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Adolescents, Parents, and Physicians: A Comparison of Perspectives on Type 1 Diabetes Self-Care

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Abstract

Objective—No research to date has compared the beliefs of adolescents, parents, and physicians with respect to type 1 diabetes (T1D) self-care perceptions and barriers. This study examined how adolescents with T1D, their parents, and physicians perceive four key diabetes self-care behaviors (testing blood glucose, taking insulin, exercise, and diet) and what influences those behaviors.

Method—48 adolescent/parent dyads and 21 pediatric endocrinologists rated importance, difficulty, and proficiency for 4 self-care behaviors, and provided up to 5 perceived influences on these behaviors. We compared adolescents to parents and families to physicians.

Results—Groups rated all self-care behaviors as important, with taking insulin as most important. Families rated behaviors as relatively easy compared to physicians. All groups agreed that diet was most difficult and the behavior at which adolescents were least proficient. Although families rated teens as proficient overall, physicians disagreed. Adolescent and parent perception of diet difficulty was related to poorer glycemic control, and blood glucose testing and insulin administration proficiency were linked to better glycemic control. Compared to other groups, teens were especially likely to mention internal and hindering influences, and more likely to mention other people as negative influences.

Conclusions—Although all groups agreed that all self-care behaviors are important, there are key areas of discrepancy in perceptions, particularly between families and physicians. Further research should connect the beliefs examined in this study to actual self-care behaviors.

Keywords

Type 1 Diabetes Mellitus; Psychosocial Factors; Adolescent; Self Care; Patient Adherence

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Introduction

Type 1 diabetes (T1D) is one of the most prevalent chronic diseases diagnosed in childhood and adolescence (1), and its annual worldwide incidence in youth and adolescents is rising (2). Faced with failure of the pancreas to produce adequate levels of insulin for glucose metabolism, individuals with T1D must adopt a complicated regimen of self-care behaviors to compensate for what their bodies can no longer do for themselves. Balancing glucose intake and metabolism is achieved through careful execution of 4 primary self-care behaviors: monitoring blood glucose, taking insulin, monitoring diet, and exercising. Proper self-care behavior is important for reducing the probability of serious short- and long-term complications resulting from poor glycemic control (3).

Diabetes self-care can be difficult for all patients, but is especially challenging for adolescents. Self-care behavior declines during adolescence, and glycemic control deteriorates (4, 5). Youth with T1D, like most teens, are learning to assert independence (6) and increasing time spent with peers relative to parents (7,8). In addition, youth with diabetes are given increasing accountability for taking care of their diabetes, sometimes before ready to assume the responsibility (9, 10). These psychosocial changes may interfere with diabetes management. Given the difficulties adolescents with diabetes face, one plausible question is whether parents, youth, and physicians share the same understanding of diabetes self-care behaviors. Although previous research has examined the association of illness perceptions to coping, well-being, and treatment adherence (11–13) and compared adolescent and physician assessments of adherence (14), no research to date has compared the perceptions of parents, youth, and adolescents regarding the importance, difficulty, and proficiency or the perceived facilitators and barriers to self-care for adolescents with T1D.

This study examined how adolescents with T1D, their parents, and physicians view how adolescents take care of themselves. Understanding similarities and differences among these groups could benefit scientists and professionals in two ways. First, differences in beliefs may identify potential areas of education for teens with T1D and their families. For example, if parents believe that some behaviors are less important than physicians, families should be informed of this discrepancy. Second, differences in beliefs between families and physicians may be areas that require additional clinical care and intervention.

To accomplish these goals, we examined adolescents', parents', and physicians' perceptions about the importance of each of 4 key self-care behaviors (blood glucose testing, exercise, diet, insulin administration), the difficulty of these behaviors, and the proficiency of adolescents in enacting these behaviors. We also asked each group to identify factors that they believed influenced these self-care domains.

Methods

The Institutional Review Boards of Carnegie Mellon University and the University of Pittsburgh approved this study.

Participants

Adolescents and parents—To be eligible for the study, adolescents had to be 13–16 years old, been diagnosed with type 1 diabetes for at least one year, have no major co-morbidities, have no parent with diabetes, and have the ability to participate in a structured interview. In accordance with HIPAA regulations, letters were sent by the outpatient clinic at the Children's Hospital of Pittsburgh (CHP) to parents of teens who were within the included age range describing the study and requesting that a postcard be returned indicating whether they would like to be contacted about the study. Of 252 letters sent, 107 (42.5%) received no response, 42 (16.7%) were returned for wrong addresses, 29 (11.5%) were returned with refusals of contact, and 74 (29.4%) returned requests for contact. Research assistants screened all interested families by phone, verified inclusion criteria, explained the study, and, if they remained qualified and interested, scheduled an appointment with the parent and adolescent for the interview. Of the 74 families who returned postcards, 48 (64.9%) completed the interview process, 8 (10.8%) were unreachable, and 18 (24.3%) were not interviewed for the following reasons: 9 did not meet inclusion criteria, 5 refused, 3 could not find a good time, 1 did not show up.

Table 1 lists the demographic characteristics of the 48 adolescents and parents. Just over 60% of adolescents were using an insulin pump; remaining participants used multiple daily injections. No differences existed between those who used injections or the pump on any of the outcomes examined in this paper.

Physicians—Physicians were eligible to participate if they were pediatric endocrinologists practicing within a three-hour radius of Pittsburgh, PA. Potential participants were identified via referral from the Director of Pediatric Endocrinology at CHP and from checking professional registries and organization listings. We mailed invitations describing the study to physicians, and followed up with phone calls to formally invite them to participate. To improve the diversity of our samples, it was not required for physician participants to be treating one of the adolescent participants, nor was it a requirement that the adolescent participants be treated by one of the physician participants. Interviews were conducted at physicians' offices. Of the 12 physicians contacted at CHP, 11 (91.7%) participated. Of the 14 physicians contacted from other practices, 10 (71.4%) participated. About half of the 21 physician participants (52.4%) were recruited from CHP, and the rest were recruited from other clinics and private practices. The two groups were similar on all characteristics shown in Table 2, except the CHP group reported seeing more patients with T1D per week than those recruited from other venues. No differences emerged between the two groups of physicians on the study's outcome variables.

Procedure

Interviews with adolescents and parents lasted approximately 45 minutes, and were conducted either before the adolescent's scheduled clinic appointment (54.2%) or a minimum of two weeks post-appointment (45.8%) at a convenient location. There were no demographic differences between dyads interviewed at the clinic and those interviewed elsewhere. After obtaining parent informed consent, child assent, and demographic information, the adolescent and parent were separated for privacy during interviewing.

Interviews with physicians also lasted approximately 45 minutes. Physicians provided informed consent prior to their interviews.

Interviewers asked the three groups of participants the same questions with modified pronouns, depending upon whether the participant was the adolescent, parent, or physician. For example, while the adolescent was asked, “How important is exercise for keeping *your* blood sugar under control?” the parent was asked “How important is exercise for keeping *adolescent name’s* blood sugar under control?” and the physician was asked, “How important is exercise for keeping *a teen with T1D’s* blood sugar under control?” Physicians were instructed to average across their patients, using their experience as clinicians.

We asked participants to rate how important (1 = not at all; 5 = a lot), how difficult (1 = extremely easy; 6 = extremely difficult) and how proficient (−4 = extremely bad; 4 = extremely good) adolescents were at blood glucose testing (BG), exercise (EX), insulin administration (IN), and monitoring and maintaining their prescribed diet (DIET). The order of the 4 self-care behaviors was counterbalanced.

Then we asked each group to name up to five things that influenced whether adolescents engaged in each of the 4 self-care behaviors. After a response was identified (e.g., getting distracted, being organized), participants rated the item’s effect on the self-care behavior - that is whether the response made it easier or harder for the adolescent to engage in the self-care behavior on a 9-point scale (−4 = completely harder; +4 = completely easier).

We requested the most recent glycosylated hemoglobin (HbA1C) from the adolescents’ physicians after the interview.

Overview of Analysis

Because data collected from parents and adolescents were not independent, we conducted a 2 (Group: adolescent, parent) x 4 (Behavior: BG, EX, DIET, IN) repeated measures ANOVA to assess whether there were differences between parent and adolescent ratings of importance, difficulty, and proficiency for each of the self-care behaviors. We tested the assumption of homogeneity of variance and covariance for each level of our repeated measure variables by using Mauchly’s Test of Sphericity, for which significant values ($p < 0.05$) indicate this assumption has been violated and a correction is needed. In the case of violation, we used either a Huynh-Feldt (HF; $\epsilon > 0.75$) or Greenhouse-Geisser (GG; $\epsilon < 0.75$) correction to report ANOVA results. These corrections are indicated in parentheses after the statistics, as appropriate.

To compare parent and adolescent ratings to physician ratings, we averaged across parents and adolescents to create family ratings. Although there were mean level differences between parent and adolescent ratings in some of the previous analyses, there were no group by self-care behavior interactions. That is, parents and adolescents generally agreed on the pattern of ratings across the four self-care behaviors. We averaged across adolescents and parents because we could not compare all three groups simultaneously; parent and adolescent data are dependent, but family and physician data are independent. Thus, we conducted 2 (Group: family, physician) x 4 (Behavior: BG, EX, DIET, IN) mixed ANOVAs

to assess differences between family and physician ratings for importance, difficulty, and proficiency of each of the self-care behaviors. In the manner reported earlier, we tested repeated measures variables for violations of sphericity and used appropriate corrections when necessary. Corrections are indicated in parentheses after the statistics, as appropriate.

Then, we examined the correlations of adolescent and parent beliefs about importance, difficulty, and proficiency to glycemic control. Finally, to examine the answers to the open-ended questions identifying the determinants of self-care behavior, two independent coders placed responses into categories. Inter-rater reliability was high ($\kappa = 0.93$). For ease of presentation, we examined the five most frequent responses to each of the four self-care behaviors. Two independent coders evaluated whether responses were internal causes, defined as something about the person, or external causes, defined as something about the environment or external to the person. Inter-rater agreement on this classification was 100%.

Results

Ratings of Importance, Difficulty, Proficiency

The left column of Figure 1 illustrates the means of importance, difficulty, and proficiency ratings for adolescents and parents. The right column of Figure 1 illustrates the same ratings for physicians and families.

Importance—As shown in Figure 1, both parents and adolescents rated all behaviors as highly important. There was a main effect of group on importance ratings, such that parents ($M = 4.79$, $SE = 0.04$) rated all behaviors as significantly more important than adolescents ($M = 4.63$, $SE = 0.05$), $F(1, 47) = 7.65$, $p = .01$, $\eta_p^2 = 0.14$ (HF). There was also a main effect of behavior, $F(2.37, 111.41) = 17.52$, $p < 0.001$, $\eta_p^2 = 0.27$ (HF), such that both rated IN as the most important, followed by BG, DIET, and EX. Significant differences were found among all behaviors except for EX and DIET. There was no interaction between group and behavior.

Comparing families to physicians, there was no group effect on importance ratings. There was a main effect of behavior, $F(2.40, 160.76) = 43.38$, $p < 0.001$, $\eta_p^2 = 0.39$ (HF), qualified by a significant group by behavior interaction, $F(2.40, 160.76) = 9.65$, $p < 0.001$, $\eta_p^2 = 0.13$ (HF). As shown in Figure 1, both physicians and families agreed that IN was most important, followed by BG and DIET, but families rated EX as more important than physicians.

Difficulty—Parents and adolescents did not rate behaviors as exceedingly difficult, as suggested by group means that were below the midpoint of the scale (indicated by bold line in figure). As with importance ratings, there was a main effect of group on difficulty ratings, such that parents ($M = 2.68$, $SE = 0.12$) rated all behaviors as more difficult than adolescents ($M = 2.31$, $SE = 0.09$), $F(1, 47) = 6.80$, $p = 0.01$, $\eta_p^2 = 0.13$ (GG). There was also a main effect of behavior, $F(2.03, 95.49) = 17.17$, $p < 0.001$, $\eta_p^2 = 0.27$ (GG), such that both rated DIET as the most difficult, followed by BG, EX, and IN. There were significant differences in difficulty ratings among all behaviors except for EX and BG. There was no group by behavior interaction.

Comparing families to physicians, there was a main effect of group on difficulty ratings, $F(1, 67) = 145.44, p < 0.001, \eta_p^2 = 0.69$, such that physicians ($M = 4.06, SE = 0.11$) rated all behaviors as more difficult than families ($M = 2.49, SE = 0.07$). Similar to the findings reported above, there was a main effect of behavior, $F(2.33, 156.06) = 17.58, p > 0.001, \eta_p^2 = 0.21$ (HF), such that both physicians and families rated DIET as most difficult, followed by BG, EX, and IN. Difficulty ratings were significantly different between all behaviors except for between EX and BG. There was no significant group by behavior interaction.

Proficiency—Both parents and adolescents rated teens as moderately proficient in all behaviors. There was a main effect of behavior, $F(2.01, 94.50) = 8.92, p < 0.001, \eta_p^2 = 0.16$ (GG), such that parents and adolescents rated proficiency the highest for IN, followed by BG, EX, and DIET. Ratings for all behaviors were significantly different except EX did not differ from BG and DIET. There was no group by behavior interaction.

Comparing families to physicians, there was a main effect of group on proficiency ratings, $F(1, 66) = 84.71, p < 0.001, \eta_p^2 = 0.56$, such that families rated adolescents as more proficient ($M = 2.19, SE = 0.14$) than physicians ($M = -0.17, SE = 0.22$). Interestingly, as shown in Figure 1, while families rated adolescents as relatively proficient at all behaviors (means are positive), physicians' ratings were much lower (means range from 0 to negative), and even indicated lack of proficiency, especially in DIET and EX. There also was a main effect of behavior, $F(2.58, 170.25) = 14.25, p < 0.001, \eta_p^2 = 0.18$ (HF). Both families and physicians rated teens as most proficient in IN, followed by BG, but disagreed on the behavior with the lowest level of proficiency (physicians: EX, families: DIET). Ratings for all behaviors were significantly different, except for between EX and DIET. There was not a group by behavior interaction.

Adolescent Beliefs and Glycemic Control

We examined the association of adolescent and parent reports of importance, difficulty and proficiency ratings to glycemic control. For adolescents, the importance ratings of the self-care behaviors were unrelated to glycemic control. Parent ratings of exercise importance were linked to better glycemic control ($r = -0.29, p < 0.05$). Among adolescents' difficulty ratings, higher difficulty in eating a healthy diet was associated with poorer glycemic control ($r = 0.36, p < 0.001$). Parent difficulty ratings for insulin and diet each were related to poorer glycemic control (r 's = 0.33 and 0.36, p 's < 0.05, respectively). Among adolescents' proficiency ratings, higher proficiency in blood glucose testing ($r = -0.28, p < 0.001$) and taking insulin ($r = -0.44, p < 0.001$) were linked to better glycemic control. Parent proficiency ratings for insulin and diet were related to better glycemic control (r 's = 0.38 and 0.36, p 's = 0.01, respectively).

Adolescent, Parent, and Physician Beliefs About Determinants of Self-Care Behavior

We examined what adolescents, parents, and physicians thought helped and hindered each of the 4 diabetes self-care behaviors. The 5 most frequent responses for each of the self-care behaviors for each of the three groups are shown in Table 3. (In the event of a tie, more than five responses are shown.) The *effect* ratings indicate whether the factor helped or hindered

the self-care domain. Positive numbers indicate a benefit and negative numbers indicate a hindrance. A mix of positive and negative factors are listed for each self-care domain. However, adolescents were more likely than parents or physicians to identify negative factors; 69% of adolescent responses were negative compared to 54% of parent and 33% of physician responses. The most frequently named negative factor was being distracted or preoccupied; it was identified by all three groups in response to multiple self-care behaviors. A negative factor that was identified by all three groups with respect to DIET was others encouraging improper self-care behavior. On average, others' mere presence was viewed negatively in regard to BG by both adolescents and parents and by parents with respect to DIET.

The most frequently named positive factor that cut across domains was others encouraging proper self-care. Both parents and physicians offered this factor for each of the self-care domains. Adolescents only identified this factor once, and it was with respect to DIET. A positive factor that stood out with respect to EX was being active or sporty, which was named by all three groups. A positive personality characteristic linked to both DIET and IN was being conscientious; this was named by both adolescents and parents but not physicians.

Items that are internal, or characteristic of the person, such as being conscientious (positive) or distracted (negative) are bolded in Table 3. Items that are external, or characteristic of the environment, such as others encouraging proper self-care (positive) or others encouraging improper self-care (negative) are italicized. Overall, more external factors than internal factors were identified. The one exception was responses to IN, in that all of the factors identified by adolescents were internal; most of the factors identified by parents were internal; and only one of the factors identified by physicians was internal. All groups agreed that external factors influenced DIET. Responses for BG and EX were a mix of internal and external reasons. Overall, physicians identified more external factors than adolescents or parents.

Discussion

Adolescents, parents, and physicians agreed that the 4 self-care behaviors were highly important. There was some suggestion that parents thought the behaviors were more important than teens, but overall means suggested all groups regarded the behaviors as important. Parents rating behaviors as more important than teens may reflect a more mature realization of the serious implications of having a chronic disease, but, encouragingly, does not indicate a severe gap in beliefs between the groups. Within the behaviors, there also was consensus that insulin administration and blood glucose testing—the more medical behaviors—were more important than lifestyle behaviors—eating and exercise. Families regarded exercise as more important than did physicians.

In terms of difficulty, parents rated the behaviors as more difficult than teens, and physicians rated the behaviors as more difficult than families. However, the discrepancy in ratings was much larger between physicians and families than within families. Parents and youth considered the behaviors to be relatively easy, whereas physicians did not. It may be that physicians--and parents to some extent--have higher expectations for self-care behavior

than teens. Adults may infer that a task is difficult if teens are not engaging in it. However, difficulty is only one explanation for youth not engaging in a behavior.

There was consensus across the groups about the most difficult and one of the least proficient self-care behaviors. All groups agreed that diet was the most difficult self-care behavior and the behavior at which teens were least proficient, reinforcing the idea that dietary concerns should be highlighted in diabetes education.

Parents and youth agreed that teens were relatively proficient at all of the self-care behaviors. Physicians, however, disagreed and rated youth as less proficient compared to families and as overall not very proficient. There was consensus that youth were more proficient at the medical behaviors—insulin administration and blood glucose testing—than the lifestyle behaviors—diet and exercise.

Why do physicians believe more strongly than families that self-care behaviors are more difficult and that adolescents are less proficient at them? Three possible reasons may explain this discrepancy. First, physicians may believe that the behaviors are more difficult and adolescents are less proficient because they hold higher standards for good self-care compared to families and believe teens are not meeting these standards. Second, the discrepancy could have resulted from a methodological artifact of our design. Whereas parents and adolescents were considering the same person—the specific teen, physicians were considering all of their patients. When considering patients as a group, physicians may recall vivid cases, which are likely to be patients who are having difficulties.

Third, teens, parents, and physicians may all hold the same standard for self-care but understand deviations from self-care in different terms. Physicians may infer that the failure to engage in good self-care is a skill deficit, whereas families may believe that the behaviors are relatively easy for teens and perceive the failure to engage in good self-care as a choice. These differing explanations have implications for how one improves youth self-care. Interventions aimed to optimize self-care will look quite different if targeted at motivation rather than skills. Recent research on motivational interviewing, largely conducted with adults (15, 16), may hold promise in this population.

Adolescent and parent beliefs about self-care had some predictive value in terms of glycemic control. Although the importance of the self-care behaviors did not predict glycemic control, difficulty and proficiency did. Specifically, both adolescent and parent perception of difficulty in adhering to the self-care behavior that was judged the hardest—diet—was related to poorer glycemic control. By contrast, proficiency in the two medical behaviors (insulin administration, blood glucose testing)—rather than the lifestyle behaviors (exercise, diet)—were related to better glycemic control. These findings have implications for the education of youth with diabetes and their families. Emphasizing the importance of self-care behaviors, and perhaps their consequences, may not matter so much as providing youth with the skills and the motivation to execute these behaviors successfully. One must recognize, however, that these data are cross-sectional. Behavior difficulty may lead to poorer glycemic control, or poor glycemic control could lead one to infer difficulty.

The open-ended data provided some insight into what the groups thought affected youth's diabetes self-care. The data suggested that teens perceive more internal influences on self-care compared to parents and physicians. Youth may identify internal factors as a way to maintain a belief that they have control over their self-care behavior, and possibly glycemic control. Health psychologists have long documented the psychological and physical benefits that accompany a belief in personal control (17–19).

Adolescents, and parents somewhat, were much more likely to identify factors that hindered rather than helped teen self-care compared to physicians. Perhaps physicians are not entirely cognizant of the barriers to self-care. If adolescents communicated those barriers to clinicians, perhaps recommendations could be made to address them. For example, one negative influence on self-care identified by all 3 groups was being distracted or preoccupied. If this is a major deterrent to self-care, youth with T1D might benefit from a mindfulness-based intervention, such as mindfulness-based stress reduction, aimed at increasing stability and decreasing reactivity to life situations, especially during times of stress. There is a large literature on mindfulness interventions with adults, but these studies have only recently begun to focus on their usefulness among youth and individuals with diabetes (20).

Other negative factors observed by all groups involved negative influences of other people—either their mere presence or their active encouragement of improper self-care. Adolescents were especially likely to perceive influence from others as negative rather than positive. In particular, teens were less likely than parents and physicians to identify others' encouragement as a determinant of self-care. Teens may not perceive encouragement from others in their environment, or teens may not perceive that others' encouragement affects their self-care. It is not clear from these data whether these "other people" are adults or peers. Research has shown conflict with peers has a stronger relation to diabetes outcomes than support from peers (21). Future research would benefit from a more detailed examination of social barriers to self-care.

This is one of the first studies to interview pediatric endocrinologists about their perception of youth's diabetes behaviors and to compare those perceptions to those of the families. Several important conclusions can be drawn from this research. First, widespread agreement exists among adolescents, parents, and physicians that all 4 self-care behaviors are important. Second, physicians perceive self-care behaviors as more difficult and teens as less proficient compared to families. Third, all groups agreed that diet was the most difficult self-care behavior, and difficulty with diet was related to poor glycemic control. Fourth, qualitative data suggested that youth perceive more barriers to self-care compared to parents or physicians, including barriers posed by other people. Finally, youth with diabetes were more likely to believe the factors that influenced their self-care were internal compared to parents and physicians, possibly due to the desire to perceive control over one's behavior.

Before concluding, we acknowledge some limitations. First, the sample was almost exclusively white and largely middle to upper-middle class, limiting its generalizability to racial minorities and those with lower socioeconomic status. Second, we did not examine actual self-care behaviors but only beliefs about self-care behaviors. Third, we acknowledge

that we conducted many analyses on these data, but consider this study to be an exploratory approach to a novel research question that will be useful for encouraging further inquiry in this area and to further establish a more conservative threshold for replication. Last, the open-ended data are qualitative and highly speculative. We examined the first responses that came to people's minds, which might tell us about the most vivid determinants of self-care but does not establish an exhaustive list. Future research should connect the beliefs examined in this study to actual behavior.

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Figure 1. Importance, difficulty, and proficiency ratings for parents versus adolescents and physicians versus families. Error bars show standard error.

Table 1

Adolescent and Parent Demographics (n = 48)

	Adolescent	Parent
% Male	41.7	14.6
Age	14.7 ± .60 (13.5 – 15.6)	46.7 ± 6.9 (30 – 68)
Years Since Diagnosis	6.3 ± 3.7 (2 – 13)	
% Pump	60.4	
HbA1c	7.9 ± 1.4 (5.4 – 12.4)	
Race:		
Amer Ind/Alaska Nat	0%	0%
Asian	0%	0%
Nat Haw/Oth Pac Isl	0%	0%
Black of African Amer	2.1%	2.1%
White	95.8%	95.8%
More Than One Race	2.1%	2.1%
Unknown/Not Reported	0%	0%
% Hispanic	2.1%	0%
Household: Live with both bio parents	72.9%	
Education		
Less than High School		2.1%
Technical/Vocational (HS)		2.1%
Graduated High School		18.8%
Some College		6.3%
Technical/Vocational (post HS)		14.5%
Graduated 2-Year College		6.3%
Graduated 4-Year College		31.2%
Post-Graduate Degree		18.8%
Work for Pay?		
Full time		45.8%
Part time		18.8%
Do not work		35.4%
Annual Family Income		
< \$ 20K		2.1%
\$20K to 39,999		10.4%
\$40K to 59,999		18.8%
\$60K to 79,999		18.8%
\$80K to 99,999		12.5%
\$100K to 119,999		6.3%
>\$120K		22.9%
Refused to Answer		8.2%
Patient at CHP?	87.5%	

Table 2

Physician Characteristics

	Total	UPMC	Other	p
n	21	11	10	
% Male	38.1	36.4	40	
Years in Practice (inc. fellowship)	18.0 (2 – 40)	18.9 (2 – 40)	17.4 (3.5 – 38)	.82
% Patients with T1D	44.6 (15 – 96)	56.7 (15 – 96)	31.3 (15 – 40)	.02
Approx # T1D patients/week	13.4 (3 – 22)	11.8 (3 – 20)	15.2 (5 – 22)	.14
% T1D on pump	39.4 (12 – 90)	37.3 (20 – 70)	41.7 (12 – 90)	.60

Table 3

Top Five Most Frequently Mentioned Determinants of Self-Care Behavior

	BG		DIET		EX		IN				
	Freq	Eff	Freq	Eff	Freq	Eff	Freq	Eff			
Adolescent (n = 48)											
Distracted	11	- 1.73	Hungry/cravings	17	- 0.52	Physically ill	15	- 1.89	Active/Sporty	13	- 1.08
<i>Time/weather</i>	8	+ 0.91	<i>Other enc improper SC</i>	14	- 1.56	Distracted	11	- 2.09	Distracted	7	- 1.63
Physically ill	8	+ 0.75	<i>Location</i>	11	- 0.91	<i>Time/weather</i>	10	- 0.30	Forgetful	7	- 2.14
<i>Location</i>	7	- 0.67	<i>Other enc proper SC</i>	6	+ 3.17	Tired	9	- 2.10	Conscientious	7	+ 2.00
<i>Other presence</i>	7	- 1.29	<i>Other model neg beh</i>	5	- 1.00	Active/Sporty	8	+ 2.89	Hunger/cravings	5	- 1.00
			<i>Doing things for them</i>	5	+ 3.33				Physically ill	5	- 0.71
			Conscientious	5	+ 3.20						
Parent (n = 48)											
Distracted	13	- 1.69	<i>Location</i>	14	- 0.11	<i>Time/weather</i>	21	- 0.21	Distracted	9	- 2.00
<i>Other presence</i>	13	- 2.23	<i>Doing things for them</i>	14	+ 3.27	Active/Sporty	19	+ 2.88	<i>Pump</i>	7	+ 1.25
Physically ill	12	+ 1.31	<i>Other enc proper SC</i>	13	+ 2.29	<i>Other enc proper SC</i>	10	+ 2.60	<i>Other enc proper SC</i>	6	+ 1.50
<i>Other enc SC</i>	11	+ 2.00	<i>Other presence</i>	12	- 2.33	Distracted	10	- 1.09	Hunger/cravings	6	- 1.17
Organized	9	+ 2.67	<i>Other enc improper SC</i>	7	- 2.25	Physically ill	9	- 2.40	Tired	6	- 1.83
			Distracted	7	- 2.00				Conscientious	6	+ 3.63
			Hungry/cravings	7	- 2.00						
			Conscientious	7	+ 2.75						
Physician (n = 21)											
Distracted	8	- 2.00	<i>Other enc proper SC</i>	10	+ 2.71	Active/Sporty	10	+ 3.50	<i>Other enc proper SC</i>	9	+ 2.10
<i>Routine</i>	5	+ 2.80	<i>Doing things for them</i>	7	+ 2.71	<i>Model desired beh</i>	9	+ 2.57	<i>Pump</i>	8	+ 2.00
<i>Other enc proper SC</i>	5	+ 2.29	<i>Other enc improper SC</i>	7	- 2.63	Distracted	8	- 1.22	<i>Convenient</i>	5	+ 3.17
Forgetful	5	- 2.80	<i>Financial</i>	5	- 2.40	<i>Financial</i>	5	- 2.00	<i>Emo Support</i>	5	+ 2.71
<i>Emo support</i>	4	+ 3.00	<i>Other model pos beh</i>	3	+ 3.00	<i>Other enc proper SC</i>	5	+ 3.00	<i>Inconvenient</i>	4	- 1.25
			<i>Other model neg beh</i>	3	- 3.20				<i>Routine</i>	4	+ 2.50
			Agreeable	3	0.00				Intelligent	4	+ 2.75

Notes: Bold = internal; italics = external; Freq = number of participants who mentioned the item; Eff = average rating of effect of item on self-care (+ = helped, - = hindered)