Original Article

Translation, Validation and Cultural Adaptation of the Greek Version of the Diabetes Self-Management Profile–Self Report (DSMP-SR) in Children and Adolescents with Type 1 Diabetes.

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Abstract

Background : Valid and culturally adapted instruments are essential for assessing diabetes self-management in children and adolescents. Accurate evaluation of self-management behaviours can help identify areas of risk and support more individualized diabetes care. The Diabetes Self-Management Profile is a semi-structured instrument designed to assess core self-management activities in young people with type 1 diabetes, including dietary behaviours, physical activity, blood glucose monitoring and insulin-related practices.

Aim: This study aimed to evaluate the construct validity, convergent validity and internal consistency of the Greek version of the Diabetes Self-Management Profile –Self Report (DSMP-SR) in children and adolescents with diabetes.

Methods: A validation study was conducted with 251 children and adolescents aged 8–18 years with type 1 diabetes mellitus (T1D). The mean age of participants was 13.6±2.9 years, and 50.2% were girls. Construct validity was examined through confirmatory factor analysis of the original 24-item model. Convergent validity was assessed using Pearson correlation coefficients between Diabetes Self-Management Profile scores and the domains of the Pediatric Quality of Life Inventory. Internal consistency was evaluated using Cronbach's alpha coefficient.

Results: Confirmatory factor analysis supported the hypothesised unidimensional structure of the Greek Diabetes Self-Management Profile and demonstrated a very good fit to the original 24-item model. All model-fit indices met predefined acceptability criteria: chi-square/degrees of freedom=1.126, root mean square error of approximation=0.022, goodness-of-fit index=0.924, adjusted goodness-of-fit index=0.901, Tucker–Lewis index=0.980, incremental fit index=0.984, normed fit index=0.902 and comparative fit index=0.984. Convergent validity was supported by statistically significant positive correlations between Diabetes Self-Management Profile scores and Pediatric Quality of Life Inventory physical health (r=0.47), emotional health (r=0.45), social health (r=0.43) and school functioning (r=0.18), all $p \leq 0.005$. Internal consistency was excellent, with a Cronbach's alpha coefficient of 0.866.

Conclusion: The Greek DSMP-SR demonstrated very good construct validity, significant associations with quality-of-life domains, and excellent internal consistency. It can be used as a clinically feasible self-report measure to support individualized paediatric diabetes education and nursing care, although further studies should examine temporal stability and associations with objective glycaemic indicators.

Key Words: construct validity, convergent validity, internal consistency, Greek version, Diabetes Self-Management Profile –Self Report (DSMP-SR) in children and adolescents with diabetes.

Introduction

Type 1 diabetes mellitus (T1D) is one of the most common chronic conditions in childhood and adolescence and remains a demanding, chronic disease requiring adaptation to therapy and daily life changes and increased self-management. Approximately 1.5 million people under the age of 20 are living with T1D worldwide, while the global incidence is increasing by about 2-3% per year (Gregory et al., 2022a; Cockcroft et al., 2024). Daily care management depends on insulin administration, systematic or continuous glucose monitoring, a careful diet schedule, physical activity, controlling diabetes mellitus and preventing its complications, and the ability to respond effectively to acute changes in glucose levels (Cockcroft et al., 2024; Montali et al., 2022). These activities require complex decision-making and coordinated participation of the child or adolescent, the family, the school environment, and the multidisciplinary diabetes team. Consequently, diabetes self-management acts as a cornerstone of treatment and critical determinant of metabolic control, safety, quality of life, and long-term health outcomes (Ahmad and Joshi, 2023).

The developmental period of adolescence adds further complexity to diabetes care. The 2022 International Society for Pediatric and Adolescent Diabetes (ISPAD) guidance emphasizes that, despite modern insulin regimens and diabetes technologies, optimal glycaemic control during adolescence remains difficult to achieve (Gregory et al., 2022b). Compliance with the treatment plan, level of resilience, insulin resistance, level of autonomy, peer influence, diabetes distress, evolving family roles, family functioning, school demands, and transition from paediatric to adult care are only some of the parameters that may all influence the ability of the child or the adolescent to self-manage (Montali et al., 2022; Gregory et al., 2022b).

Recent evidence also indicates that biopsychosocial factors, such as motivation, perceived health, support needs, and the wish to avoid self-management tasks, may predict daily variations in adherence and glycaemic outcomes among adolescents and young adults with T1D (Messer et al., 2022). In the Greek paediatric context, a recent study of children and adolescents with T1D and their parents indicated that parents reported higher fear of hypoglycaemia than their children, highlighting the importance of structured assessment of family-related diabetes concerns (Andreopoulou et al., 2024).

Self-management education and support are essential in paediatric diabetes care because they strengthen the capacity of children, adolescents, and families to use insulin safely, match insulin to carbohydrate intake and activity, interpret glucose diary data, and maintain glycaemic targets (Rohilla et al., 2021). Malak and Shehadeh (2025) describe self-management among adolescents with type 1 diabetes as a multidimensional process involving insulin administration, glucose monitoring, dietary regulation, physical activity, and psychosocial adaptation. Individualised education should also promote goal setting, problem-solving, decision-making, self-monitoring, and coping skills (Malak and Shehadeh, 2025).

Additionally, previous systematic and narrative reviews have shown heterogeneous effects of educational and psychoeducational interventions on clinical, behavioural, and psychosocial outcomes, emphasizing the need

for validated measures that can reliably assess self-care behaviours over time (Rohilla et al., 2021; Cockcroft et al., 2024). Such measures are important for clinical practice, individualized education, family-centred care planning, and research evaluation.

Measuring diabetes self-management is challenging because it requires direct assessment of multiple daily behaviours, such as insulin administration, glucose monitoring, diet, exercise, and corrective adjustments, that may vary independently and are clinically relevant to glycaemic control, making multidimensional and psychometrically sound instruments necessary. Therefore, self-management seems to stand as a core determinant of the course of diabetes, reflecting relevant behaviours, and its assessment can both identify areas of potential improvement and support clinical practice (Schmitt et al., 2022).

The Diabetes Self-Management Profile (DSMP) was developed to assess this multidimensional concept. Harris et al. (2000) validated the DSMP as a semi-structured interview covering exercise, hypoglycaemia management, diet, blood glucose testing, insulin administration, and dose adjustment. The original instrument demonstrated adequate internal consistency, test–retest reliability, inter-interviewer agreement, parent–adolescent agreement, and associations with HbA1c and quality of life (Harris et al., 2000). However, the interview format requires trained personnel and may be difficult to use routinely because of time demands (Markowitz et al., 2011; Teló et al., 2014). To improve feasibility, Wysocki et al. (2012) developed the Diabetes Self-Management Profile–Self Report (DSMP-SR), which can be completed by parents and young people. The DSMP-SR demonstrated sound internal consistency, parent–youth agreement, and significant correlations with HbA1c, health-related quality of life, and diabetes-specific family conflict (Wysocki et al., 2012).

Cross-cultural adaptation is required before applying the DSMP-SR in different linguistic and health-care settings. Diabetes self-management is influenced by family communication, school routines, health literacy, access to diabetes technologies, and the organization of paediatric diabetes services. Therefore, direct translation alone cannot ensure conceptual equivalence or psychometric validity. Previous adaptations support this need. The Brazilian Portuguese DSMP showed adequate internal consistency and a significant negative correlation with HbA1c (Teló et al., 2014). The Hindi DSMP-SR also demonstrated good reliability and strong correlations with HbA1c, although its factor structure differed from the original version (Barola et al., 2021). These findings indicate that adapted versions require empirical testing within each target population.

To date, a validated Greek version of the DSMP-SR for children and adolescents with T1D has not been available. This limits the ability of Greek clinicians, paediatric nurses, diabetes educators, and researchers to assess self-management behaviours systematically, identify educational needs, compare findings with international evidence, and evaluate interventions. The present study therefore aimed to translate, culturally adapt, and evaluate the construct validity, convergent validity, and internal consistency of the Greek version of the Diabetes Self-Management Profile–Self Report in children and adolescents with T1D.

Methods

Study design, sample and setting: The target population consisted of children and adolescents aged 8-18 years with a diagnosis of type 1 diabetes who were attending routine paediatric diabetes follow-up in participating clinical settings in Greece. Participants were eligible when they were able to understand written Greek and when a parent or legal

guardian was available to provide consent. Children and adolescents with severe cognitive, developmental or communication difficulties that would prevent independent completion of the questionnaire were excluded. A total of 251 children and adolescents participated in the validation analysis.

Eligibility required a diagnosis of type 1 diabetes according to recognized paediatric diabetes criteria, at least six months since diagnosis, attendance at a scheduled paediatric diabetes follow-up visit, adequate understanding of written Greek and satisfactory communication ability. Exclusion criteria included difficulty in communication, inability to read or understand written Greek, refusal or non-completion of informed consent, and severe cognitive impairment. Recruitment of the convenience sample was planned and implemented within paediatric diabetes services in selected public paediatric clinics in Greece (Karamanandaneio General Children's Hospital of Patras, Panagiotis and Aglaia Kyriakou General Children's Hospital, and the University General Hospital of Patras "Panagia Voitheia"). Children, adolescents and parents were approached during scheduled diabetes clinic appointments or hospital-based follow-up, so that participation did not interfere with usual clinical care.

Instruments: The Diabetes Self-Management Profile-Self Report (DSMP-SR) is a self-administered version of the original Diabetes Self-Management Profile, which was developed as a structured interview for assessing adherence and self-management behaviours in paediatric type 1 diabetes (Harris et al., 2000; Wysocki et al., 2012). The instrument addresses key areas of daily diabetes care, including blood glucose monitoring, insulin administration and dose adjustment, dietary behaviours, exercise and management of hypoglycaemia. Higher scores indicate more consistent diabetes self-management behaviours.

The Pediatric Quality of Life Inventory (PedsQL) was used to examine convergent validity. The PedsQL is a generic health-related quality-of-life instrument with physical, emotional, social and school functioning domains, and its reliability and validity have been demonstrated in both general paediatric populations and children with diabetes (Varni et al., 2001; Varni et al., 2003). The expected positive association between DSMP-SR scores and PedsQL domains was used as evidence that better self-management is related to better perceived functioning and quality of life.

A study-specific sociodemographic and clinical questionnaire, was used to document contextual variables relevant to paediatric diabetes care. These included child age and sex, family and parental educational and occupational characteristics, family history of diabetes, parental involvement in treatment, anthropometric data, age at diagnosis, HbA1c information, frequency of glycaemic monitoring, type of insulin treatment, insulin dose, use of diabetes-related technology, comorbidities, and school-related care, including the presence and perceived contribution of a school nurse. These variables supported characterization of the clinical context in which the DSMP-SR was evaluated.

Translation of the DSMP: Permission to use and translate the DSMP-SR was obtained before the translation procedure. The original English version was translated into Greek independently by bilingual translators familiar with health terminology. A reconciled Greek version was then produced after comparison of the translations, with attention to semantic equivalence, clarity, conceptual accuracy and age-appropriate language. The reconciled Greek version was back-translated into English by an independent bilingual translator who had not seen the original instrument. The back-translation was compared with the original DSMP-SR to identify discrepancies, ambiguous wording or cultural inconsistencies. Differences were discussed by the research team until consensus was reached and a pre-final Greek version was produced (Beaton et al., 2000; Sousa & Rojjanasrirat, 2011).

Cultural adaptation: The pre-final version was reviewed for cultural relevance and suitability for Greek children and adolescents with type 1 diabetes. Particular attention was given to wording related to school routines, family involvement, insulin administration, blood glucose monitoring, physical activity and dietary practices, because these behaviours may be influenced by local family structures, school organization and health-care routines.

Minor linguistic adjustments were made to improve readability without altering the meaning of the original items. The final Greek version was designed to retain the conceptual content of the DSMP-SR while ensuring that the questions were understandable, acceptable and relevant for the Greek paediatric diabetes context.

Ethical Considerations: The study was conducted in accordance with the ethical principles of the Declaration of Helsinki (World Medical Association, 2013). The study protocol was approved by the Ethics Committee of the Department of Nursing, University of Patras (reference number: 24557, 01/01/2021). The study also received the required institutional and ethics approvals from each hospital and competent administrative authorities: the Scientific Council of the General Children's Hospital of Patras "Karamandaneio" (16th meeting, 27 November 2025, protocol No. 23998/27-11-2025); the Research Ethics and Deontology Committee of the University General Hospital of Patras "Panagia i Voitheia" (10th meeting, 11 November 2025, protocol No. 406/11-11-2025) and the 6th Health Region of Peloponnese, Ionian Islands, Epirus and Western Greece (approval No. 83339, 04 December 2025), covering data collection in the Patras hospitals, and the Scientific Council (4th meeting, 13 February 2026, Subject 16) and Board of Directors (8th meeting, 01 April 2026, Subject 21; protocol No. 7799/21-04-2026) of the General Children's Hospital of Athens "Panagiotis & Aglaia Kyriakou". Written informed consent was obtained from parents or legal guardians, and age-appropriate assent was obtained from participating children and adolescents. Participation was voluntary, confidentiality was maintained, and questionnaires were completed anonymously using coded data. Participants and parents were informed about the purpose of the study, the voluntary nature of participation, confidentiality of data and the right to withdraw without any effect on clinical care. Data were handled using coded questionnaires and restricted-access procedures to protect personal information.

Statistical analysis: We performed confirmatory factor analysis (CFA) to examine the construct validity of the DSMP. In particular, we calculated chi-square/degree of freedom (x2/df); root mean square error of approximation (RMSEA); goodness of fit index (GFI); adjusted goodness of fit index (AGFI); Tucker–Lewis index (TLI); incremental fit index (IFI); normed fit index (NFI); comparative fit index (CFI). Acceptable value for x2/df is <5, for RMSEA is <0.10, and for all other measures in the CFA >0.90 (Baumgartner and Homburg, 1996; Hu and Bentler, 1998; Brown, 2015). We used the AMOS version 21 (Amos Development Corporation, 2018) to conduct the CFA. We calculated Pearson's correlation coefficient between the DSMP and the PEDSQL to examine convergent validity. Also, we calculated Cronbach's alpha for the DSMP with values greater than 0.60 indicating acceptable reliability. P-values less than 0.05 were considered as statistically significant. We used the IBM SPSS 28.0 (IBM Corp. Released 2021. IBM SPSS Statistics for Windows, Version 28.0. Armonk, NY: IBM Corp) for the analysis.

Results

The study sample consisted of 251 children with a mean age of 13.6 years (standard deviation = 2.9), a median age of 14 years, a youngest age of 8 years, and an oldest age of 18 years. 50.2% (n=126) were girls and 49.8% (n=125) were boys.

Table 1 and Figure 1 present the results of the confirmatory factor analysis. The Greek version fits the original form of the DSMP exceptionally well, as shown in Table 1, since all indices have acceptable values (24-item model). Therefore, the Greek version of the DSMP is a unidimensional scale, just like the original form of the DSMP.

Table 1. Results of the confirmatory factor analysis for the DSMP.

Model	x2	df	x2/df	RMSEA	GFI	AGFI	TLI	IFI	NFI	CFI
24 items	254.548	226	1.126	0.022	0.924	0.901	0.980	0.984	0.902	0.984
Acceptable values			<5	<0.10	>0.9	>0.9	>0.9	>0.9	>0.9	>0,9

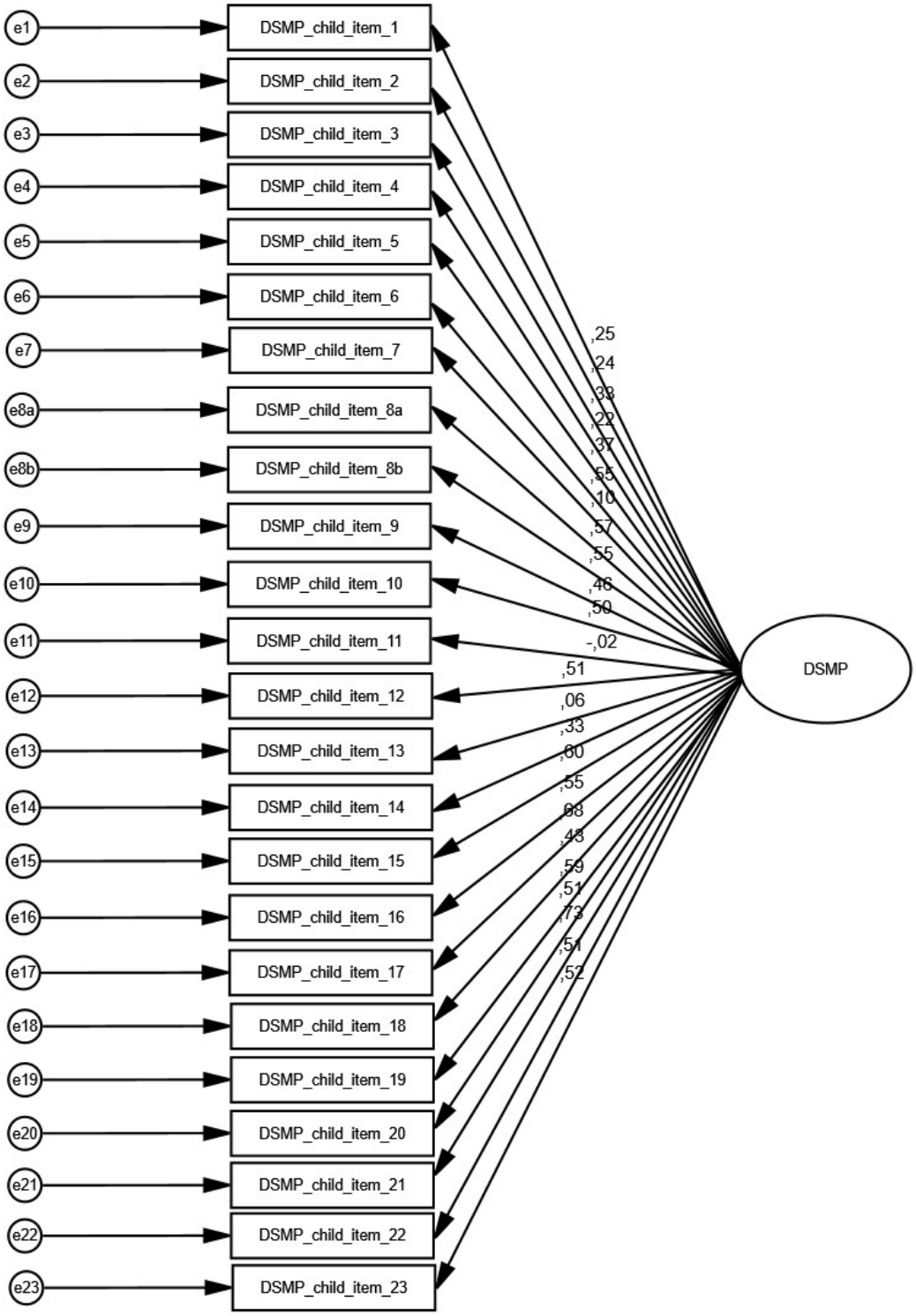

Figure 1. Confirmatory factor analysis of the Greek version of the DSMP.

The PEDSQL questionnaire was used to investigate the convergent validity of the DSMP. Scores on the PEDSQL and DSMP followed a normal distribution, so Pearson's correlation coefficient was used to investigate the correlations between scores on the PEDSQL and DSMP (Table 2). The statistically significant correlations found were as follows:

- a positive correlation between the DSMP score and the score on the "physical health" factor of the PEDSQL.
- a positive correlation between the DSMP score and the score on the "emotional health" factor of the PEDSQL.
- a positive correlation between the DSMP score and the score on the "social health" factor of the PEDSQL.
- a positive correlation between the DSMP score and the score on the "school functioning" factor of the PEDSQL.

The statistically significant correlations described above indicate that the DSMP is highly valid, as better diabetes self-management was associated with a better quality of life.

Table 2. Pearson's correlation coefficient for examining the correlations between scores on the PEDSQL and the DSMP.

Scale	Physical health		Emotional health		Social health		School functioning	
	CC	P-value	CC	P-value	CC	P-value	CC	P-value
DSMP	0.47	<0.001	0.45	<0.001	0.43	<0.001	0.18	0,005

CC: correlation coefficient

To assess reliability of the DSMP, Cronbach's alpha was calculated and found to be 0.866. Therefore, the reliability of the DSMP was excellent.

Discussion

The present study provides evidence that the Greek version of the DSMP-SR is a psychometrically sound instrument for assessing diabetes self-management behaviours in children and adolescents with type 1 diabetes. The confirmatory factor analysis supported the original 24-item model and demonstrated very good overall model fit, while the Cronbach alpha coefficient indicated excellent internal consistency. These findings suggest that the Greek version can produce a coherent total score reflecting the overall level of self-management behaviour in paediatric type 1 diabetes.

The reliability findings are consistent with previous validation studies of the DSMP and DSMP-SR. The original self-report validation by Wysocki et al. (2012) demonstrated sound internal consistency for both youth and parent versions and significant associations with HbA1c, quality of life and family conflict. Similarly, the Brazilian Portuguese validation reported adequate reliability and a significant association between DSMP total score and A1C (Teló et al., 2014), while the Hindi adaptation demonstrated strong internal consistency and meaningful associations with glycaemic control (Barola et al., 2021). The present Greek results therefore extend the cross-cultural evidence base for the DSMP-SR and support its use in another European language and health-care context.

The confirmation of a coherent overall structure should be interpreted alongside the established

understanding that diabetes self-management is behaviourally complex. Earlier work emphasized that self-management is not a simple unitary act of compliance, but a set of repeated behaviours directed toward maintaining glycaemic stability and preventing deviations from target glucose levels (Harris et al., 2000). Studies of adolescent self-management styles further show that young people may differ in their patterns of monitoring, insulin routines, diet, exercise and self-care adjustments (Schneider et al., 2007). Hood et al.'s meta-analysis supports the association between adherence/self-management behaviours and HbA1c in paediatric T1D, strengthening the argument that behavioural assessment has clinical value. Thus, the Greek DSMP-SR total score can be useful as a global indicator, but item-level review remains clinically valuable for identifying specific areas requiring education or nursing support. On contrary, Rohan et al. (2011) used cluster analysis to identify distinct self-management patterns in young people with T1D and found that less optimal patterns were associated with poorer HbA1c, supporting the value of looking beyond a global score.

The positive correlations between DSMP-SR scores and the PedsQL domains of physical, emotional, social and school functioning support the validity of the Greek version. These findings are important in practice because, during adolescence, diabetes self-management is closely connected with everyday life, family support, friendships, and school routines. Adolescents and young adults with type 1 diabetes often face challenges related to technology use, social support, stigma and the way diabetes fits into their identity (Montali et al., 2022), while their daily physical, emotional and social experiences may also affect glucose outcomes and self-management goals (Messer et al., 2022). Recent validation work also highlights the need for brief, contemporary tools that assess diabetes self-management behaviours in adolescents with type 1 diabetes and relate them to health-related quality of life (Jaser et al., 2025). Therefore, a validated self-report tool can help clinicians look beyond biomedical indicators alone and better understand behaviours that are linked to daily functioning and quality of life.

The findings also align with the broader evidence linking adherence and self-management with diabetes outcomes in youth. A meta-analysis demonstrated that better adherence is associated with lower A1C in paediatric type 1 diabetes (Hood et al., 2009), and systematic reviews continue to identify the need for reliable behavioural outcome measures when evaluating self-management education and support interventions (Rohilla et al., 2021; Cockcroft et al., 2024). The DSMP-SR can therefore contribute to both clinical assessment and intervention research by offering a brief, standardized and culturally adapted measure of self-management behaviours.

From a paediatric nursing and interprofessional care perspective, the Greek DSMP-SR may support individualized diabetes education, shared goal setting and structured follow-up. Current international guidance recommends culturally sensitive, age-appropriate and developmentally appropriate diabetes self-management education and support for children, adolescents and their families, both at diagnosis and routinely thereafter (Lindholm Olinder et al., 2022; American Diabetes Association Professional Practice Committee for Diabetes, 2026). The DSMP-SR can facilitate this process by helping nurses and diabetes teams identify whether difficulties are concentrated in monitoring, insulin administration, dietary routines, physical activity, hypoglycaemia management or general problem solving.

Currently, literature highlights the importance of contextual factors such as diabetes technology use, parental participation in treatment and school-based nursing support. These factors are particularly relevant in Greece because successful self-management often extends beyond the clinic and depends on coordination among the child, family, school and health-care team. In practice, DSMP-SR scores may therefore be interpreted alongside information about insulin regimen, glucose monitoring practices, technology use and the availability of school support in order to design realistic and individualized nursing interventions.

The Greek paediatric diabetes context also requires attention to psychosocial needs. Adolescence is associated with increasing autonomy, diabetes distress, fear of hypoglycaemia, school demands and transition-related challenges (Young-Hyman et al., 2016; Gregory et al., 2022b). Greek data showing that parents may report higher fear of hypoglycaemia than their children further highlight the importance of family-centred assessment and support (Andreopoulou et al., 2024). In this context, the DSMP-SR should not

be used as a judgemental measure of compliance, but as a communication tool that promotes constructive discussion, identifies modifiable barriers and guides tailored education.

Limitations: This study has several limitations. First, the cross-sectional design does not allow assessment of responsiveness to change over time or the stability of scores through test-retest reliability. Second, self-report instruments may be influenced by recall bias and social desirability, particularly when children and adolescents report behaviours that they know are expected by health professionals. Third, although the sample size was adequate for confirmatory factor analysis, participants were recruited from participating clinical settings located in Athens and Patras, and may not fully represent all children and adolescents with type 1 diabetes in Greece, especially those followed in remote areas or settings with different access to diabetes technology and specialist education. Furthermore, convergent validity was examined using quality-of-life domains, but additional criterion-related validation with glycaemic indicators such as HbA1c, time-in-range, frequency of hypoglycaemia or diabetes technology metrics would strengthen future evidence.

Conclusions: The Greek version of the DSMP-SR demonstrated very good construct validity, significant convergent validity with quality-of-life domains, and excellent internal consistency in children and adolescents with type 1 diabetes. These findings support its use as a valid and reliable self-report instrument for assessing diabetes self-management behaviours in the Greek paediatric diabetes context.

In clinical practice, the Greek DSMP-SR may help paediatric nurses, diabetes educators, and multidisciplinary teams identify self-management strengths and difficulties, guide individualized education, and support structured follow-up. Its item-level review may be particularly useful for identifying specific behavioural areas requiring nursing counselling or family-centred support.

Future studies should examine test–retest reliability, responsiveness to change, parent–adolescent agreement, and associations with objective glycaemic indicators such as HbA1c, time in range, hypoglycaemia frequency, and diabetes technology metrics. Further research should also explore how DSMP-SR scores relate to parental involvement, school nursing support, and patient-reported quality of life in Greek children and adolescents with type 1 diabetes.

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