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Psychometric properties of a Turkish version of the Diabetes Management Self-Efficacy Scale in Adolescents with Type 1 Diabetes Mellitus

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ABSTRACT

The objective of this study was to determine the validity and reliability of the Diabetes Management Self-Efficacy Scale in Adolescents with Type 1 Diabetes. The study sample consisted of 203 adolescents with type 1 diabetes mellitus. The data were statistically analyzed based on frequency counts, percentages, and reliability/validity analyses. The internal consistency reliability coefficient of the scale was 0.85. According to confirmatory factor analysis, the model fit indices of the scale were determined as follows: Goodness-of-Fit Index = 0.90, Comparative Fit Index = 0.93. This is the first report of a disease-specific instrument for evaluating the self-efficacy of adolescents with type 1 diabetes mellitus in Turkey.

Type 1 diabetes mellitus (T1DM) is characterized by chronic immune-mediated destruction of pancreatic β-cells, which leads to partial or, in most cases, absolute insulin deficiency (Craig et al., 2014). More than 79,000 adolescents are diagnosed as having T1DM everyday worldwide (International Diabetes Federation, 2013). In Turkey, it is estimated that there are approximately 15,000 adolescents with diabetes, most of whom are school aged, and approximately 1,500–1,700 adolescents are diagnosed as having TIDM every year (Adolescent Endocrine Society [AES], 2013). In the context of type 1 diabetes, many adolescents experience a deterioration in metabolic control, which is often attributable to erratic meal and exercise patterns, poor treatment regimen adherence, eating disorders, and endocrine changes associated with puberty, all of which lead to greater insulin resistance (Cameron, Amin, Beaufort, Codner, & Acerini, 2014). Self-management domains include insulin administration, self-monitoring of blood glucose at home, dietary behaviors, hypoglycemia preparedness, collaboration with health care staff on exercise, responsibility in care, diabetes problem-solving, communication about diabetes with parents or health care staff, and diabetes knowledge (Guo, Whittemore, & He, 2011). Support for self-management among adolescents improves their

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quality of life and health outcomes (American Diabetes Association [ADA], 2014). Given that adolescents have increasing autonomy and take more responsibility for their own disease care regimens, individual characteristics that facilitate adherence to disease-care behaviors should also be considered (Iannotti et al., 2006).

Adolescents who believe that they can monitor their own blood glucose level, even when busy, who manage their blood glucose level appropriately when participating in after-school athletics, or who eat appropriately when with friends at fast-food restaurants should be better able to persevere and succeed in the face of situational barriers to diabetes self-management (Iannotti et al., 2006). There appears to be a strong relationship between self-management and self-efficacy (Bandura, 1997). The concept of self-efficacy is based on social cognitive theory, which describes the interaction among behavioral, personal, and environmental factors in health and chronic disease. Higher self-efficacy is associated with more prudent self-care behaviors and better glycemic control, which indicates that individuals who perceive themselves as competent in managing their disease are more likely to actually do so (Ahola, 2012). Previous studies have shown that high self-efficacy in adolescents with diabetes positively influenced quality of life and blood sugar control (Grey, Boland, Yu, Sullivan-Bolyai, & Tamborlane, 1998; Ott, Greening, Palardy, Holderby, & DeBell, 2000; Rose, Fliege, Hildebrandt, Schirop, & Klapp, 2002). A study by Chih, Jan, Shu, and Lue (2010) further highlighted the positive effects of high self-efficacy in controlling diabetes in adolescent patients with T1DM. Additionally, systematic reviews have indicated that self-efficacy could positively influence self-management behaviors of patients with diabetes (Krichbaum, Aarested, & Buethe, 2003). Measurement of self-efficacy can be used to predict a patient's intention to change and to identify interventions aimed at increasing self-care. Therefore, the validity and reliability of instruments must be evaluated in specific cultural contexts.

The Diabetes Management Self-Efficacy Scale for adolescents with type 1 diabetes was developed by Moens in 1998. The scale can be used to assess adolescents' educational needs or to evaluate the effectiveness of diabetes education programs. Initially, 30 items for the instrument were generated through focus group interviews and their relevance was judged by a team of 10 experts on self-management behavior in adolescents. Cronbach's alpha for the 26-item instrument was 0.86. The sample for psychometric testing consisted of 90 patients with type 1 diabetes who were aged between 12 and 18 years. Moen's self-efficacy scale is a reliable and valid instrument, but it has never been translated and used in Turkey.

The concept of self-efficacy is most important for adolescents with type 1 diabetes, but there is no reliable and valid self-efficacy instrument for Turkish adolescents with diabetes. We decided to adapt the Diabetes

Management Self-Efficacy Scale for Adolescents with Type 1 Diabetes and specifically aimed at determining the validity and reliability of a Turkish version of the scale. The purpose of the study was to assess the psychometric properties of the Diabetes Management Self-Efficacy Scale for Turkish adolescents with type 1 diabetes. First, we sought to examine the internal consistency of the measure. Second, we examined the content validity of the measure through subject matter experts' opinions. Third, we sought to confirm the 4-factor model that has been found in previous study.

Methods

Study design

This study used a descriptive, cross-sectional design with psychometric analysis. The study population consisted of adolescents with T1DM aged 12–18 years who were registered in the pediatric endocrinology outpatient clinics of two university hospitals in Western Turkey between November 2013 and December 2014.

Participants

A sample size of more than 100–200 subjects for the whole scale or of 5–10 subjects for each item was recommended to ensure that the factor analysis was valid when adapting the scale (Brown, 2015). The target sample size in our study was five subjects per item, or a total of 130 subjects; a total of 203 teenagers with T1DM were finally recruited. The average age of the participants was 14.32 ± 1.30 years, 66.7% of whom were girls. Some 17.9% of the participants were in the 9th grade, 22.8% were in the 10th grade, 29.7% were in the 11th grade, and 29.7% were in the 12th grade. The inclusion criteria were as follows: (a) T1DM diagnosed at least 6 months before enrollment, (b) adolescents aged 12–18 years, and (c) the ability to read and understand the questionnaire. The exclusion criteria were as follows: (a) the presence of thyroiditis or celiac disease, both of which are often concomitant with diabetes, and (b) the presence of either diabetes-related or unrelated neurologic problems. Diseases such as thyroiditis and celiac disease, which are frequently observed together with diabetes, and neurologic diseases that are or are not related to diabetes all affect the cognitive function of adolescents. These patients were excluded from the study because these conditions might disrupt the adolescents' diabetes education and perception of diabetes, and might complicate the metabolic control of diabetes.

Procedure and measurements

Data were collected using the demographic data form (data included age; sex; schooling; years with diabetes; and parents' ages, education, and income levels) and the Diabetes Management Self-Efficacy Scale for Adolescents with Type 1 Diabetes.

Diabetes Management Self-Efficacy Scale for Adolescents with Type 1 Diabetes

The Diabetes Management Self-Efficacy Scale for Adolescents with Type 1 Diabetes was developed by Moens in 1998. The study population consisted of adolescents with T1DM aged 12–18 years. The scale comprises 26 single-choice items scored on a 5-point scale ranging from 1 (*definitely yes*) to 5 (*definitely not*). Self-efficacy scores are summed and divided by the total number of items to indicate the strength of perceived self-efficacy for different levels of performance regarding the total domain of diabetes self-management activities. High scores represent less self-efficacy (Moens, 1998).

The content validity of the scale was determined using 10 experts' opinions. The experts' opinions were examined using the Content Validity Index. After adherence to the 26-item scale was analyzed, the consensus between the 10 experts was 88%.

Cronbach's alpha for the 26-item instrument was 0.86. The mean inter-item correlation of the original scale was 0.34. The total descriptive variance rate of the 4-factor scale was 47.1%. Factor 1 (medical treatment and nourishment) items were: 1, 2, 4, 5, 7, 9, 10, 11, 14, 18, 22, and 26; Factor 2 (evaluating glycemia and making adjustments to nourishment and/or insulin dose) items were: 6, 8, 12, 13, 17, 19, 21, and 25; Factor 3 (talking about your diabetes) items were: 23 and 24; and Factor 4 (honesty with yourself and others) items were: 3, 15, 16, and 20 (Moens, 1998). The factor load values of the scale were as follows: Factor 1 load values were between 0.47–0.72; Factor 2 load values were between 0.46–0.78; the Factor 3 load value was 0.76; and Factor 4 load values were between 0.47–0.62.

Adaptation of the Diabetes Management Self-Efficacy Scale for Adolescents with Type 1 Diabetes

The scale was independently translated into Turkish by three linguists. The Turkish version was then translated back into English by a different linguist. Expert opinions were sought from 5 nursing faculty members, 2 diabetes nurses, 1 pediatric oncologist, and 1 faculty member from the Pediatric Diabetes Association. The experts were shown the original and translated versions of the scale and were asked to evaluate the items for compatibility on a scale of 1–4, ranging from 1 (*very compatible*) to 4 (*requires major modification*). After the linguistic validity was established, the instrument was

tested on 10 adolescents by members of the research team. Adolescents who participated in the pilot study were excluded from the remainder of the study. It was determined that the scale could be used with an adequately large sample to test its reliability and validity because no negative feedback was received from the adolescents.

The researcher obtained written permission from Dr. Amber Moens, who developed the original version of the scale. Additionally, approval to conduct the study was obtained from the university's ethics commission (protocol number 779-GOA, decision number 2012/36–02), which oversaw the study. All procedures were approved by the Institutional Review Board of the participating institution. Before the study was conducted, the adolescents and their parents were informed of the purpose of the research, and written permission was obtained from the adolescents and parents who agreed to participate in the research. After written consent was obtained, the eligible adolescents completed both the Demographic Questionnaire and the Diabetes Management Self-Efficacy Scale for Adolescents with Type 1 Diabetes. The data collection process lasted for a maximum of 10 minutes per adolescent.

Data analysis

The Statistical Package for the Social Sciences version 15.0 (SPSS Inc, Chicago, IL, USA) was used for statistical evaluation of the data. Reliability was determined using Cronbach's alpha and item-total correlations. A Cronbach's alpha of 0.70 was acceptable for new measures, representing a modest degree of homogeneity (Wasserman & Bracken, 2003). In the item-total analysis, the acceptable coefficient in item selection was required to be greater than 0.30 (Şencan, 2005).

Validity was evaluated using the content validity index (CFI) and confirmatory factor analysis (CFA). The CVI for the total instrument is the percentage of the total items rated by the experts as being quite or very relevant, based on a 4-point scale. A CVI score above 80% represents excellent agreement; above 60%, a substantial level of agreement; from 40–60%, moderate agreement; and below 40%, prescriptive validity, which must be considered in the context of the desired outcome (Portney & Watkins, 2000).

Results

In the present study, we included adolescents with type 1 diabetes who were in the clinic on the days of data collection and met the inclusion criteria. All of the adolescents and parents agreed to participate in the study. A total of 203 adolescents with type 1 diabetes met the inclusion criteria. Expert opinions were sought from five nursing faculty members, two diabetes nurses, one pediatric oncologist, and one faculty member from the

Pediatric Diabetes Association. The experts were shown the original and translated versions and asked for their evaluation. The inter-rater agreement was tested using the CVI, which yielded 86% agreement between the experts.

The CFA showed respective factor-loading ranges of Factor 1 (medical treatment and nourishment), 0.41–0.86; Factor 2 (evaluation of glycemia), 0.42–0.89; Factor 3 (talking about your diabetes) 0.75–0.77; and Factor 4 (honesty with yourself and others), 0.41–0.72 (Table 1). The model fit indicators were the goodness-of-fit index (GFI) = 0.90, non-normed fit index (NNFI) = 0.93, comparative fit index (CFI) = 0.93, and incremental fit index (IFI) = 0.93, with $\chi 2 = 470.15$ for $df = 290$, $p < .001$, and the root mean square error of approximation (RMSEA) was 0.056 (Figure 1). Another parameter for model fit is calculated by dividing its $\chi 2$ value by its degree of freedom. If the outcome is under the value of five, the model fit is satisfactory (Şencan, 2005). This calculation was less than five ($\chi 2/df = 1.62$) (Table 2) in the current analysis, which indicated that the data were compatible with the scale, the items and sub-scales were related, and items in each sub-scale could define the corresponding factor sufficiently. These results supported the construct validity of the original questionnaire and indicated that the instrument was a valid tool that could be used in Turkish populations.

The total Cronbach's alpha internal consistency reliability coefficient value was 0.85, and the Cronbach's alpha coefficient, organized according to the factors in the Turkish version of the scale, showed values of 0.80, 0.75, 0.70, and 0.70 for Factor 1 (medical treatment and nourishment), Factor 2 (evaluation of glycemia), Factor 3 (talking about your diabetes), and Factor 4 (honesty with yourself and others), respectively. The item-total correlations varied between 0.40 and 0.59 and were statistically significant ($p < .001$) (Table 1).

Discussion

This is the first study to test the instrument's reliability and validity in a different culture, and our study supported the reliability and validity of this instrument in adolescents with diabetes in Turkey. However, the discussion section of our study can only be based on the original scale because it has not been adapted before now.

CVI analysis was performed to validate the content of the original scale; the scale was examined by experts, reviewed, and prepared according to their criticisms. The experts evaluated the coherence of items by giving points; CVI scores above 80% indicate that there is excellent agreement (Polit & Beck, 2008). As a result of the CVI analysis, it was found that the views of the experts were compatible with each other. The opinions of experts were also obtained for the content validation of the Turkish validity and reliability study. In this study, all factor loadings were above 0.30 (Şencan, 2005). When we examined the factor load values, it was concluded that the load values of Factor 3 were similar to

Table 1. Factor analysis and corrected item–total correlation of the Diabetes Management Self-Efficacy Scale for Adolescents with Type 1 Diabetes Mellitus.

Item no.	Item description	Medical treatment and nourishment	Evaluation of glycemia	Talking about your diabetes	Honesty with yourself and others	Corrected item–total correlation
1	I'm convinced that I can refuse sugared candies when offered by friends.	0.516				0.41
2	I'm convinced that I am able to keep my diet when going to a party.	0.494				0.40
4	I'm convinced that I am able to take Dextros (or sugar, cookies, cola) with me when I go out.	0.568				0.48
5	I'm convinced that I can feel when my blood sugar is too high.	0.407				0.49
7	I'm convinced that I am able to eat exactly sufficient food in case of a hypo.	0.465				0.47
9	I'm convinced that I am able to continually alternate my insulin injection places.	0.469				0.40
10	I'm convinced that I can inject my insulin at the right time of day.	0.570				0.56
11	I'm convinced that I am able to adjust my insulin dose and/or diet when going in for sports.	0.498				0.56
14	I'm con I'm convinced that I am able to take sufficient regular exercise or do sports.	0.415				0.42
18	I'm convinced that I can inject my insulin in all situations.	0.473				0.42
22	I'm convinced that I am able to tell my friends what I have to do and not do because of my diabetes.	0.862				0.51
26	I'm convinced that I can adjust my insulin dose correctly in case of illness.	0.526				0.50
6	I'm convinced that I am able to eat a snack in the classroom in case of a hypo, even when my classmates are watching.		0.489			0.42
8	I'm convinced that I am able to manage my diabetes when staying with friends as well as when I am at home.		0.748			0.42
12	I'm convinced that I can choose what to or not to eat.		0.525			0.42
13	I'm convinced that I am able to eat all the required meals and snacks.		0.571			0.51
17	I'm convinced that I am able to discuss the results of my blood sugar tests with my physician or with somebody on the diabetes team, even when they are not satisfactory.		0.889			0.40
19	I'm convinced that I can react correctly in case of sometimes forgetting to inject insulin.		0.412			0.40
21	I'm convinced that I dare to tell at a new school that I have diabetes.		0.676			0.59

(*Continued*)

Table 1. (Continued).

Item no.	Item description	Medical treatment and nourishment	Evaluation of glycemia	Talking about your diabetes	Honesty with yourself and others	Corrected item–total correlation
25	I'm convinced that I am able to adjust my insulin dose and/or diet when having exams or difficult tests.		0.828			0.50
23	I'm convinced that I can adjust my insulin dose in relation to my nutritional needs.			0.744		0.50
24	I'm convinced that I am able to adjust my diet and/or insulin dose correctly when getting up late.			0.769		0.48
3	I'm convinced that I can feel when my blood sugar is too low.				0.412	0.49
15	I'm convinced that I can carry out regular consults with my physician for diabetes control.				0.477	0.56
16	I'm convinced that I am able to check my blood sugar as many times as advised by my physician or the diabetes team, and not only when I feel that my blood sugar is too high or too low.				0.668	0.54
20	I'm convinced that I am able to do an extra check of my blood sugar when out for a long time and not able to take my meal directly.				0.716	0.40

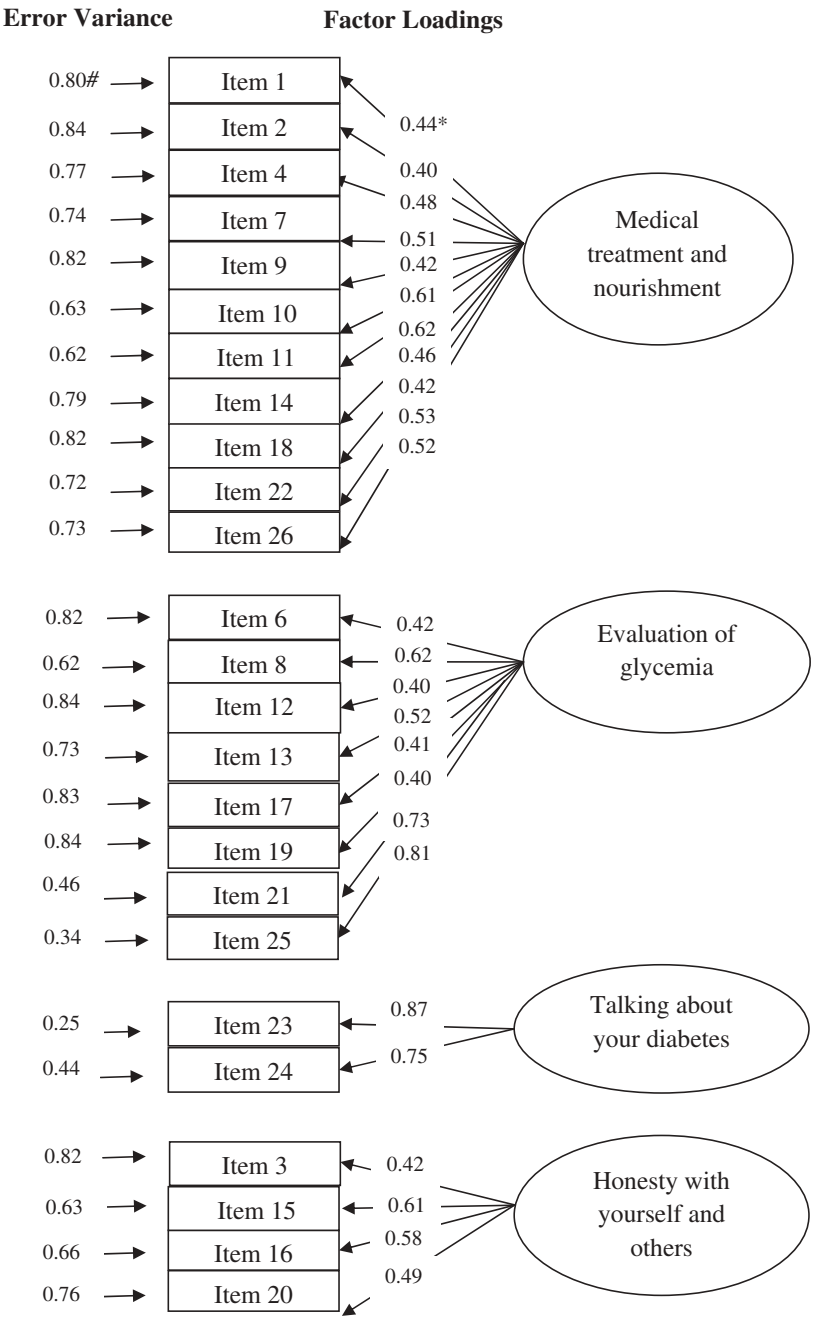

Figure 1. Confirmatory factor analysis of The Diabetes Management Self-efficacy Scale for Adolescents with Type 1 Diabetes. *Factor loadings; #Error variance: The part of the total variance caused by anything irrelevant that was not experimentally controlled.

Table 2. Model fit indices for confirmatory factor analysis.

χ2	*df*	*p*	χ2/*df*	GFI	NNFI	CFI	IFI	RMSEA
470.15	290	<.001	1.62	0.90	0.93	0.93	0.93	0.056

values of the original scale, and that the values of the Turkish scale were higher than the values of the original scale for other factors. According to our findings, the scale had adequate construct validity for the Turkish population.

CFA is used to show the relationship between the scale and their items. It is recommended that CFA be used to test scales that were developed in different cultures. A number of goodness-of-fit measures are used in the evaluation of models compatibility. The most commonly adopted ones are the resemblance rate Chi-square degrees of freedom statistics (χ2/*df*), RMSEA, GFI, and (CFI) (Şencan, 2005). Published reports indicate that model goodness-of-fit values (i.e., NFI, NNFI, and CFI) greater than 0.90 and an RMSEA lower than 0.08 are desirable (Hooper, Coughlan, & Mullen, 2008). Our study showed that these values were in the desirable range and were compatible with the model, thus confirming the 4-factor structure; the scale items and sub-dimensions correlated with the total scale, and the items in each sub-dimension sufficiently characterized the model's own factors. Fit indices in this study were not compared with those from the original study because these results were not given in the original study. Another parameter for model fit is calculated by dividing its χ2 value by its degree of freedom. If the outcome is under the value of 5, the model fit is satisfactory (Şencan, 2005). This calculation was less than 5 in the current analysis, which indicated that the data were compatible with the scale, the items and sub-scales were related, and items in each sub-scale could define the corresponding factor sufficiently. These results indicated that this scale is a valid, and it is a reliable scale for use in adolescents with type 1 diabetes in Turkey.

The Cronbach's alpha and item-total correlations were used in order to assess the internal consistency reliability. The total value of the scale and subscale Cronbach's alpha was similar to the original scale. High correlation coefficients indicate a strong association of the item with the theoretical construct being measured, and that the item can measure the intended construct effectively. The acceptable coefficient in item selection should be higher than 0.30. The item-total correlations of all items were above 0.30 in this study. The item-total correlation results showed that items had a strong correlation with the total score and had a good reliability level for the Diabetes Management Self-Efficacy Scale for Adolescents with Type 1 Diabetes.

Conclusion

Self-efficacy affects adherence to treatment and therefore plays a vital role in clinical outcomes. The practical implication is that assessment of self-efficacy in adolescents with diabetes may be a first step to identifying interventions aimed at increasing self-care.

This is the first report of a disease-specific instrument for evaluating self-efficacy in Turkish adolescents with T1DM, and this work supports the instrument's validity and reliability. Therefore, physicians in Turkey who work with adolescents with diabetes can use this instrument to assess self-efficacy. These findings may provide diabetes care providers an opportunity to develop and test targeted self-management interventions yielding the highest probability of improved glycemic control. Future studies are needed to analyze results obtained using this tool. The evaluation of such an approach is an important area for future research. Furthermore, the reliability and validity study of the scale in different languages will provide an opportunity for comparison between different cultures.

Study limitations

This study has several limitations. The test-retest was not applied to the study group in this study. Concurrent/convergent and divergent validity were not examined. Furthermore, the comparison of the scales cannot be performed between different cultures due to the lack of scales organized in different languages; therefore, only the original scale was reviewed in the discussion section of this article.

Implications for practice

There should be valid-reliable instruments in order to manage self-efficacy of patients in pediatric endocrinology and to determine and apply the required nursing interventions. The self-efficacy of adolescents with diabetes should be evaluated routinely. This instrument can be used easily by diabetes care teams. In addition, it is thought that the Diabetes Management Self-Efficacy Scale is a basis for interventions that support adolescents and enhance diabetes care provider's care. Diabetes care providers will be able to detect problems that have a negative impact on self-efficacy levels, and it may be possible to increase self-efficacy levels by using this scale. Health care providers could develop interventions for adolescents based on results obtained through use of this scale.

Conflict of interest

The authors declare that they have no competing interests.

References

Adolescent Endocrine Society (AES). (2013). *Okulda Diyabet Eğitim Programı: Programın Amaçları* [Diabetes education program at school: Objectives of the program]. Retrieved from http://www.okuldadiyabet.org/

Ahola, A. (2012). *Psychological determinants and self-care in patients with type 1 diabetes* (Doctoral Dissertation). Retrieved from https://helda.helsinki.fi/handle/10138/29792

American Diabetes Association (ADA). (2014). Standards of medical care in diabetes. *Diabetes Care*, *37*(1), 14–80. doi:10.2337/dc14-S014

Bandura, A. (1997). Cambridge handbook of psychology, health and medicine. In A. Baum, S. Newman, J. Wienman, R. West, & C. McManus (Eds.), *Self-efficacy and health behavior* (pp. 160–162). Cambridge, UK: Cambridge University Press.

Brown, A. T. (2015). Confirmatory factor analysis for applied research. In A. T. Brown (Ed.), *Statistical power and sample size* (2nd ed., pp. 380–381). New York, NY: A Division of Guilford Publications.

Cameron, F. J., Amin, R., Beaufort, C. D., Codner, E., & Acerini, C. L. (2014). Diabetes in adolescence. *Pediatric Diabetes*, *15*(Suppl. 20), 245–256. doi:10.1111/pedi.12169

Chih, A.-H., Jan, C.-F., Shu, S.-G., & Lue, B.-H. (2010). Self-efficacy affects blood sugar control among adolescents with type I diabetes mellitus. *Journal of the Formosan Medical Association*, *109*(7), 503–510. doi:10.1016/S0929-6646(10)60084-8.

Craig, M. E., Jefferies, C., Dabelea, D., Balde, N., Seth, A., & Donaghue, K. C. (2014). Definition, epidemiology, and classification of diabetes in children and adolescents. *Pediatric Diabetes*, *15*(Suppl. S20), 4–17. doi:10.1111/pedi.12186

Grey, M., Boland, E. A., Yu, C., Sullivan-Bolyai, S., & Tamborlane, W. V. (1998). Personal and family factors associated with quality of life in adolescents with diabetes. *Diabetes Care*, *21*(6), 909–914. doi:http://dx.doi.org/10.2337/diacare.21.6.909

Guo, J., Whittemore, R., & He, G.-P. (2011). The relationship between diabetes self-management and metabolic control in youth with type 1 diabetes: An integrative review. *Journal of Advanced Nursing*, *67*(11), 2294–2310. doi:10.1111/j.1365-2648.2011.05697.x

Hooper, D., Coughlan, J., & Mullen, M. R. (2008). Structural equation modelling: Guidelines for determining model fit. *The Electronic Journal of Business Research Methods*, *6*(1), 53–60. Retrieved from www.ejbrm.com/issue/download.html?idArticle=183

Iannotti, R. J., Schneider, S., Nansel, T. R., Haynie, D. L., Plotnick, L. P., Clark, L. M.,… imons-Morton, B. (2006). Self-efficacy, outcome expectations, and diabetes self-management in adolescents with type 1 diabetes. *Journal of Developmental & Behavioral Pediatrics*, *27*(2), 98–105. doi:10.1097/00004703-200604000-00003

International Diabetes Federation. (2013). *Diabetes Atlas, introduction*. Retrieved from http://www.idf.org/sites/default/files/EN_6E_Atlas_Full_0.pdf

Krichbaum, K., Aarested, V., & Buethe, M. (2003). Exploring the connection between self-efficacy and effective diabetes self-management. *Diabetes Educator*, *29*(4), 653–662. doi:10.1177/014572170302900411

Moens, A. (1998). *Ontwikkeling van een valide en betrouwbaar meetinstrument dat perceived self-efficacy meet t.a.v. diabetes zelfzorg bij adolescenten met type 1 diabetes mellitus*. (Unpublished Master's Thesis). Gent University, Ghent, Belgium.

Ott, J., Greening, L., Palardy, N., Holderby, A., & DeBell, W. K. (2000). Self-efficacy as a mediator variable for adolescents' adherence to treatment for insulindependant diabetes mellitus. *Adolescent's Health Care*, *29*(1), 47–63. doi:10.1207/S15326888CHC2901_4

Polit, D. F., & Beck, C. T. (2008). Nursing research: Generating and assessing evidence for nursing practice. In D. F. Polit & C. T. Beck (Eds.), *Assessing measurement quality in quantitative* (p. 455–459). Philadelphia, PA: Lippincott Williams & Wilkins.

Portney, L. G., & Watkins, M. P. (2000). *Foundations of clinical research: Applications to practice* (2nd ed.). Upper Saddle River, NJ: Prentice Hall Health.

Rose, M., Fliege, H., Hildebrandt, M., Schirop, T., & Klapp, B. F. (2002). The network of psychological variables in patients with diabetes and their importance for quality of life and metabolic control. *Diabetes Care*, *25*, 35–42. doi:10.2337/diacare.25.1.35

Şencan, H. (2005). *Sosyal ve Davranışsal Ölçümlerde Güvenilirlik ve Geçerlilik* [Reliability and validity of the social and behavioral measurements] (1st ed.). Ankara, Turkey: Sistem.

Wasserman, J. D., & Bracken, B. A. (2003). Handbook of psychology. In J. R. Graham, J. A. Maglieri, & I. B. Weiner (Eds.), *Psychometric Characteristics of Assessment Procedure, 1: 3* (pp. 43–66). Hoboken, NJ: John Wiley & Sons. doi:10.1002/0471264385.wei1003