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Psychometric Properties of the Pediatric Testing Attitudes Scale-Diabetes (P-TAS-D) for Parents of Children Undergoing Predictive Risk Screening

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Abstract

OBJECTIVE—Examine the factor structure, reliability, and validity of the Pediatric Testing Attitudes Scale-Diabetes (P-TAS-D), a measure of parental attitudes about predictive risk screening for type 1 diabetes in children.

METHODS—Surveys were completed by 3,720 Swedish parents of children participating in the adolescent follow-up of a birth cohort study of type 1 diabetes onset. Parents averaged 43.5 years, 42.3% were college-educated, and 10.6% of children had a family history of type 1 diabetes. The parent sample was randomly divided, an exploratory factor analysis (EFA; $n=1,860$) was conducted, followed by confirmatory factor analysis (CFA; $n=1,860$) and testing.

RESULTS—EFA/CFA revealed the P-TAS-D has three factors/scales: Attitudes and Beliefs toward type 1 diabetes predictive risk screening ($\alpha = 0.92$), Communication about risk screening results ($\alpha = 0.71$), and Decision Making ($r = 0.19, p < .001$). This solution fit the data well ($\chi^2 [42] = 536.0$, RMSEA = 0.08, CFI = 0.95) and internal consistency for the full scale was high ($\alpha = 0.86, M = 36.2, SD = 8.2$). After adjusting for covariates, more favorable attitudes towards children's risk screening were associated with greater worry about type 1 diabetes ($B = 1.1, p < .001$), less worry about health overall ($B = -0.10, p = .001$), and more positive attitudes toward ($B = 0.28, p < .001$) and less worry about ($B = 0.41, p < .001$) diabetes research.

CONCLUSIONS—The P-TAS-D is a stable, reliable, and valid measure for assessing parents' type 1 diabetes risk screening attitudes. Scale data can help target parent education efforts in risk screening trials.

Introduction

Findings demonstrating the specific genetic underpinnings of type 1 diabetes (1) are rapidly transforming the idea of predictive risk screening for this childhood disorder into a reality. Indeed, Direct-to-Consumer (DTC) genetic testing companies who purportedly curate such

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findings are already incorporating them into multiplex genetic testing panels. These DTC testing panels tout type 1 diabetes among the disease risks they can inform the public about, and market these tests with rhetoric and images suggesting the benefits of predictive testing for entire families, including children (e.g., www.23andme.com; accessed March 25, 2013). This is true despite the fact that the clinical utility underlying many of the genotype-phenotype risks on DTC testing panels have not been fully established (2), effective therapies to prevent type 1 diabetes onset among children remain elusive (3), and the psychosocial implications of identifying children at future risk for multifactorial diseases is largely unknown (4).

It is not surprising, therefore, that the bioethics of screening newborns and children for type 1 diabetes risk remains controversial (2), and signals a need for continued research into these issues as DTC genetic testing proliferates. Researchers and clinicians seeking to translate new and promising type 1 diabetes preventive treatments routinely assert they must first screen large populations to identify children who may be at-risk, consider how to inform parents of their child's risk status, and then monitor these children over long periods to establish disease causality and possible therapeutic benefit (5). As part of this strategy, type 1 diabetes researchers design and deploy disease risk screening communication protocols to minimize potential harms to children and their parents, including misunderstanding and untoward psychosocial impact (5).

In a research context, this latter objective is paramount during the recruitment, enrollment, and informed consent phases of screening studies--when education and counseling efforts occur with children's parents (6). From a research bioethics and clinical standpoint, this includes monitoring parents' attitudes and beliefs about the potential benefits and harms of type 1 diabetes predictive risk screening for their child, managing parents' expectations about the certainty of risk screening results, and facilitating parental decision making about children participating in repeat screenings across time. Unfortunately, there is a lack of standardized and well-validated behavior rating scales to assist clinicians and researchers in meeting these objectives. If such a tool were available, it could help to identify and target those parents with varying attitudes and provide them with information tailored to their beliefs about the pros and cons of screening, expectations about the timing and content of risk screening feedback, and future preventive actions. Such a resource could also help identify parents who may require additional support to reach a quality decision about participating in type 1 diabetes risk screening research, and standardize the reporting of bioethical outcomes among type 1 diabetes screening trials conducted in the U.S. and abroad.

Toward that end, we developed and evaluated a new behavioral self-report measure for parents of children undergoing predictive screening for type 1 diabetes risk. The purpose of the current study was to conduct a comprehensive psychometric investigation of this new measure: the Pediatric Testing Attitudes Scale-Diabetes (P-TAS-D). Our approach included empirically-derived exploratory and confirmatory factor analyses, and reliability and validity testing of the measure by examining its internal consistency and association with related measures. The P-TAS-D is an adaptation of the original P-TAS, which assesses parental attitudes toward cancer genetic risk screening in children (7). We hypothesized that the P-TAS-D would be reliable and valid when applied to an autoimmune disease model, retaining a similar factor structure to the original measure.

Research Design and Methods

This study relied on an analysis of data from All Babies in Southeast Sweden (ABIS), a population-based prospective birth cohort study that combines mapping of environmental

factors for multifactorial diseases with newborn screening for type 1 diabetes risk. A complete description of ABIS has been published previously (8,9). Briefly, the goals of ABIS are to examine factors that influence the development of immune-mediated diseases, with a specific focus on type 1 diabetes, among children and to identify pediatric biomarkers of risk.

The original ABIS cohort was assembled from all live births occurring in southeast Sweden between October 1997 and October 1999 and included approximately 17,000 parents of newborns and the infants themselves. Data collected to date include biospecimens and parent-completed surveys assessing demographics, medical history, environmental exposures, and psychosocial and bioethical issues (e.g., parental perspectives on research participation) (10). ABIS began its data collection at the time of participating children's birth and parental surveys were also administered 1, 2–3, 5–6, and 8 years later. The most recent wave of data collection, which comprises the sample for the present analysis, occurred in collaboration with the Swedish school system from 2009–2011 at 10–12 years following cohort enrollment (11).

All ABIS cohort volunteers provided informed consent upon enrollment and were given ongoing education (e.g., letters, brochures, videos, study web site) and offered an opportunity to continue participation or opt-out of ABIS at each wave of prospective data collection (9–11). The ABIS study procedures were approved by the Research Ethics committees at Linköping and Lund Universities. Secondary analysis of ABIS data for this study was also approved by the Institutional Review Board at Georgetown University.

At the adolescent follow-up, parents completed a battery of psychosocial assessments. This included the P-TAS-D, an 11-item scale assessing parental attitudes towards predictive screening and testing for type 1 diabetes in their child. The P-TAS was originally developed to measure parents' attitudes toward the genetic screening of minor-age children for hereditary cancer risk. A previous analysis of the psychometric properties of the P-TAS revealed two reliable scales: Attitudes and Beliefs (6 items) and Decision Making and Communication (5 items) (7). To adapt the P-TAS for use with an autoimmune disease model, the study authors (K.P.T., S.B.J., U.S.) reviewed, nominated, and drafted items for inclusion on the P-TAS-D. These items were then distributed to content experts in children's type 1 diabetes, disease screening bioethics, patient education and risk counseling, and cross-cultural psychology for item clarity and face validity. Revisions to items were made based on expert feedback. Consistent with recommended practices for scale development, the English version of the P-TAS-D was then adapted for validation in ABIS by translating it to Swedish and back-translating to English in order to ensure the items retained their original meanings and were appropriate for the target population (12). We then sought to empirically validate the Swedish version of the measure in this study.

We analyzed the psychometric properties of the P-TAS-D and its associations with coincident psychosocial variables that were relevant to this study to assess construct validity. Demographic characteristics included parent and child age, education and employment, and descriptive information about the family structure (i.e., number of biological siblings). Medical characteristics assessed included family history of type 1 diabetes, defined as the presence of type 1 diabetes among any of the children's first-degree relatives (yes/no) (10). Based on completion of prior ABIS assessments, we also calculated the total number of person-years each mother contributed previously to ABIS as an indicator of participants' level of involvement in the ABIS study (range 1–9 years) for use as a covariate (13).

Construct and face validity of the P-TAS-D was assessed through its multivariate association with other face-valid and reliable psychosocial items examining parents'

attitudes and beliefs about type 1 diabetes including: perceived risk that the child will develop type 1 diabetes (1 item, range 1–5), worry about the child developing type 1 diabetes (1 item, range 1–5), and frequency of engaging in efforts to prevent type 1 diabetes (1 item, range 1–5) (14,15). Parents' worry about participation in childhood type 1 diabetes research (5 items, Cronbach's $\alpha = 0.94$) and attitudes toward childhood type 1 diabetes research (5 items, Cronbach's $\alpha = 0.85$) were also assessed using items from ongoing ABIS surveys (8,10,16–19).

Sample Characteristics

The analytic sample consisted of 3,720 parents who: (1) had participated in at least 1 prior ABIS assessment to ensure complete demographic information was available; (2) did not report their child had been diagnosed with type 1 diabetes; and (3) completed 6 or more of the 11 P-TAS-D items (i.e., $> 50\%$). Parents who were excluded from the analysis due to missing data on 5 P-TAS-D items ($n = 316$, 7.8% of the full sample) were significantly older (M age 44.2 years, SD 4.6) than those who were included in analyses (M age 43.5 years, SD 4.4, $p = .009$). Characteristics of the analytic sample are shown in Table 1.

Nearly all participants (99%, $n = 3,690$) had completed the ABIS baseline assessment at the time of their child's birth and therefore had equivalent opportunities to participate in subsequent data collection points. On average, participants completed 4 prior ABIS assessments ($SD = 1.2$, range 1–5). Nearly all (91.9%) follow-up assessments were completed by the child's mother. A summary of ABIS attrition over time (9) and an examination of reasons for non-participation (20) have been published previously.

Data Analysis

The statistical analysis occurred through several steps. Descriptive statistics were first used to examine distributional properties of all variables and to characterize the study sample. The full sample was then randomly divided into two equal subsamples of 1,860 participants. In the first subsample, the underlying factor structure of the P-TAS-D was examined using exploratory factor analysis (EFA). We then tested the extent to which the resulting EFA factor structure could be confirmed in the second subsample using confirmatory factor analysis (CFA). For both types of empirically-derived analyses, the following criteria were used to examine model fit: a Comparative Fit Index (CFI) > 0.96 , a Tucker-Lewis Index (TLI) > 0.90 , and a Root Mean Square Error Approximation (RMSEA) ≤ 0.05 (21,22). For the EFA, we identified the optimal factor structure by evaluating fit indices, examining factor loadings for each item, and based on our previous work with the original P-TAS (7). We used direct oblique rotation in the EFA to produce an orthogonal factor solution that allowed for correlation between factors (23) based on prior reporting that scales could be significantly correlated (7). P-TAS-D scale scores were derived by summing all items loading on each factor. Scale scores were then summed together to yield a total score: higher scores indicate more favorable parental attitudes toward predictive risk screening for type 1 diabetes in children.

Internal consistency of the overall P-TAS-D score and resulting scale scores was evaluated by computing Cronbach's coefficient alpha (24) and, where applicable, evaluating inter-item correlations. Finally, the construct validity of the total P-TAS-D score was examined through bivariate associations with potential covariates (e.g., demographics, family history of type 1 diabetes) and psychosocial variables of interest using t tests and F tests. Variables significantly associated with P-TAS-D scores in bivariate analyses ($p < 0.05$) were then entered into a multivariable regression model to examine their simultaneous relationships with the P-TAS-D. We conducted similar analyses on PTAS-D factor scores and the results were consistent with those from analyses of the total score. We report findings from

analyses of the total score only for brevity, but include factor-level scale scores for thorough reporting of findings.

Results

Factor Structure

Factor loadings for the best-fitting EFA model are shown in Table 2. A three-factor solution fit the data well ($\chi^2 [25] = 198.7$, RMSEA = 0.06, CFI = 0.98, TLI = 0.96), maximized loadings for each item, and was a close replication of the factor structure of the original P-TAS (7). One factor ($\chi^2 [44] = 1073.1$, RMSEA = 0.11, CFI = 0.89, TLI = 0.86) and two factor solutions ($\chi^2 [34] = 319.1$, RMSEA = 0.07, CFI = 0.97, TLI = 0.95) were also evaluated, however these were both inferior to the three factor results based on model fit criteria. Results of the CFA testing this three factor structure are also shown in Table 2. The three factor solution fit the data well ($\chi^2 [42] = 536.0$, RMSEA = 0.08, CFI = 0.95, TLI = 0.93), with only one necessary modification. The second factor was unstable with only two items, so the residual variance of one item, which was not statistically significant in an initial model ($p = 0.72$), was fixed to zero to improve stability. The CFA results confirmed the three factor solution.

Reliability

Descriptive information for the P-TAS-D scores for the full sample is provided in Table 1. For all items, internal consistency reliability was high ($\alpha = 0.86$, $M = 36.2$, $SD = 8.2$). The 6 items constituting the first P-TAS-D factor corresponded with the previously-established Attitudes and Beliefs scale of the P-TAS (7) and had excellent internal consistency reliability (Cronbach's $\alpha = 0.92$). The second factor was comprised of the P-TAS-D items capturing Communication about type 1 diabetes risk, and also had good internal consistency reliability (Cronbach's $\alpha = 0.71$). The third factor captured parental Decision Making about type 1 diabetes predictive risk screening, with a modest but statistically significant correlation between these items ($r = 0.19$, $p < .001$).

Validity

Bivariate associations between total P-TAS-D scores and covariate and psychosocial variables are shown in Table 3. Parental attitudes favoring predictive screening for children's type 1 diabetes risk were significantly greater among parents with less than a college/university education, in families with fewer children, and among those families reporting a history of type 1 diabetes among first-degree relatives (Table 3). P-TAS-D scores were also positively associated with greater prior involvement in the ABIS study, greater worry about the child someday developing type 1 diabetes, less worry about the child's health overall, less worry and more positive attitudes about childhood type 1 diabetes research, and greater knowledge about the ABIS study among participating children (Table 3).

The P-TAS-D was then regressed onto these significant variables in a linear model, the results of which are shown in Table 4. After adjusting for covariates, more favorable parental attitudes towards type 1 diabetes risk screening were associated with greater worry about their child developing type 1 diabetes ($B = 1.1$, $p < .001$), and more positive attitudes toward ($B = 0.28$, $p < .001$) and less worry about ($B = 0.41$, $p < .001$) childhood type 1 diabetes research. However, the model explained <10% of the variance in P-TAS-D scores.

Discussion

This study set-out to examine the psychometric properties of a new measure of parental attitudes, beliefs, and expectations about predictive risk screening for type 1 diabetes in children (P-TAS-D). Our results suggest that the measure is psychometrically stable and reliable. In a large and representative sample of parents of Swedish schoolchildren participating in a longitudinal birth cohort, the P-TAS-D's three factor structure was established and confirmed, with high internal consistency. The Attitudes and Beliefs factor/scale had a high internal consistency (Cronbach's $\alpha = 0.92$). This assesses a range of circumstances and conditions under which parents may subject their child to predictive risk screening for type 1 diabetes, including: that the child is a minor, is asymptomatic, in the absence of an effective prevention or cure for type 1 diabetes, and despite risks that could outweigh the benefits of screening. These sentiments are consistent with those of proponents of expanding newborn screening to include a widening array of diseases (25), and pediatric bioethicists who uphold valuing and respecting parental autonomy about early disease risk identification in their children (26). The second factor/scale, Communication, also had good internal consistency (Cronbach's $\alpha = 0.71$). This scale assesses parents' preferences for disease risk feedback and communication of risk to the child, including if the screening results indicate an elevated likelihood of developing type 1 diabetes. Naturally, this depends on the child's age, level of maturity, and cognitive capacity to understand the information--a finding which has been observed in other predictive risk screening paradigms (27). The third P-TAS-D factor/scale captured parental Decision Making about type 1 diabetes predictive risk screening, with a modest but statistically significant correlation between its two items. Here, the focus is on who is the decision-maker about predictive risk screening, and the extent to which children themselves could be involved in making that choice (11). Taken together, an assessment of these issues could further inform longstanding debates about whether and when to approach parents about predictive risk screening for type 1 diabetes, and the bioethical and psychosocial issues inherent in doing so (28–30).

In addition to reliability findings, the P-TAS-D's validity was established through its association with related indices of disease worry and concern about type 1 diabetes research. We demonstrated that parents with more favorable responses on the P-TAS-D (i.e., those who were more inclined toward predictive risk screening for type 1 diabetes in children) were indeed more worried about their child developing the disease and expressed fewer concerns about their child engaging in type 1 diabetes research. Prior work by Johnson (31) has pointed to the important role that behavioral science plays in type 1 diabetes screening and risk notification trials to address bioethical concerns and improve scientific quality. We would further add that the availability and use of valid study measures such as the P-TAS-D could help achieve these outcomes by identifying parents with varying attitudes about predictive risk screening. For example, parents with higher scores on the P-TAS-D might be more prone to experience heightened anxiety in response to serial screenings of their child, at the time of risk notification, and beyond. Conversely, parents with lower scores on the P-TAS-D might be more difficult to retain in screening studies over time and have higher rates of drop-out. As a research tool, the P-TAS-D could facilitate targeted education for subgroups of parents, such as those with varying scores and certain demographic characteristics. In this study, parents with less education had more favorable attitudes, which could signal a need for additional information regarding risks and benefits. Future research with the P-TAS-D could investigate these possibilities. Moreover, the advent of DTC genetic testing panels that include low penetrance type 1 diabetes risk alleles may take parents by surprise to learn that their child is at-risk (4), and especially if testing was performed with a healthy child in mind (32). As a community, genetic counselors are underprepared to educate parents about these issues (33). Use of the P-TAS-D could help

inform counseling efforts by advancing our understanding of how parents perceive type 1 diabetes risk for their children.

Although the P-TAS-D was developed in English and underwent a rigorous translation process for administration in Swedish and subsequent validation, it was not validated in an English-speaking U.S. sample. Thus, more work is needed to assess the cross-cultural stability of the measure. Its availability in both English and Swedish will facilitate this work. Other limitations include the low number of items on the Decision Making factor, which could be addressed in future studies by developing additional items to improve the stability of this factor. Additionally, the relatively high level of experience with cohort research among the parents assessed and the advanced ages of their children approaching adolescence are acknowledged limitations of this research. Future studies are needed of individual P-TAS-D factor scores, with more naive parents, and those of younger age children. As our study sample fell within a specific age range, it would also be informative to study parents with varying times since their child's birth. Finally, our validity data accounted for less than 10% of the variance in the P-TAS-D. Future work should better understand determinants and correlates of parental attitudes toward children undergoing predictive risk screening for type 1 diabetes.

Despite these limitations, this is the first behavior rating scale to reliably and validly assess a large sample of parents' attitudes and beliefs about their children's predictive risk screening for type 1 diabetes. The potential uses of this measure include administration in diabetes screening trials, as well as clinical education and counseling efforts with parents contemplating genetic testing for type 1 diabetes risk in clinical settings.

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Table 1

Characteristics of the sample

	<i>M ± SD or n (%)</i>
<u>Parent Characteristics</u>	
Age, years	43.5 ± 4.4
Education	
< College/university	2,145 (57.7)
College/university	1,575 (42.3)
Employment status	
Employed	3,144 (84.6)
Not employed	571 (15.4)
Parental Swedish Origin	
Both parents Swedish origin	3,390 (92.2)
1 Parent non-Swedish origin	288 (7.8)
<u>Child and Family Characteristics</u>	
Age, years	13.3 ± 0.6
Gender	
Female	1837 (49.4)
Male	1883 (50.6)
Biological siblings	
0	337 (9.2)
1	1,983 (54.3)
2	1,335 (36.5)
Prior ABIS involvement, person-years	6.7 ± 2.4
Family history of type 1 diabetes	
Yes	383 (10.6)
No	3,244 (89.4)
<u>Validity Characteristics</u>	
Attitudes about type 1 diabetes	
Perceived risk, 1 = Much less, 5 = Much greater	2.6 ± 0.8
Disease worry, 1 = Never, 5 = Very often	1.8 ± 0.7
Disease prevention, 1 = Never, 5 = Very often	3.7 ± 0.9
Worry about type 1 diabetes research, [range = 5–25; higher scores = less worry]	18.6 ± 2.1
Attitudes toward type 1 diabetes research, [range = 4–20, higher scores = more favorable attitudes]	15.6 ± 3.0
Parent-child communication about ABIS, [range = 1–3, higher scores = greater communication]	1.8 ± 0.6
Child ABIS knowledge, [range = 0–3, higher scores = greater knowledge]	1.6 ± 0.6
<u>Pediatric Testing Attitudes Scale-Diabetes</u>	
Total [higher scores = more favorable attitudes and beliefs]	36.2 ± 8.2
Attitudes and Beliefs	19.8 ± 5.6
Communication	10.5 ± 2.6
Decision Making	6.0 ± 1.8

Total $n = 3,720$. Data are in n (%) or mean $\pm$ SD (range). Due to sporadic missing data (less than 5% for any individual variable) total sample size does not equal 3,720 for some comparisons.

Table 2
Factor loadings for exploratory and confirmatory factor analyses of the Pediatric Testing Attitudes Scale-Diabetes

P-TAS-D Item	Sample 1: Exploratory Factor Analysis			Sample 2: Confirmatory Factor Analysis		
	Factor 1: Attitudes and Beliefs	Factor 2: Communication	Factor 3: Decision Making	Factor 1: Attitudes and Beliefs	Factor 2: Communication	Factor 3: Decision Making
1 Children and teenagers under 18 years of age should be offered screening and testing of their risk to develop type 1 diabetes	.70	.03	.09	.71		
2 Parents should decide if their children should be screened or tested on their risk of developing type 1 diabetes, regardless of the doctor's opinion	.05	.06	.58			1.0
3. Even if symptoms associated with type 1 diabetes don't show until the child is older, infants and young children should still be offered screening and testing of risk of developing type 1 diabetes	.90	-.11	.10	.85		
4. The child should be a part of the decision-making regarding participation in screening and testing for type 1 diabetes.	-.09	.16	.29			.16
5.I am in favor of screening and testing of infants and children regarding risk of type 1 diabetes	.90	-.06	-.06	.86		
6. If infants and children are tested and a higher risk of developing type 1 diabetes is shown, the child should be informed of the test results during its childhood.	.13	.65	.02		.77	
7. Even if there isn't a cure or prevention to offer at present, infants and children should still be offered screening and testing for increased type 1 diabetes risk.	.82	.07	-.01	.87		
8. If the child is screened and tested and does have a higher risk of developing type 1 diabetes, this information should be given to those giving the child medical care	.36	.27	-.14		.58	
9. I want my child/my children to be screened and testing for a higher risk of developing type 1 diabetes before he/she/they turn 18 years old	.73	.13	.01	.78		
10. If children are screened and tested for type 1 diabetes and have a higher risk, the children should be immediately informed about the test results.	-.03	.88	.01		.74	
11. The advantages about letting infants and children participate in type 1 diabetes screening and testing outweigh the disadvantages	.75	.10	-.08	.81		

Two randomly selected subsamples of 1,860 participants each were used to conduct exploratory and confirmatory factor analyses. Exploratory factor analysis model fit indices: $\chi^2 [25 \text{ df}] = 198.7, p < .001$, Root Mean Square Error Approximation (RMSEA) = 0.06, Comparative Fit Index (CFI) = 0.98, Tucker-Lewis Index (TLI) = 0.96. Confirmatory factor analysis model fit indices: $\chi^2 [42 \text{ df}] = 536.0, p < .001$, RMSEA = 0.08, CFI = 0.95, TLI = 0.93.

Table 3

Bivariate associations with the Pediatric Testing Attitudes Scale-Diabetes

	Pearson's <i>r</i> or <i>M</i> ± <i>SD</i>	<i>p</i>
<u>Parent Characteristics</u>		
Age, years	.00	.97
Education		<.001
< College/university	37.1 ± 8.1	
College/university	34.8 ± 8.2	
Employment status		.13
Employed	36.1 ± 8.1	
Not employed	36.6 ± 8.7	
Parental Swedish Origin		.78
Both parents Swedish origin	36.0 ± 8.2	
1 Parent non-Swedish origin	36.2 ± 8.1	
<u>Child and Family Characteristics</u>		
Age, years	.03	.07
Gender		.32
Female	36.3 ± 8.2	
Male	36.0 ± 8.2	
Biological Siblings		.005
0	37.2 ± 8.0	
1	36.3 ± 8.3	
2	35.6 ± 8.2	
Prior ABIS involvement, person-years	.06	<.001
Family history of type 1 diabetes		.005
Yes	37.2 ± 8.4	
No	36.0 ± 8.2	
<u>Validity Characteristics</u>		
Attitudes/Perceptions about type 1 diabetes		
Perceived risk	−0.02	.24
Disease worry	0.13	<.001
Disease prevention	−0.03	.09
Worry about type 1 diabetes research	0.06	<.001
Attitudes toward type 1 diabetes research	0.14	<.001
Parent-child communication about ABIS	0.03	.12
Child ABIS knowledge	0.06	<.001

Table 4

Validity of the Pediatric Testing Attitudes Scale-Diabetes

	Estimate (B)	Standard Error B	<i>p</i>
Parental college education	−2.1	0.27	<.001
2 Siblings	−0.62	0.28	0.03
Family history of type 1 diabetes	0.52	0.45	0.24
Prior ABIS involvement	0.14	0.05	0.01
Worry about type 1 diabetes	1.3	0.19	<.001
Worry about type 1 diabetes research	0.37	0.07	<.001
Attitudes toward type 1 diabetes research	0.29	0.05	<.001
Child ABIS knowledge	0.28	0.22	0.21
Model <i>F</i> Statistic (Model $R^2 = 0.06$)	$F[8,3588] = 28.0$		<.001