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Psychometric properties of a Turkish version of the Collaborative Parent Involvement Scale for youths with type 1 diabetes

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Abstract
This study aimed to examine the psychometric properties of the Turkish version of the Collaborative Parent Involvement Scale for youths with type-1 diabetes. This methodological descriptive-correlational study was carried out on 200 youths with type-1 diabetes, between November 2018 and November 2019. Factor analysis, Cronbach's alpha coefficient, and item-total correlation were used to evaluate the data. The total Cronbach's alpha coefficient of the Turkish scale was 0.958. From the confirmatory factor analysis, the results of model-fit index are: goodness-of-fit index = 0.94, comparative fit index = 0.99. Therefore, the Turkish version of the Collaborative Parent Involvement Scale, designed for youth with diabetes, was found to be a valid and reliable measurement tool for the Turkish population.

Keywords Diabetes · Type 1 diabetes · Collaborative parent involvement

Introduction

Type-1 diabetes mellitus (T1DM) is a chronic metabolic disease that is common among youths (Mayer-Davis et al. 2018). In Turkey, approximately 17,000 children have T1DM, with an annual increase of about 2000 children (Diabetes Education Program in School, Purposes of the Program 2020). The prevalence of T1DM in Turkey is approximately 0.67/1000 individuals. It necessitates lifestyle changes and psychosocial adjustment by both affected youth and their parents. Management of diabetes involves adherence to nutrition therapy, exercise, self-monitoring of glucose measurements, use of insulin pump/multiple insulin injections, and coping with changes in blood glucose levels (DiMeglio et al. 2018). Youths need to adapt to the disease, in addition to practicing good diabetes management (Lohan et al. 2017; Holmström et al. 2018a). Diabetes management is enhanced when parents are more involved in adherence behaviors, are knowledgeable about diabetes management, and collaborate with their children (Nansel et al. 2009; Wiebe et al. 2014).

Collaborative parental involvement involves solving the problems of youths under any circumstances and at any time, facilitating diabetes management, and promoting the youth's autonomy in diabetes management. Collaborative parental involvement is characterized by emotional support and encouragement of independence (Gruhn et al. 2016). It has been reported that collaborative parental involvement in diabetes management positively impacts metabolic control and psychosocial outcomes (Radcliff et al. 2017). Sharing responsibilities with the help of a normal youth-parent relationship increases both adherence to nutrition therapy and the youth's emotional development during diabetes management (Lord et al. 2015; Delamater et al. 2018). Studies have reported that the overall quality of life and health-related quality of life of youths with diabetes increased, their levels of self-efficacy and adaptation to the disease improved, and A1C levels were enhanced with the involvement of collaborative parents (Nansel et al. 2009; Wysocki et al., 2009; King et al. 2014; Marker et al. 2018). In addition, Noser et al. (2017) conducted a study on 135 youths between the ages of 10–16 and observed that young people did not monitor their own blood glucose levels without the participation of collaborative parents, and their diabetes management was negatively affected.

Collaborative parent involvement entails the active participation of both the mother and father in the management of the

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disease. In previous studies, fathers have been reported to have lesser participation in disease management compared to mothers. In a study conducted by Berg et al. (2011) on 252 youths, the equal involvement of younger parents in diabetes management was observed to increase the self-efficacy of youth and their compliance with diabetes. Particularly, the collaborative involvement of fathers in that study was determined to have a direct positive effect on the A1C levels. Studies have also shown that the involvement of fathers along with mothers in the management of T1DM positively influenced the child's adaptation to the disease and health outcomes (Palmer et al. 2011; King et al. 2014; Markowitz et al., 2014; Taylor et al. 2020). Patients whose fathers accompanied them during at least one clinic visit over a 2-year period had better metabolic control (lower HbA1c), compared to those whose fathers had never done so (Markowitz et al. 2014). Mothers play a primary role in the management of chronic diseases in Turkish culture. In Turkey, fewer women are involved in businesses than men, or if working, they drop out of work more often than men. Therefore, mothers often take on disease management of their children (Atagün et al. 2011; Erdem et al. 2013). However, existing literature has emphasized that the involvement of both parents in diabetes care is highly important and also more effective in improving the A1C levels (Wysocki et al. 2009; Palmer et al. 2011; Levitsky and Misra 2019).

While maintaining parental support along with being involved in the management of diabetes, parents should aim to gradually give their diabetic children a responsibility, thus promoting their autonomy and independence (Gruhn et al. 2016). The importance of collaborative parent involvement in the management of diabetes is well known; however, while parents exhibit cooperative behavior during insulin injection, they experience great stress during blood sugar follow-up and planning of nutrition and exercise (Holmström et al. 2018b). Although there is no specific age at which youth with T1DM could be expected to assume full responsibility for the self-management of their diabetes (Lawrence et al. 2015), it is generally assumed that by the age of 12, youth can practice self-management of diabetes (Bratina et al. 2018). However, it is advised that parents should take full responsibility for the management of diabetes in younger children, which could be gradually decreased during the transition into adolescence (Feldman et al. 2018).

The collaborative participation of parents in diabetes management is also highly significant during adolescence. In addition to the specific challenges of youth, changes in communication, and youth-parent relationships during this period can affect disease management and glycemic control in youths with diabetes. Although parents play a critical role in the management of diabetes, it has been emphasized that youth and parents with diabetes should cooperate to ensure well-maintained disease management (Palmer et al. 2011; Goethals et al. 2017). It has been reported in the literature that youths with diabetes are often not ready to manage their diabetes independently, while some youth with diabetes could even go against all rules/recommendations when they enter puberty (Lyons et al. 2013). Therefore, it is necessary to review the responsibilities of parents and youth with diabetes as they transition to adolescence (Levitsky and Misra 2019).

Studies have revealed that some parents transfer responsibilities related to diabetes to their children at a very early age, due to which the youths' compliance with treatment and blood glucose control are affected adversely (Wu et al. 2014; Caccavale et al. 2015; Feldman et al. 2018). In a study conducted by Anderson (2011) on children between the ages of 9 and 14, it was observed that providing early collaborative parent involvement was crucial for optimal glycemic control.

Only one study in the literature has examined direct collaborative parent involvement in the disease management of diabetic youth from the youth's perspective. This study developed a scale that covered youth, which made it easy to reach a wider sample. Questioning the younger age group about the involvement of their parents in diabetes care is crucial for achieving glycemic control during the transition to adolescence (Anderson 2011). This scale, developed by Nansel et al. (2009), consists of items such as "My parents know the difficulties I have in managing my diabetes"; "They help me solve my diabetes-related problems"; "They talk to me about how to adjust my insulin dose, and organize my diet plan and exercises". It is a scale that questions young diabetic individuals about how much their parents support them in their problems and when they are in need of support. These are among the advantages of the scale. In Turkey, a validated and reliable measurement tool that measures the CPI concept, which is important in the management of T1DM, is not yet available. Therefore, this study was designed to investigate the psychometric properties of the Collaborative Parent Involvement scale in Turkey for youths with T1DM.

Methods

This study was carried out in a descriptive-sectional design to test the psychometric properties of the Collaborative Parent Involvement Scale for Turkish youths with T1DM. Data were obtained from 200 participating adolescents aged 9–18, that were registered at the Pediatric Endocrinology Clinic of a university hospital in western Turkey between November 2018 and November 2019. The sample sizes for scale development studies have been categorized as: excellent- up to 1000; very good- up to 500; good- 200–500 (Karagöz 2018). Therefore, we planned to include at least 200 youth with T1DM. Inclusion criteria for the participating youths were: a) age of 9–18-years-old; b) diagnosis of T1DM at least six months ago; c) voluntary participation in the study; and d)

ability to read and understand the questions in the survey. The exclusion criteria for youths were: a) presenting with diabetes-related thyroiditis and celiac disease, which are common co-existing diseases with diabetes, and b) having a neurological problem due to diabetic or non-diabetic reasons.

Participants

The mean age of the youth included in the study was 13.66 ± 2.70 years, and 54% ($n = 108$) of the youth were male. The mean age of the mothers included in the study was 41.15 ± 5.25, and that of fathers was 45.43 ± 6.16. Furthermore, 45.5% ($n = 91$) mothers and 46% ($n = 92$) fathers were high school graduates. Among the youth examined in our study, 47% ($n = 94$) had been suffering from T1DM for 1–5 years; 40% ($n = 80$) for 6–10 years; and 13% ($n = 26$) for 11–17 years. Furthermore, 34.5% ($n = 69$) of the youth had A1C values <7.5%, while 65.5% ($n = 131$) had A1C values >7.5%, and 35% of the youth did not use insulin injections. The demographic characteristics are presented in Table 1.

Table 1 Descriptive characteristics of the youths with type 1 diabetes mellitus ($n = 200$)

Variable	Mean	SD
Age (years)	13.66	2.70
	n	%
Gender		
Female	92	46.0
Male	108	54.0
Diabetes Regimen		
Not using insulin injection (%)	70	35
Not using insulin pump (%)	130	65
Mother Education		
Primary school	7	3.5
Middle school	65	32.5
High School	91	45.5
University	37	18.5
Father Education		
Primary school	3	1.5
Middle school	54	27.0
High School	92	46.0
University	51	25.5
A1C (%)		
<7.5	69	34.5
>7.5	131	65.5
Duration of diabetes (years)		
1–5 years	94	47.0
6–10 years	80	40.0
11–17 years	26	13.0

Measures

Descriptive Information Form

This form, which was completed by youths, consisted of items inquiring about their age, gender, parental education status, duration of diabetes, and A1C levels.

Collaborative Parent Involvement Scale for Youths with T1DM (CPIS)

The scale developed by Nansel et al. (2009) evaluates the status of the participation of parents of youths with T1DM, from the youth's perspective. The original scale comprises 12 items and a single sub-dimension, and is scored in a range of 1–5: 1 = almost never; 2 = sometimes; 3 = often; 4 = almost always; 5 = always. The scale does not have a cut-off point, and the higher the score, the higher is the parental participation in diabetes care. The scale consists of question items inquiring the extent of involvement of the parents of diabetic youth in the management of diabetes (including guiding the youth on insulin dosage, nutrition plan, organization of exercise, and helping solve the diabetes-related problems of the youth). While the total Cronbach's alpha coefficient of the scale was 0.91, the item-wise total correlation coefficient ranged from 0.52 to 0.78. The factor analysis revealed that the scale was single-factor, and the explained variance ratio was 51.3%. The scale was found to be a valid and reliable instrument in assessing parental participation in the management of diabetes of diabetic youth aged 9–18 years (Nansel et al. 2009).

Procedure

Written permission for the Turkish adaptation and use of the CPIS was obtained through e-mail. Three linguists independently translated the scale into Turkish. Subsequently, the Turkish translations of the scale were rearranged by the researchers. Then, the scale was revised by a Turkish language expert. The Turkish scale was then back-translated into English by a different linguist.

In order to determine the content validity of a scale, the opinions of at least three experts should be sought (Seçer, 2018). A total of seven experts, including four instructors from the Department of Pediatric Nursing, two pediatric endocrinologists, and a pediatric psychologist, were asked to evaluate the scale. The draft form of the scale and its original English version were given to the experts, and they were asked to score the scale from 1 to 4 (1 = not appropriate at all, 4 = totally appropriate) to evaluate the appropriateness of the items. These scores were evaluated using the content validity index (CVI). The draft form of the scale was then revised according to the experts' opinions (Karagöz 2018).

The revised form of the scale was then applied to 10 participants that met the study sampling criteria, and a decision was then made to proceed with the study, since no negative feedback was received. The ten youths that were involved in the pilot study were excluded from the main sample. During the pilot study, more attention was paid to the younger age group. They were asked whether they understood each item of the scale. This was important for us, as this group had diabetes for at least five years, and had been maintaining their diabetes management. As the items of our questionnaire were directly related to the process that the youth were experiencing and inquired whether parents were involved in diabetes management, the youth had no difficulty in answering the questions. Also, during the data collection period, the researchers were in the outpatient clinic and were easily accessible to youth that had any difficulties.

The obtained Turkish version was translated back into English by a person who had not seen the scale before. A fit between the Turkish and English versions was obtained. After confirming that the language and scope equivalence of the scale was satisfactory, the scale was administered to the study sample.

Ethics of the Study

For analysis of the validity and reliability, permission was obtained from the original owner of the scale via e-mail (Nansel et al. 2009). Approval from the Ethics Committee of Non-Interventional Studies (protocol No. 4442 GOA, decision No. 2019/01–109) and permission from the institution were obtained before initiation of the study. Before the study was conducted, the youths and their parents were informed about the purpose of the research, and written permission was obtained from the youths and parents who agreed to participate. After written permission was obtained, the eligible youths completed both the Descriptive Information Form and Collaborative Parent Involvement Scale for youths with T1DM.

Data Analysis

The Statistical Package for Social Sciences version 22.0 (SPSS, Chicago, Illinois, U.S.) and LISREL version 8.7 software were used for statistical evaluation of the data. Sociodemographic data from the youths were analyzed by number, percentage, and mean. Validity is the degree to which a scale measures what it is intended to measure. To determine the validity of the scale in the Turkish population for this study, content validity and construct validity were employed. The Content Validity Index (CVI) was used to analyze the compatibility of the experts' opinions. Pearson correlation was used to assess the total score of the scale. For assessment of the internal consistency, Cronbach's alpha, test re-test analysis, and item-total score were determined (Wasserman and Bracken 2003). The explanatory factor analysis (EFA) and confirmatory factor analysis (CFA) were employed to ensure the construct validity of the Turkish version of the scale. Hotelling's T-squared test was used to determine response bias (Şencan 2005; Simşek 2010). *P* values <0.05 were considered to be statistically significant.

Results

Content Validity

Based on the opinions of seven experts on the Turkish version of the scale content validity, the item-level content validity index (I-CVI) was calculated as 0.87. The scale-level content validity index (S-CVI) was also observed to be 0.87.

Explanatory Factor Analysis (EFA)

Based on the EFA, the Kaiser-Meyer-Olkin (KMO) coefficient of the Turkish scale was determined to be 0.944, while Bartlett's $\chi 2$ value was 2226.374 ($p < 0.001$). On the other hand, the EFA revealed that the Turkish scale comprised a single dimension, and the scale's total explained variance was 69.2%. The EFA also revealed that the scale's factor load values were in the range of 0.75–0.84 (Table 2).

Confirmatory Factor Analysis (CFA)

Based on the CFA, the scale's factor load values were observed to be in the range of 0.71–0.88. Regarding the model-fit indexes, model chi-square ($\chi 2$) was 79.47 (df: 42), and the root mean square error of approximation (RMSEA) was 0.067. Another parameter for model fit is calculated by dividing its $\chi 2$ value by its degree of freedom. If the output value is below 5.0, the model fit is satisfactory (Şencan 2005). The value of this parameter in our study was 1.89, indicating a satisfactory model fit (Table 3). Among the other indices, the goodness-of-fit index (GFI) was 0.94, comparative fit index (CFI) was 0.99, incremental fit index (IFI) was 0.99, relative fit index (RFI) was 0.98, normed fit index (NFI) was 0.98, and non-normed fit index (NNFI) was 0.99 (Table 3, Fig. 1).

Reliability Analysis

Cronbach's alpha coefficient of the entire scale was 0.96. We did the test-retest analysis with 30 youth who had visited the outpatient clinic for control and had agreed to fill out the scale again. We were able to reach 30 (15%) out of 200 youth. The test-retest reliability, as assessed by intra-class correlation, was 0.85. For analysis of the two-halves, the Cronbach's alpha value of the first half was 0.93, the Cronbach's alpha value of the second half was 0.92, the Spearman-Brown coefficient

Table 2 Factor Analysis and Corrected Item–Total Correlation of Turkish version of The Collaborative Parent Involvement Scale for Youths with Type 1 Diabetes (n = 200)

Item No	Item Description	Factor Loading	Corrected Item Total Correlations (r*)
1	Helps me plan my diabetes care to fit my schedule.	0.85	0.81
2	Knows when I need a little extra help with my diabetes.	0.87	0.84
3	Helps me figure out how to change my insulin or eating to fit the amount I exercise.	0.79	0.75
4	Helps me out when I am too tired or stressed to take care of my diabetes on my own.	0.84	0.80
5	Knows what things are hard for me in taking care of my diabetes.	0.82	0.77
6	Helps me learn how to take care of troubles I have with my diabetes	0.86	0.82
7	Knows when to let me do more to take care of myself and my diabetes.	0.86	0.83
8	Helps me plan how to spend time with my friends and still takes good care of my diabetes.	0.82	0.79
9	Talks with me about how to adjust (change) my insulin, eating, and exercise.	0.87	0.84
10	Helps me with my diabetes when I need it.	0.83	0.80
11	Helps me take care of any problems I am having at school with taking care of my diabetes.	0.81	0.77
12	Knows how I am taking care of my diabetes when I am with friends.	0.77	0.73
Explained Variance (%)		**69.2%**	

*Significant at $p < 0$ .001 level

was 0.93, the Guttman split-half coefficient was 0.88, and the correlation coefficient between the two halves was 0.86 (Table 4). When the item-total correlations of the scale were examined, they were observed to be in a range of 0.729–0.843 and statistically significant ($p < 0.001$). The Hotelling's T-squared test was used to determine whether the scale had response bias, and its value was 37.214, F = 3.213 ($p < 0.001$).

Discussion

Youths should assume an increasing amount of responsibility for the management of their own diabetes, but with continuous, mutually agreed parental involvement and support (Feldman et al. 2018; Lohan et al. 2017). In literature, parents have been suggested to be an integral part of diabetes management, and are essential for achieving optimal glycemic control (Delamater et al. 2018). Mothers play a primary role in the management of chronic diseases in Turkish culture. In Turkey, women are involved in businesses to a lesser extent than men, and even if working, they tend to drop out of work more often than men. Therefore, mothers often take on the disease management of their children (Atagün et al. 2011; Erdem et al., 2013). However, it has been emphasized in the literature that the collaborative involvement of both parents in diabetes care is highly important, and is more effective in improving A1C levels (Wysocki et al., 2009; Palmer et al. 2011; Levitsky and Misra 2019). For this reason, it is important to evaluate the collaborative involvement status of the parents, especially from the perspective of youths. In this study, the findings of the Turkish psychometric properties of the "Collaborative Parent Involvement Scale for youths with type 1 diabetes" were discussed. This section compares our findings in the Turkish context only with those of the study by Nansel et al. (2009), since the validity and reliability of the scale have not been studied across different cultures.

Previous literature has emphasized that collaborative parent involvement is affected by the communication between parents and youths, separation of mother and father, income level, race, and ethnicity (Hanna and Guthrie 2003; Drew et al. 2011). The individual contribution of both the mother and father to diabetes management is especially important in collaborative parent participation. Parental involvement in diabetes care enhances the level of self-efficacy of youths, enabling them to experience fewer diabetes-related problems in the future and obtain support when needed (King et al. 2014). In

Table 3 Model fit indices for confirmatory factor analysis

Single Factor	χ2	df[a]	χ2/df	RMSEA[b]	GFI[c]	CFI[d]	IFI[e]	RFI[f]	NFI[g]	NNFI[h]
Model	79.47	42	1.89	0.067	0.94	0.99	0.99	0.98	0.98	0.99

[a] Degree of Freedom, [b] (Root Mean Square Error of Approximation, [c] Goodness of Fit Index, [d] Comparative Fit Index, [e] Incremental Fit Index, [f] Relative Fit Index, [g] Normed Fit Index, [h] NNFI: non-normed fit index

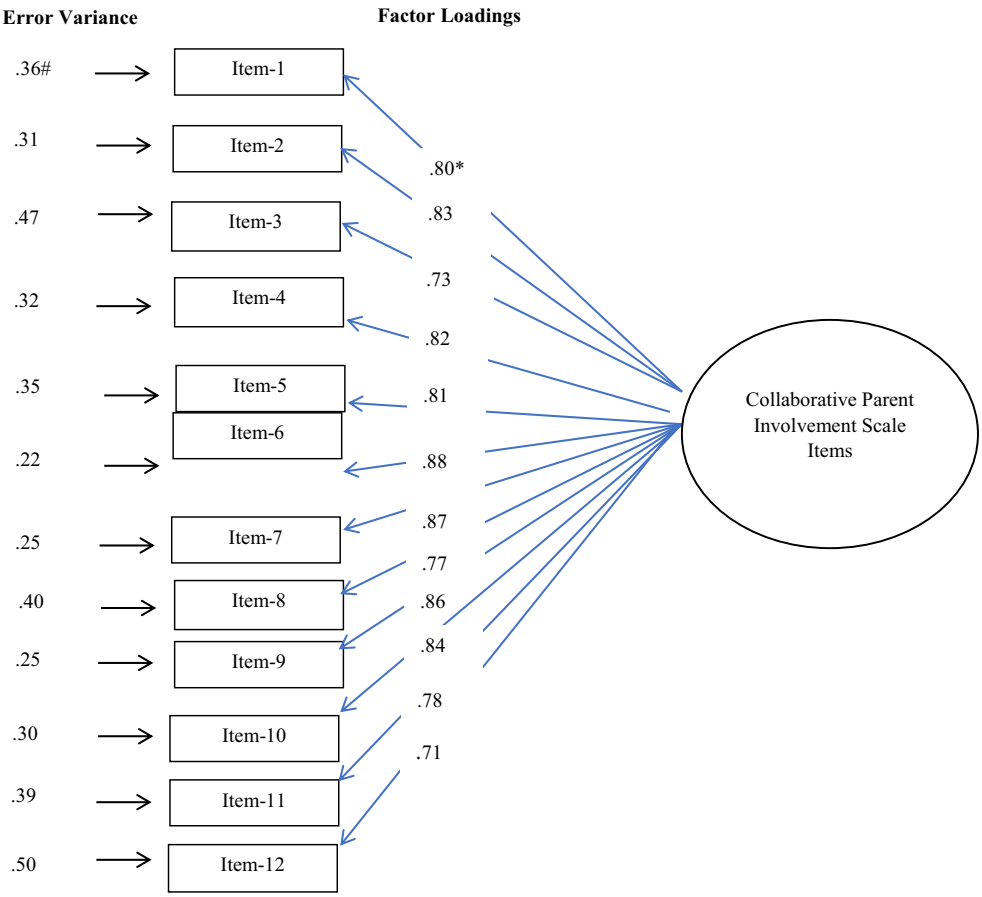

Fig. 1 Confirmatory factor analysis of Turkish version of The Collaborative Parent Involvement Scale for Youths with Type 1 Diabetes. *Factor loadings; #Error variance: The part of the total variance caused by anything irrelevant that was not experimentally controlled

this study, the mean age of the young individuals alone was found to account for 13% of the mean total score of the collaborative parent involvement scale. The gender of the young individuals, education level of the parents, age of the parents, duration of diabetes, and the level of A1C were not observed to impact the collaborative parent involvement. Contrary to these findings, Zhang et al. (2016) reported that the age of the child had no effect on collaborative parent involvement, but the age of the parents did, as younger parents monitored their youth more closely, controlled blood sugar more often, and thus were more involved in diabetes care. Similar to our findings, they observed that the gender of the child did have an effect on collaborative parent involvement.

Both I-CVI and S-CVI should be >0.80 in order to be able to confirm that there is an agreement between the experts' opinions. If the I-CVI and S-CVI >0.80%, the item is relevant; if it is between 0.70 and 0.79, the item needs revisions, and if the value is below 0.70, the item is eliminated (Zamanzadeh et al. 2015). In this study, the values of both I-CVI and S-CVI were observed to be >0.80. This showed that there was an agreement between the experts, based on which it was concluded that the expressions of the scale corresponded with the Turkish culture, represented the area to be measured, and provided content validity.

The Kaiser-Meyer-Olkin (KMO) coefficient and Bartlett's Sphericity test were used to determine whether the data were sufficient and appropriate for factor analysis. In the literature, it has been stated that the Barlett Sphericity test value should be statistically significant, and the KMO value should be at least 0.60 (DeVellis 2012). Based on the KMO test, it has been argued that the factor analysis cannot be continued if the value is <0.50 (Çokluk et al. 2018). In this study, the value

Table 4 Results of scale reliability ($n = 200$)

	Cronbach's α	First half Cronbach's α	Second half Cronbach's α	Spearman's Brown	Guttman split-half	Correlation between two halves	M ± SD (Min-Max)
Total Scale	0.96	0.93	0.92	0.93	0.88	0.86	50.79 ± 10.83 (21–60)

of the Barlett Sphericity test was observed to be statistically significant ($p < 0.05$), and the KMO value was >0.60. Thus, the database in this study was appropriate for factor analysis, and the sample size was sufficient (Terwee et al. 2007; DeVellis 2012). These results could not be compared with the findings of Nansel et al. (2009) because that study did not use KMO and Barlett Sphericity test to evaluate the data.

In the descriptive factor analysis, it was accepted that the eigenvalue of the factor number was ≥1 (Şencan 2005). The scale was determined to consist of a single sub-dimension. In this study, the single sub-dimension of the scale explained 69.2% of the total variance. The corresponding variance explained by a single factor was reported to be 51.3% in the study by Nansel et al. (2009). An analysis that explains 50–75% of the total variance is accepted in the literature as a validity analysis (Şencan 2005). It was determined that the total variance observed in this study was >50%, and the scale explained a large part of the variance. These results support the structural validity of the scale.

Based on the EFA, it was observed that the factor loads of the single sub-dimension ranged between 0.30 and 0.92. In literature, it has been reported that an item with a factor load ranging from 0.30 to 0.60 gives a moderate measure of the structure (Şencan 2005; Terwee et al. 2007; DeVellis 2012). The minimum factor load should be 0.30, and items with a factor load lower than 0.30 should be excluded from the scale. In this study, the factor loads of all the items in the scale were greater than 0.60, indicating that the scale had a strong factor structure. In the literature, it is recommended that the structure determined by EFA should be examined using CFA. It is recommended that the model compliance indicators GFI, NFI, NNFI, and CFI should be >0.90, while RMSA should be <0.08 (Hooper et al. 2008). In the present study, compliance with these requirements is observed, the data are compatible with the model, and it is a good model that confirms the single-factor structure (DeVellis 2012). Since the model-fit indices were not examined in the original scale, no comparison could be made with the Turkish scale.

Reliability is defined as the consistency between individual responses to the test items. Reliability is related to the test's accuracy in the measurement of a feature it aims to measure. Internal consistency and invariance analysis were used for analyzing the reliability of the scale. A Cronbach's alpha value below 0.40 indicates unreliability, between 0.60 and 0.80 indicates low reliability, and greater than 0.80 indicates high reliability. In the present study, the total Cronbach's alpha coefficient was greater than 0.80, indicating that the scale had a high level of reliability (Karagöz 2018). In the study conducted by Nansel et al. (2009), Cronbach's alpha values of the scale were observed to be >0.80, which was similar to our study. This result showed that the Turkish version of the scale was similar to the original scale, and had a strong internal consistency. The test-retest analysis is the correlation between the scores obtained by applying a scale to the same individuals twice at certain intervals. In the literature, the sample size recommended for the test-retest analysis is 20–30 participants. It is also vital that adolescents volunteer to fill the same scale again. In this study, 30 adolescents filled the scale again. The higher the test re-test correlation coefficient, the greater is the reliability, and a correlation coefficient between 0.80 and 0.90 indicates good reliability. The test-retest analysis of our Turkish scale showed the correlation coefficient to be above 0.80, thus indicating high reliability. The lack of test-retest analysis in the original scale is one of our study's strengths compared to the original scale.

The two-halves analysis was carried out in this study, and the Cronbach's alpha values of both halves were > 0.70. Thus, there was a strong and meaningful relationship between the two halves; both the Spearman-Brown and Guttman Split-Half coefficients were > 0.70. These results demonstrate that the scale was highly reliable (Karagöz 2018). While these results demonstrated that the internal validity of the scale was high, the results could not be compared with the findings reported by Nansel et al. (2009), as a two-halves analysis was not conducted in that study.

One of the significant factors that influence the reliability of scales is response bias. Response bias means that, while rating the items on the scale, people tend to select the answers that meet the expectations of the community or the people who administered the scale, and not according to their own opinions. This negatively impacts the reliability of the scale, and indirectly, its validity. Hotelling's T-squared test was used to determine if there was a response bias in the proposed Turkish version of the scale. It was observed that the respondents reacted to the items according to their own views, the responses of the participants to the items varied from each other, and the scale did not have a response bias. This further reinforces the scale's reliability (Şencan 2005).

The item-total correlation analysis explains the relationship between the scores obtained from scale items and the scale's total score. It shows how the items in the scale are related to the scale, and whether they measure the desired quality (Terwee et al. 2007; DeVellis 2012). The item-total correlation coefficient is expected to be greater than 0.30 and positive (Şencan 2005). It was observed that the correlations of items with the total score of the scale were between 0.52 and 0.78. In this study, the item-total correlation coefficient was found to be positive and > 0.30. Therefore, all items of the scale adequately measured the quality to be measured, and the item reliability of the scale was high.

This study has several limitations. First, the concurrent/convergent and divergent validity were not examined. Secondly, as this scale could not be compared across different cultures due to the lack of scales developed for different languages, only the original scale was reviewed in this article.

Conclusion

The findings indicated that both the Turkish version of the scale and the original scale consisted of a single sub-dimension. Similar to the original scale, Cronbach's alpha value of the Turkish version of the scale was high. The present study demonstrated that the Turkish version of the Collaborative Parent Involvement Scale for youths with T1DM is a valid and reliable measurement tool. This scale can be used to understand how parental involvement in diabetes care is perceived in both childhood and during the transition to youth and facilitates the identification of diabetic youth that are ready for self-care. Further interventional studies should be conducted on the importance of collaborative parental involvement in diabetes care for youth.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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