/Ethnicity , n (%)				0.015
Hispanic/Latino	15 (19.2)	14 (21.9)	1 (7.1)	
Non-Hispanic Asian	3 (3.8)	2 (3.1)	1 (7.1)	
Non-Hispanic Black	8 (10.3)	3 (4.7)	5 (35.7)	
Non-Hispanic Other	2 (2.6)	2 (3.1)	0 (0.0)	
Non-Hispanic White	50 (64.1)	43 (67.2)	7 (50.0)	
Diabetes Duration (years), Mean (SD)	8.2 (4.7)	8.2 (4.7)	8.5 (4.7)	0.73
Insulin Regimen , n (%)				0.018
Automated Insulin Delivery/Sensor-Augmented Pump	27 (33.8)	26 (40.0)	1 (6.7)	
Multiple Daily Injections	35 (43.8)	24 (36.9)	11 (73.3)	
Standard Insulin Pump	18 (22.5)	15 (23.1)	3 (20.0)	
Insurance Type , n (%)				0.019
Public Insurance	24 (31.6)	15 (24.6)	9 (60.0)	
Private Insurance	52 (68.4)	46 (75.4)	6 (40.0)	
Social Needs				
Any unmet need (yes/no)	15 (18.8)	7 (10.8)	8 (53.3)	<0.001
Unmet transportation need	6 (7.5)	2 (3.1)	4 (26.7)	0.010
Unmet nutrition need	6 (7.5)	2 (3.1)	4 (26.7)	0.010
Unmet financial need	8 (10.0)	2 (3.1)	6 (40.0)	<0.001
Unmet housing need	6 (7.5)	3 (4.6)	3 (20.0)	0.076
Number of Unmet Social Needs				<0.001
0	65 (81.3)	58 (89.6)	7 (46.7)	
1	8 (10.0)	5 (7.7)	3 (20.0)	
2	4 (5.0)	2 (3.1)	2 (13.3)	
3	2 (2.5)	0 (0.0)	2 (13.3)	
4	1 (1.3)	0 (0.0)	1 (6.7)	

¹Wilcoxon rank sum test; Pearson's Chi-squared test; Fisher's exact test

Table 6. Participant Characteristics by Diabetes Distress Among Participants Who Completed Social Needs Questionnaire.

Variable	Diabetes Distress (PAID-T)			p-value ¹
	Overall N = 80	PAID-T < 44 N = 67	PAID-T ≥ 44 N = 13	
Age (years) , Mean (SD)	19 (1)	19 (1)	19 (1)	0.96
Sex , n (%)				>0.99
Female	30 (37.5)	25 (37.3)	5 (38.5)	
Male	50 (62.5)	42 (62.7)	8 (61.5)	
Race/Ethnicity , n (%)				0.68
Hispanic/Latino	15 (19.2)	14 (21.2)	1 (8.3)	
Non-Hispanic Asian	3 (3.8)	3 (4.5)	0 (0.0)	
Non-Hispanic Black	8 (10.3)	6 (9.1)	2 (16.7)	
Non-Hispanic Other	2 (2.6)	2 (3.0)	0 (0.0)	
Non-Hispanic White	50 (64.1)	41 (62.1)	9 (75.0)	
Diabetes Duration (years), Mean (SD)	8.2 (4.7)	8.1 (4.8)	8.7 (4.0)	0.54
Insulin Regimen , n (%)				0.027
Automated Insulin Delivery/Sensor-Augmented Pump	27 (33.8)	26 (38.8)	1 (7.7)	
Multiple Daily Injections	35 (43.8)	29 (43.3)	6 (46.2)	
Standard Insulin Pump	18 (22.5)	12 (17.9)	6 (46.2)	
Insurance Type , n (%)				0.60
Public Insurance	24 (30.3)	19 (30.2)	5 (38.5)	
Private Insurance	52 (68.4)	44 (69.8)	8 (61.5)	
Social Needs				
Any unmet need (yes/no)	15 (18.8)	9 (13.4)	6 (46.2)	0.013
Unmet transportation need	6 (7.5)	2 (3.0)	4 (30.8)	0.006
Unmet nutrition need	6 (7.5)	3 (4.5)	3 (23.1)	0.051
Unmet financial need	8 (10.0)	4 (6.0)	4 (30.8)	0.021
Unmet housing need	6 (7.5)	3 (4.5)	3 (23.1)	0.051
Number of Unmet Social Needs				0.004
0	65 (81.3)	58 (89.2)	7 (53.8)	
1	8 (10.0)	6 (9.0)	2 (15.4)	
2	4 (5.0)	3 (4.5)	1 (7.7)	
3	2 (2.5)	0 (0.0)	2 (15.4)	
4	1 (1.3)	0 (0.0)	1 (7.7)	

¹Wilcoxon rank sum test; Pearson's Chi-squared test; Fisher's exact test