

ORIGINAL ARTICLE

Diabetes camp still matters: Relationships with diabetes-specific distress, strengths, and self-care skills

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Objective: Prior studies suggest diabetes camps improve psychosocial well-being in youth with type 1 diabetes but these studies suffer from variable levels of rigor. **The present study assessed associations between camp participation and diabetes distress, perceived independence in diabetes self-care, and diabetes strengths in a large sample of children, adolescents, and their parents across 44 camps in the United States.** Analyses compared viewpoints of study participants, identified moderators of change, and assessed perceived benefits of camp participation.

Methods: There were 2488 youth and 2563 parents consented for participation in the online survey. Participants reported diabetes distress and perceived independence in youth care, their new experiences and best parts of camp, and changes in behavior following camp. T-tests, regressions, Cohen's *d*, and relative frequencies were used as appropriate to assess baseline differences between reporters, pre-post outcome differences, and moderators of change.

Results: Parents as compared to youth reported higher pre-camp distress and lower perception of youth independence in self-care. Youth experienced a statistically significant decrease in distress and increase in independence in self-care. Diabetes strengths did not change. Higher A1c prior to camp was associated with higher levels of distress across camp participation. Campers and their parents endorsed a high frequency of positive firsts, bests, and benefits of camp.

Conclusions: Data from a large sample youth with type 1 diabetes across multiple camps showed broad-based psychosocial benefits of camp participation.

KEYWORDS

camp, diabetes distress, diabetes strengths

1 | INTRODUCTION

The American Diabetes Association states that an important goal for diabetes camps is to “enable children with diabetes to meet and share their experiences with one another while they learn to be more responsible for their condition”.¹ Assessing associations between attending camp and improvements in psychological distress and diabetes-specific knowledge is key to improved medical outcomes^{2,3} because diabetes-specific distress is associated with regimen adherence and glycemic control.^{4,5} Nevertheless, the psychosocial impact of camp has received little attention, as only six recent studies have assessed the association between attending diabetes camp and psychosocial outcome, with varying levels of methodological rigor.^{6–13}

Participation in diabetes camp has demonstrated positive associations with diabetes knowledge and coping.⁷ Camp is also associated with improvements in youth perception of engaging in diabetes-specific self-care skills, increased diabetes self-efficacy, increased positive attitudes about diabetes, and feeling socially supported.^{9,10} Parent reports of their camper's psychosocial functioning have shown similar improvements in perceptions regarding adolescent's diabetes adherence and adjustment after attending camp⁸ and confidence about diabetes management skills.¹⁰ In spite of these findings, methodological concerns include wide age-ranges,^{7,9,10} assessing outcomes from only one camp,^{6–10} and relatively small sample sizes.^{6,10}

Our research team published the largest study of participant perceptions regarding the psychosocial impact of diabetes camp.¹¹ We collected data on 115 children and 154 adolescents (aged 8–18 years)

and their parents. Pre-post quantitative findings showed improvements in self-reported diabetes-specific emotional distress among children and parents and a trend toward improvement among adolescents. Findings also revealed improvements in perceptions regarding self-care skills among children, adolescents, and parents. No differences in quality of life (QOL) were found. Qualitative findings suggested that respondents perceived camp to be a place where the campers can meet others who are like them and where they felt understood. The study assessed 42 camps across the United States, separated assessments of children from adolescents, and gathered both quantitative and qualitative data from both campers and their parents. Despite camp directors e-mailing over 7500 campers and their families to participate, only 20% of the parents signed consent. Moreover, only 39% of the parents signing consent actually completed the pre-camp surveys (less than 8% of those who had received the recruitment e-mail). In addition, campers were mostly Caucasian, living in two-parent homes with parents who had college degrees, and using insulin pumps, representing a more privileged sample of youth.

The present study sought to improve recruitment and retention strategies to ascertain a more representative sample of campers (see Table 4 for differences in recruitment and retention between the two studies) and to further understand the association of camp participation with several psychosocial outcomes. **This study focused on three key outcomes examined pre- and post-camp participation: diabetes-specific emotional distress, perceived independence in diabetes-specific self-care skills, and diabetes-specific strengths.** We hypothesized that there would be decreases in diabetes distress and increases in reported diabetes skills and strengths across camp participation. In addition, post-camp qualitative surveys were gathered regarding perceptions of: (a) the best things about attending camp, (b) first experiences while attending camp, and (c) diabetes-related management changes upon return home.

2 | METHODS

2.1 | Procedures

This study was approved by the Institutional Review Board (IRB) at the authors' institution. Campers and their parents were recruited from 44 diabetes camps throughout the United States, representing 114 separate camp sessions. All campers, ages 8 to 18, who had an English speaking parent able to consent to the study were eligible to participate. One month prior to camp starting, camp directors sent e-mails and/or letters to families enrolled in camp, inviting them to participate. Families received a second e-mail from their camp director approximately 2 weeks prior to starting camp. Parents could then review the study website, consent to participate, and enroll themselves and their children. Campers reviewed their own study information sheet to decide whether to assent to participation.

Hyperlinks to the online, participant-specific questionnaires (child, ages 8-11; adolescent, ages 12-18; parent) were sent to provided e-mail addresses. If parents enrolled but did not complete the surveys within the first week after enrolling, an e-mail was sent, reminding them to complete the surveys. E-mails to the campers were also sent

if they assented to participate but did not yet complete surveys. E-mails to registered participants were sent once per week asking them to complete the surveys. Also, families were able to enroll in the study and complete the questionnaires on-line any time prior to arriving on camp property. Paper versions of the questionnaires were available for families to complete when they arrived on camp property but before camp began.

Once pre-camp surveys were completed, a hand-written note was mailed to the family, thanking them for completing the surveys and reminding them that an e-mail would be sent 2 weeks after their child's camp ended with the link to the post-camp questionnaires. Reminders to complete the surveys were e-mailed once per week for up to 4 weeks. Families were mailed a \$20 gift certificate if both the parent and the camper completed the pre- and post-camp surveys; this enabled every family the opportunity to earn a gift certificate.

2.2 | Participants

After viewing the website, 2419 parents consented to participate in the study. In the previous study, 1562 parents consented, an increase of 55%. An additional 144 parents consented when they arrived on camp property, completing paper and pencil measures, with parent $N = 2563$. Of the parents who participated online, 585 parents were unable to be identified as the parent of an adolescent or child and had incomplete data. The remainder of parents ($n = 1978$) were able to be identified with 1216 being identified as the parent of an adolescent aged 12 to 18 years, and 762 being identified as the parent of a child aged 8 to 11 years. Of the 1216 parents of adolescents who consented, 1005 (82.6%) completed the full pre-camp battery and 629 (51.7%) completed the full post-camp battery. Of the 762 parents of children who consented, 655 (86.0%) completed the full pre-camp battery and 417 (54.7%) completed the full post-camp battery.

Online youth assent was obtained by 2419 campers, with an additional 158 campers consenting and completing paper measures on arrival at camp. There were 89 campers who did not meet age criteria or were routed to the wrong set of age-appropriate forms. The final camper N was 2488 (1542 were adolescents and 946 were children; in the previous study, 285 adolescents and 213 children participated). Of the 1542 adolescents who consented, 908 (58.9%) completed the full pre-camp battery, and 469 (30.4%) completed the full post-camp battery. Of the 946 children who assented, 549 (58.0%) completed the full pre-camp battery, and 311(32.9%) completed the full post-camp battery.

2.3 | Outcome measures

Demographic information was provided by parents, with information regarding child's age, ethnicity, family SES, basic diabetes variables (eg, method of insulin delivery, method of blood sugar monitoring), and camper status (first-time camper or veteran camper).

Diabetes-specific emotional distress was assessed through the 26 item problem areas in diabetes measures. Parents of adolescents completed the parent-report of problem areas in diabetes, teen version (P-PAID-T),^{5,14} adolescents completed the teen self-report (PAID-T),⁵ parents of children completed the parent-report of problem

areas in diabetes, child version (P-PAID-C),¹⁵ and children completed the child self-report (PAID-C).¹⁵ These measures assess the respondent's own emotional distress living with diabetes. Reliability for the child-report, adolescent-report, and parent-report measures are high with α ranging from 0.91 to 0.96.^{5,14-16}

Perceived independence in self-care skills was assessed through the 23-item self-care skills checklist,¹⁷ designed to evaluate an individual's perception regarding their ability to independently complete daily self-care skills tasks. This measure is completed both as a self-report by the youth and as a parent-report on their child's self-care skills. Cronbach alphas for these measures are high (0.84 for adolescent report and 0.87 for parent report).

*The diabetes strengths and resilience measure (DSTAR)*¹⁸ is a 12-item measure of diabetes resilience-related strengths as indicated by adaptive behaviors and attitudes about diabetes. Cronbach alpha for this measure is 0.77.

Hemoglobin A1c was used to assess glycemic control. Parents reported their children's most recent A1c, providing a feasible means to obtain data from youth attending 44 different camps nationwide. While parent report of A1c is not the same as the gold standard of lab-measured A1c, parent report of youth A1c has been used in prior research. There is a high association between adult self-reported A1c and objectively-measured A1c ($r = 0.84$) and very low missing data or improbable values¹⁹ and high association between parent-report of adolescent A1c and lab-measured A1c ($r = 0.84$).^{20,21}

Camp experiences. Participants completed measures assessing the best parts of camp participation, first experiences occurring at camp, and self-care behaviors that have changed since attending camp. Participants were presented with a list of potential firsts, bests, and diabetes-related changes ("things done differently") to endorse as being true for them.

2.4 | Data analysis

Demographic variable association with pre-camp scores on diabetes distress, perceived independence in diabetes skills, and diabetes strengths were examined using t tests and bivariate correlations as appropriate. Sidak-Bonferroni correction for multiple tests was used to adjust for inflated type 1 error given the number of comparisons being made in both pre-camp and pre-post change analysis sets. Correction was made based on 60 comparisons in each set with family-wise alpha equal to 0.05. Adjusted alpha for these analyses was 0.0009 or $P < 0.001$. IBM SPSS version 25 was used.

Differences between campers and their parent on pre-camp measures were examined using independent samples t tests. Cohen's d effect sizes for independent samples using pooled, between-group SDs were calculated.

Paired t tests were used to examine pre-post change across time for parent and youth reports of diabetes distress and diabetes skills and youth-reported diabetes strengths. Cohen's d effect sizes for repeated measures were calculated. Association of change, measured as pre-post difference scores, in parent-reported outcomes with change in camper-reported outcomes was determined using regressions that controlled for baseline parent reports and baseline camper reports. These associations were calculated for both diabetes distress

and youth diabetes skills measures. Regressions included pre-camp scores to account for regression to the mean. Alpha for these analyses was 0.05. Demographic variables were also examined as moderators of pre-post change by regressing change scores on the demographic variable (dummy coded if categorical) while controlling for pre-camp scores. Sidak-Bonferroni correction was implemented for these analyses as discussed above.

Frequencies of endorsed participant reports of camp firsts, bests, and things performed differently were calculated.

3 | RESULTS

3.1 | Pre-camp sample characteristics and associations with distress, skills, and strengths

Mean age of children was 10.4 ($SD = 1.1$) and 14.4 ($SD = 1.5$) for adolescents (Table 1). Slightly more respondents were female, more than 88% were Caucasian, and most campers were living with families who reported an overall median income between \$76 to 100 000. The majority of families (73.8%) were using an insulin pump to manage diabetes, and 13.6% reported using continuous glucose monitoring (CGM) technology. Most of the participants (71.4%) had been to camp in prior years. These demographic findings are similar to those found in our previous study. Associations of each demographic variable with pre-camp measures of distress, diabetes skills, and diabetes strengths are presented in Table 2. Higher levels of adolescent-reported distress were noted for those who were female, who lived in families with lower incomes, and who had higher A1c. Lower levels of distress were noted for adolescents who used an insulin pump. Parents of adolescents similarly reported higher levels of distress when family income was lower, and when A1c was higher. Adolescents' and parents' of adolescents perceptions regarding independence in self-care were lower for adolescents who were from a racial minority group, were from families with lower income, and had higher A1c. Higher parent of adolescent- and adolescent-reported self-care skills was associated with pump use. Higher adolescent-reported diabetes strengths were associated with pump use and lower A1c.

Child-reported distress was not associated with any demographic variables. Higher levels of parent-reported diabetes distress were noted for children from a racial minority group, and for children with higher A1c. Higher child- and parent of child-reported diabetes skills were associated with lower A1c. Higher child-reported diabetes strengths were associated with pump use and lower A1c.

3.2 | Reporter differences in pre-camp outcomes

Parents reported significantly higher pre-camp distress and lower perception of their youth's independence in self-care skills than their campers. Differences in pre-camp distress were smaller between adolescents and their parents ($d = 0.20$) compared with children and their parents ($d = 0.47$). Pre-camp differences in perceptions of diabetes skill independence were smaller between adolescents and their parents ($d = 0.43$) compared with children and their parents ($d = 0.55$).

TABLE 1 Demographic and clinical characteristics of study sample

	Total (N = 1978)		Children (n = 762)		Adolescents (n = 1216)	
	Mean	SD	Mean	SD	Mean	SD
Age	12.8	2.4	10.4	1.1	14.4	1.5
Parent-reported A1c	7.7	1.4	7.4	1.1	7.9	1.6
	n	%	n	%	n	%
Gender: female	1027	51.9	386	53.5	641	56.9
Race						
Caucasian	1584	89.1	615	88.6	969	89.5
Black/African American	76	4.3	25	3.6	51	4.7
Latino	96	5.4	43	6.2	53	4.9
Native American	12	0.7	6	0.9	6	0.6
Asian	9	0.5	5	0.7	4	0.4
Caregiver relationship						
Mother	1548	89.8	606	90.3	942	89.5
Father	157	9.1	61	9.1	96	9.1
Grandmother	13	0.8	2	0.3	11	1.0
Grandfather	1	0.1	0	0.0	1	0.1
Other legal guardian	4	0.2	2	0.3	2	0.2
Household income						
≤\$100 000	922	57.7	368	57.2	554	58.1
>\$100 000	675	42.3	275	42.8	400	41.9
Use Insulin Pump	1360	73.8	534	74.2	826	73.6
Use continuous glucose monitoring	244	13.6	104	15.0	140	12.8
Camp experience						
First-time campers	528	28.6	310	43.0	218	19.4
Veteran campers	1318	71.4	411	57.0	907	80.6

Percentages in the table are based on available data. Because of missing data, denominators for these relative frequencies may vary and are not based on overall sample sizes.

3.3 | Change in outcomes associated with camp participation and moderators of change

Paired *t* tests, examining differences pre- to post-camp on psychosocial outcomes for parents, adolescents, and children are presented in Table 3. **Statistically significant decreases in diabetes-related distress and increases in perceived independence in diabetes self-care skills were reported by both parents and campers** (p 's ≤ 0.001). There was no statistically significant change in diabetes-related strengths for campers. Most effect sizes for these comparisons can be considered small based on values of *d* although some differences were of negligible effect size ($d < 0.20$: adolescent- and child-reported distress, adolescent-reported skills, and adolescent- and child-reported strengths).

Change in parent-reported distress was significantly and directly associated with change in adolescent-reported distress ($\beta = 0.231$, $P < 0.001$) and with change in child-reported distress ($\beta = 0.287$, $P < 0.001$) indicating similar trends in distress between campers and their parents. **Change in parent perception of camper independence in self-care skills was significantly and directly associated with change in adolescent report of their own skills** ($\beta = 0.290$, $P < 0.001$) and with change in child report of their own skills ($\beta = 0.332$, $P < 0.001$) indicating similar trends in perceptions of independence between campers and their parents.

A1c was the only demographic variable found to moderate change in adolescent distress where higher pre-camp A1c was associated with an increase in distress across camp participation. A1c was not a moderator of any other outcome. This moderation finding was probed through analysis of covariance (ANCOVA) with adolescent distress difference scores as the dependent variable, A1c quartile grouping as the independent variable, and covarying for baseline adolescent distress. (see Figure 1). Adolescents in the >75th percentile A1c group showed an increase in distress across camp while the other groups demonstrated decreases. Adolescents in the <25th percentile group showed the steepest decrease. Adolescents in the 25 to 50th and the 50 to 75th percentile group were not statistically different from each other and had a less pronounced decrease in distress.

3.4 | Endorsement of camp firsts, bests, and things done differently following camp

Campers and their parents endorsed items related to camp firsts, best parts of camp, and things done differently since attending camp. All respondents indicated that one key camp "first" was making a friend with diabetes. Other first time experiences included seeing a CGM and being away from home. Everyone agreed that the best thing about camp was being with people who are like the campers and

TABLE 2 Associations of demographic variables with pre-camp psychosocial outcomes

Measure	Gender			Minority status			Family annual income		
	t (df)	P-value	d	t (df)	P-value	d	t (df)	P-value	d
Parent of adolescent distress	-0.02 (1108)	0.983	0.00	-2.65 (128)	0.009	-0.30	3.96 (901)*	<0.001	0.26
Parent perception of adolescent skills	-1.95 (998)	0.051	-0.12	4.29 (104)*	<0.001	0.55	-4.62 (832)*	<0.001	-0.31
Parent of child distress	0.72 (719)	0.472	0.05	-3.98 (93)*	<0.001	-0.54	2.32 (625)	0.021	0.18
Parent perception of child skills	-1.43 (651)	0.154	-0.11	1.36 (628)	0.176	0.17	-0.65 (578)	0.517	-0.05
Adolescent distress	-6.45 (914)*	<0.001	-0.43	-0.48 (879)	0.629	-0.06	4.10 (742)*	<0.001	0.29
Adolescent perception of skills	-0.56 (843)	0.576	-0.04	4.02 (76)*	<0.001	0.68	-3.96 (694)*	<0.001	-0.29
Adolescent diabetes strengths	-2.03 (890)	0.042	-0.14	1.99 (854)	0.047	0.24	-1.31 (750)	0.191	-0.10
Child distress	-0.51 (578)	0.613	-0.04	-3.14 (557)	0.002	-0.44	3.12 (516)	0.002	0.28
Child perception of skills	0.57 (521)	0.572	0.05	1.67 (500)	0.096	0.25	-1.75 (464)	0.081	-0.16
Child diabetes strengths	-1.87 (569)	0.063	-0.16	2.61 (59)	0.011	0.47	-3.46 (509)	0.001	-0.30

Measure	First year			Pump use			A1c	
	t (df)	P-value	d	t (df)	P-value	d	r	P-value
Parent of adolescent distress	-0.15 (1109)	0.880	-0.01	2.31 (461)	0.021	0.17	0.319*	<0.001
Parent perception of adolescent skills	1.79 (999)	0.074	0.14	-6.09 (406)*	<0.001	-0.47	-0.248*	<0.001
Parent of child distress	-0.41 (718)	0.685	-0.03	1.11 (717)	0.266	0.09	0.158*	<0.001
Parent perception of child skills	2.10 (559)	0.036	0.17	-2.59 (649)	0.010	-0.24	-0.199*	<0.001
Adolescent Distress	0.93 (914)	0.354	0.08	3.78 (916)*	<0.001	0.29	0.233*	<0.001
Adolescent perception of skills	1.97 (237)	0.051	0.18	-5.87 (844)*	<0.001	-0.46	-0.241*	<0.001
Adolescent diabetes strengths	2.43 (890)	0.015	0.21	-4.25 (369)*	<0.001	-0.34	-0.226*	<0.001
Child distress	-1.11 (577)	0.267	-0.09	2.31 (578)	0.021	0.22	0.064	0.131
Child perception of skills	2.13 (520)	0.034	0.19	-2.89 (520)	0.004	-0.29	-0.256*	<0.001
Child diabetes strengths	1.24 (569)	0.215	0.10	-3.69 (569)*	<0.001	-0.35	-0.160*	<0.001

d = Cohen's standardized mean difference effect size for independent groups. For categorical variables, positive *t* and *d* values indicate that the reference group had a higher score on the respective measure. Reference groups are in parentheses for each variable as follows: gender (male), minority status (Caucasian, not Latino), family annual income (\leq \$100 000), first year (veteran status), pump use (multiple daily injections). A1c was measured continuously and respective zero-order correlations (*r*) are presented.

*Statistical significance for adjusted $\alpha = 0.001$.

TABLE 3 Descriptive statistics for primary outcome measures and pre-post change statistics

	Pre-camp		Post-camp		t (df)	P-value	d
	Mean	SD	Mean	SD			
Diabetes-specific distress							
Parents of adolescents	78.67	24.60	72.20	24.29	9.11 (738)*	<0.001	-0.23
Adolescents	73.58	26.81	69.82	25.05	4.10 (546)*	<0.001	-0.12
Parents of children	74.59	22.16	68.15	22.25	7.04 (486)*	<0.001	-0.23
Children	63.94	23.67	59.13	22.72	3.36 (362)*	0.001	-0.13
Youth diabetes skills							
Parents of adolescents	84.52	15.53	89.66	13.84	9.48 (628)*	<0.001	0.22
Adolescents	91.50	16.72	96.00	14.11	4.11 (468)*	<0.001	0.11
Parents of children	79.85	14.60	84.99	12.87	8.21 (416)*	<0.001	0.26
Children	88.60	17.33	93.05	16.08	6.59 (310)*	<0.001	0.24
Youth diabetes strengths							
Adolescents	36.99	6.14	37.73	5.92	1.93 (509)	0.054	0.07
Children	37.36	5.92	37.71	6.38	1.38 (346)	0.168	0.06

d, Cohen's standardized mean difference effect size for repeated measures. * indicates statistical difference in pre-post means at $\alpha = 0.05$.

having fun. After returning home from camp, the top responses regarding what the camper is doing differently included the campers and parents feeling more confident in caring for diabetes, taking more initiative in caring for diabetes, and being more independent in caring for diabetes. More details of these surveys are available in the supplemental on-line table (see supplemental table).

4 | DISCUSSION

The present study extends the research on diabetes camp and psychosocial outcomes. Strengths of this study include a large, national sample size, gathering self-report data from children, adolescents, and parents, and conducting analyses that assessed both statistical

TABLE 4 Comparisons between the first and the current studies to improve recruitment and retention

	First camp study	Current camp study
Recruitment	Sent one e-mail to family about recruitment 1 month prior to camp starting	Sent an e-mail to family about recruitment 1 month prior to camp starting and another one 2 weeks prior to camp starting
Pre-camp data collection	Sent one reminder e-mail after consent/assent obtained if pre-camp questionnaires were not completed 1 week after signing up for the study The only way to complete questionnaires was on-line prior to arriving at camp	Sent one reminder e-mail after consent/assent obtained if pre-camp questionnaires were not completed 1 week after signing up for the study. Then sent a reminder e-mail once per week until the first day of camp Paper and pencil versions were available at each camp location which could be completed upon arrival at camp
Retention	No strategies were used	A hand-written thank-you note was sent to each participant's family after completing the pre-camp questionnaires. The note included a reminder that post-camp surveys would be sent 2 weeks after camp ended.
Post-camp data collection	Sent one e-mail reminder 2 weeks after camp ended Families where a camper and parent completed both pre-and post-camp surveys were entered into a raffle to win a \$200 gift certificate. One family won per camp site	Sent one e-mail reminder 2 weeks after camp ended. Then sent a reminder e-mail once per week for up to 4 weeks Every family where a camper and parent completed both pre-and post-camp surveys was mailed a \$20 gift certificate

significance and effect sizes. The present study sought to improve our team's prior efforts regarding recruitment and retention of camp-attending families, with the goal of gathering the perspectives of a more diverse sample of respondents.

This study focused on three outcomes: diabetes-specific emotional distress, perceived independence in diabetes-specific self-care skills, and diabetes-specific strengths. In addition, post-camp surveys were gathered regarding camper and parent perceptions about the following: (a) the best things about attending camp, (b) camp "firsts," and (c) tasks being done differently after returning home from camp. All participants reported decreased diabetes-specific emotional distress and perceptions of increased youth independence in self-care skills after attending camp. **These findings are consistent with our**

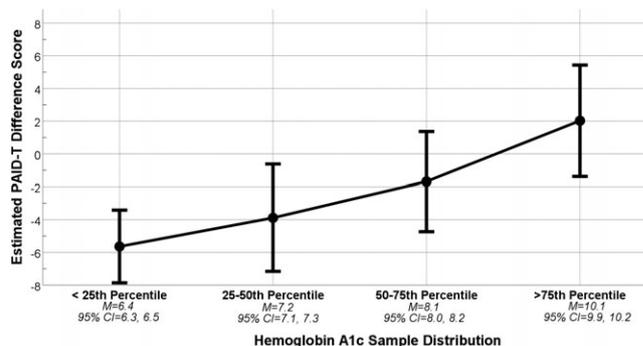


FIGURE 1 Plot of estimated marginal means of ANCOVA of PAID-T difference scores on baseline PAID-T scores and A1c percentile category. PAID-T difference scores were calculated from the difference of post-camp and baseline scores such that a positive value indicates increase in score, zero indicates no change, and a negative value indicates a decrease in score. Error bars on the plot represent the 95% confidence interval around each mean. A1c means (M) and confidence intervals (95% CI) for each percentile group are presented below labels on the x-axis. Based on ANCOVA results, the >75th percentile group was significantly different from the <25th percentile group and from the 25 to 50th percentile group. In addition, the 50 to 75th percentile group was significantly different from the <25th percentile group

hypotheses and with previous studies showing improved QOL, self-esteem, self-care skills, and coping ability after attending camp.^{7-10,22}

Importantly, perceptions regarding self-care skills are related to adherence, metabolic control, and self-efficacy.²³⁻²⁷ There were direct associations between changes in camper and parent outcomes showing that both members of the dyad perceived similar benefits of camp participation. **Contrary to our hypothesis, youth did not report changes in perceived diabetes-specific strengths, even though they reported improvements in distress and self-care skills.** It may be that feelings (emotional distress) and behaviors (diabetes self-care) are more sensitive to change after 1 week at camp than perceptions regarding strengths. Future studies should further elucidate the underlying constructs regarding a person's perceptions of their own diabetes-specific strengths. Prior studies have not specifically assessed attending camp as a clinical intervention to reduce diabetes-specific emotional distress and improve self-care skills. Current results show promise of camp as a clinical intervention.

Parents of both children and adolescents reported experiencing higher levels of diabetes-specific emotional distress than their children. Many clinical interventions targeting diabetes distress focus on the person with diabetes, not on the parent.^{28,29} Recommendations regarding psychosocial screening in diabetes clinics focus on only assessing the youth with diabetes, not their parent.³⁰⁻³² Current findings suggest that assessment protocols and intervention studies consider assessing parent perspectives. In addition, parents perceived their children as less independent in their diabetes self-care skills than campers. Lower parent perception of self-efficacy for diabetes tasks is associated with higher parent distress and decreased agreement on responsibility for diabetes self-care tasks.³³ Furthermore, higher conflict between adolescents and their parents tends to be associated with disagreement in decision-making autonomy.³⁴ It is possible that this final association could be mediated by parent perception of youth

being less independent in their diabetes self-care. Moreover, higher adolescent self-efficacy is associated with lower A1c despite level of family conflict.³⁵ Finding ways (such as through camp participation) to improve parent perceptions of youth independence and efficacy may facilitate positive medical and psychosocial outcomes.

Adolescents with the highest A1c's pre-camp showed increased diabetes distress after camp, in contrast to their peers with lower A1c's, who showed a decrease. While the lack of a comparison group renders conclusions a challenge, it is possible that adolescents with higher A1c's compared themselves less favorably to their peers which increased their distress. It is also possible that shared support while at camp (eg, checking blood sugars as a whole cabin; taking insulin before meals as an entire camp) was a contrast to the individual self-care demands when back at home, and that contrast was more distressing to those with higher A1c's. Future research should target factors concerning glycemic control and distress changes among adolescents attending camp.

Based on data collected on camp firsts, bests, and things differently, camp appears to have a perceived positive influence. The majority of respondents endorsed campers having fun, liking the staff and activities, learning more about diabetes, and gaining independence in self-care. For about a third of campers, this was the first time they were able to make a friend who had diabetes, and this was also the first time that they were away from home. For about a fourth of adolescents, this was their first time seeing others using CGM. Campers and parents noted increased camper confidence in caring for diabetes and taking initiative in managing diabetes following camp. While campers seemed to think they were engaging in specific tasks more frequently, parents had a more conservative perception. Camp seems to have positive associations with perceived independence in self-care and building a positive identification with diabetes.

Several limitations of the present study should be noted. In spite of a 55% increase in participant recruitment from the prior study, our retention rates (percent of families completing both pre- and post-camp surveys) did not improve. Our sample, while large, consisted of mostly Caucasian participants, using insulin pumps, and originating from intact, well-educated families. It was not possible to compare the demographics of each camp to those who participated in the study. Future studies should determine if those who enroll in the study are consistent with those who choose to attend camp. Relatedly, data were not collected about camp programming (eg, extent of diabetes education during camp, amount of time spent in various recreational activities) or other camp-specific variables (eg, duration, how blood sugars were managed between staff and campers) which precluded our ability to examine associations of changes in distress, self-care skills, or diabetes strengths with such variables. This would be an important area of study, particularly if examining diabetes camp as a clinical intervention. Another limitation is not including a control group which impeded any causal attributions of camp participation. Future studies assessing the impact of attending camp should include a control group and would benefit from assessing how various components of camp (eg, formal education sessions, camp activities, group diabetes management) impact psychosocial outcomes. Future studies should follow campers longer than just immediately post-camp to assess the sustained impact of camp. Finally, while there is a high

association between parent-report and adult-report A1c and lab-measured values,¹⁹⁻²¹ future studies should aim to collect lab-measured data to insure accuracy of associations between glycemic control and psychosocial outcomes.

Results of the present study extend the literature assessing the psychosocial impact of camp and suggest that attending diabetes camp may confer emotional and behavioral benefits for both campers with type 1 diabetes and their parents. Camp was generally viewed as a positive experience, giving everyone a chance to feel supported, connected, and positive about living with diabetes.

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CONFLICT OF INTEREST

The authors have no conflict of interest to report.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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