

# DO ADOLESCENTS WITH T1DM DIFFER FROM THEIR PEERS IN HEALTH, EATING HABITS AND SOCIAL SUPPORT?

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## SUMMARY

**Objective:** The aim of this study was to analyse differences in health, eating habits and social support in adolescents with type 1 diabetes mellitus (T1DM) in comparison to peers with another long-term illness or without any medical condition.

**Methods:** We used self-reported data from the cross-sectional Health Behaviour in School-aged Children study collected in 2014 among Slovak adolescents as well as data from adolescents with T1DM collected in outpatient settings (11 to 15 years old, N=8,910, 50.3% of boys). Logistic regression models and general linear models were used to analyse differences between adolescents with T1DM and their peers with and without long-term illness in self-rated health, life satisfaction, health complaints, regular breakfast, sweets and soft drink consumption, and perceived support from family, teachers and classmates.

**Results:** Adolescents with T1DM reported worse self-rated health and suffer from more health complaints, but they have lower chance of having breakfast irregularly in comparison to their peers with another long-term illness or without any medical condition. Moreover, compared with their peers, adolescents with T1DM perceived stronger support from teachers and classmates, but weaker support from their family. We did not confirm any differences in life satisfaction, sweets and soft drink consumption between adolescents with T1DM and their peers.

**Conclusions:** Adolescents with T1DM reported more regular eating habits, no difference in life satisfaction and more social support outside the family in comparison to their peers. However, their worse self-rated health, more health complaints and weaker support from family should be considered in interventions targeting psychosocial adjustment of adolescents with T1DM.

**Key words:** diabetes mellitus, adolescence, health, eating habits, social support

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## INTRODUCTION

Diabetes mellitus is one of the most common chronic diseases in adolescents (1), and the incidence is increasing in many countries worldwide, particularly in children under the age of 15 years (2–4). According to the International Diabetes Federation (IDF) Diabetes Atlas (4), in 2015 the number of children with type 1 diabetes mellitus (T1DM) exceeded half a million in the world for the first time, and the overall annual increase is estimated to be around 3%. In Slovakia, the incidence has varied between 13 and 17 cases per 100,000 children aged 0–14 years since 2004 (5).

Nutritional management is the most important part of the complex management of T1DM. Dietary guidelines for T1DM stress the importance of regularity in meal time and adequate nutritional composition for better glycaemic outcomes (2, 6). However, several recent studies found that adolescents, also in Slovakia, often struggle with adherence to dietary recommendations, eat irregularly and do not follow a healthy diet (5, 7–9).

This poorer adherence may be associated with poor parent-child mealtime behaviours (7). A routine in which a child and family sit down and eat together helps to establish better eating practices, as is stressed in the IDF (3) guidelines.

The complex management of T1DM requires significant lifestyle changes, which remain a substantial burden on adolescents and their families (1, 6, 10–12). Family factors and relations at school and with peers are integral for management of T1DM in children and adolescents (3, 13). Research has shown that high family support and good peer relations are associated with better adherence of adolescents to diabetes regimen and better glycaemic control (13, 14). However, as pointed out by Malik and Koot (12), behaviour viewed as supportive by the provider may have a negative effect on the receiver, depending on adolescents' perception of the supportiveness of specific behaviours. Thus, crucial for successful management of T1DM is that a family should provide a developmentally appropriate level of emotional support to children (10). The role of peers and teachers in management of T1DM in adolescence is also evident. According to Helgeson and

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Palladino (15), peers mainly provide diabetes-related emotional support, and peer conflict has a negative impact on diabetes outcomes. When adolescents perceive teachers' support and understanding of diabetes management, this might have a positive effect on their own self-management tasks during school attendance, as was found in the study of Hillard et al. (16).

In adolescence, young people are struggling for independence from their family, worrying about gaining acceptance from their peers and developing a sense of identity and self-esteem, all factors that affect their health-related behaviour (6, 14). Adolescents with T1DM believe they are self-responsible for diabetes tasks, which might lead to parental distress and family conflicts, with a negative impact on the management of T1DM (17–19). Several studies have found that bad glycaemic control is associated with a lower quality of life of adolescents with T1DM (11, 20) and family diabetes-specific conflicts correlated with these negative outcomes (21).

Even though the population of adolescents with a long-term illness has increased, we still know little about the impact of chronic diseases on the functioning of young people. Identifying differences between adolescents with a specific health condition and their healthy peers might help to understand the mechanisms and needs they might have. Therefore, the aim of our study was to analyse differences in health outcomes (self-rated health, life satisfaction, health complaints), eating behaviour (breakfast consumption, sweets and soft drinks consumption), and perceived social support (from family, peers and teachers) between three groups of children (children with diabetes mellitus type 1, children with a long-term illness and children without any medical condition).

## MATERIALS AND METHODS

### Sample and Procedure

We used data from the Health Behaviour in School-aged Children (HBSC) study conducted in Slovakia in 2014. To obtain a representative sample, we used two-step sampling. In the first step, 151 larger and smaller elementary schools located in rural as well as urban areas from all regions of Slovakia were asked to participate. These were randomly selected from a list of all eligible schools in Slovakia obtained from the Slovak Institute of Information and Prognoses of Education. In the end, 130 schools agreed to participate in our survey (response rate 86.1%). In the second step, we obtained data from 10,179 adolescents from the 5th to the 9th grades (response rate 78.8%). After excluding children under 11 and over 15 years of age the sample comprised 8,883 respondents. We enriched this sample by collecting data from 27 adolescents of the same age with diabetes mellitus type 1 who regularly attend diabetic outpatient settings and filled in the reduced version of the HBSC questionnaires. Therefore, our final sample consisted of 8,910 adolescents (mean age 13.48 years, 50.3% of boys).

The study was approved by the Ethics Committee of Medical Faculty at P. J. Šafárik University in Košice. Parents were informed about the study via the school administration and could opt out if they disagreed with their child's participation. Participation in the study was fully voluntary and anonymous, with no explicit incentives provided for participation. Self-reported questionnaires

were administered by trained research assistants in the absence of a teacher during regular class time and a trained diabetic nurse in outpatient settings.

### Measures

Self-rated health was measured using the question: "Would you say that your health is: excellent, good, fair or bad" and was dichotomized into two categories: excellent or good health, fair or bad health.

Life satisfaction was assessed by a one-item scale where participants rank their life satisfaction on an 11-point scale ranging from 10 (best life possible) to 0 (worst life possible). The children were given the following instruction: "Here is a picture of a ladder. The top of the ladder (10) is the best possible life for you, and the bottom (0) is the worst possible life for you. In general, where on the ladder do you feel you stand at the moment?" The response categories were dichotomized using a cut-off at 6 to obtain two groups of children – those who indicated high and low life satisfaction.

The HBSC-symptoms checklist (HBSC-SCL) assessed the occurrence of eight subjective physical and psychological health complaints; namely headache, stomach ache, back ache, feeling low, irritability and bad temper, feeling nervous, sleeping difficulties, and feeling dizzy. The response categories indicating how frequently during the last 6 months the symptom occurred are "rarely or never", "about every month", "about every week", "more than once a week", and "about every day". Responses for specific health complaints were dichotomized ("rarely or never" and "about every month" vs. "about every week", "more than once a week" and "about every day"). Also, recurrent multiple health complaints were computed and subsequently dichotomized with two or more complaints at least once a week considered as displaying noticeable subjective health complaints (22, 23).

Breakfast consumption was measured by an item: "How often do you usually have breakfast during weekdays (more than a glass of milk or fruit juice)?" Responses were: "I never have breakfast during a week", "one day", "two days", "three days", "four days", and "five days". Having breakfast 5 days a week was categorised as "regular breakfast on weekdays" (24).

Sweets and soft drinks consumption were assessed by a question asking children how many times a week they usually eat sweets as well as drink coke or other soft drinks that contain sugar. Possible responses were: "never", "less than once a week", "once a week", "2–4 days a week", "5–6 days a week", "once a day, every day", "every day, more than once". To obtain two groups of adolescents – those who drink soft drinks or eat sweets once a day or more and the others – we dichotomized the responses.

Social support from family was measured using the Perceived Social Support Scale (25), which is a 12-item self-reported questionnaire assessing perceived social support in three dimensions (from family, friends and significant others). We only used the family dimension, which consists of four items: perceived help (my family really tries to help me), help with decision-making (my family helps me in decision-making), perceived emotional support from the family (my family gives me the emotional support and help I need), and talking about problems with the family (I can talk about my problems with my family). A 7-point Likert-type format was used ranging from "totally disagree" to "totally agree".

The range of sum scores was 4–28, with a higher score indicating a higher level of perceived social support from the family (26).

The teacher and classmate support were assessed by eight items. Four of them refer to perceptions of support from teachers, and four of the items refer to support from classmates. Typical statements were “Other students accept me as I am” and “When I need extra help I can get it.” Statements were rated on a 5-point Likert-type agreement scale, ranging from “strongly agree” to “strongly disagree”. To allow a high score to reflect high support, all item scores were reversed prior to analysis (27). An increasing score indicated a higher level of perceived social support from teachers and classmates.

Long-term illness prevalence was assessed using the item: “Do you have a long-term illness, disability or medical condition (like diabetes, arthritis, allergy or cerebral palsy) that has been diagnosed by a doctor?” with “yes” and “no” as the response categories (28). The response used in statistical analyses referred to the occurrence of a long-term illness. Besides this question, we asked adolescents if they have diabetes mellitus confirmed by a doctor.

### Statistical Analysis

In the first step descriptive statistics were used for the studied variables. Next, the associations of the presence of long-term illness or diabetes mellitus with self-rated health, life satisfaction, health complaints, breakfast consumption as well as sweets and soft drink consumption were analysed using a binary logistic regression model. Children without any long-term illness were used as the reference group. Moreover, interaction of the association of age, gender and the presence of long-term illness and diabetes mellitus on health and eating habits were subsequently explored. Finally, to compare adolescents without any long-term illness, with other long-term illness and with diabetes mellitus regarding social support, including family, classmate and teachers, we compared the means and proportions, depending on the measurement scales. The differences were tested using general linear models and then post-hoc computed to determine which means differ significantly. All analyses were performed using SPSS version 21.0.

## RESULTS

Fair or poor health was reported by 18% of adolescents with a long-term illness and by almost 20% of adolescents with diabetes mellitus. Low satisfaction was reported by more than 20% of adolescents with a long-term illness and almost 24% of adolescents with a diabetes mellitus. Around half of adolescents do not eat breakfast regularly on school days and similar percentages were noted in case of adolescents with a long-term illness (46.9%) as well as in adolescents with diabetes mellitus (34.0%). Moreover, around 33% of adolescents with diabetes mellitus consume soft drinks on daily basis and 21% of them even consume sweets (Table 1).

Adolescents with T1DM have a higher chance of reporting fair or poor health and at least two health complaints at least once a week than do adolescents without any long-term illness; however, they have a two-times lower chance of reporting not having breakfast every school day. Similar findings were confirmed by comparison of adolescents with long-term illness with their peers without any long-term illness. Adolescents with a long-term illness have a two-times higher chance of reporting fair or poor health, low life satisfaction and at least two health complaints almost once a week in comparison to adolescents without any long-term illness. They also have a lower chance of reporting not having breakfast every school day. As for sweets and soft drink consumption, no significant differences were found (Table 2). The interactions of gender or age with long-term illness on self-rated health, health complaints, regular breakfast, sweets and soft drinks consumption were not significant. The exception was the interaction of gender with the presence of a long-term illness on low life satisfaction (not shown). While girls with T1DM are less satisfied in comparison with healthy girls, boys with T1DM are more satisfied than their healthy peers.

Table 3 shows the differences between three groups of adolescents in family, classmates and teachers’ support. Adolescents with T1DM have the highest score in perceived support from their teachers and classmates. However, in case of family support, healthy adolescents have the highest score. Results from the general linear model suggest that healthy adolescents and

**Table 1.** Descriptive characteristics of the sample (Slovakia 2014, 11–15 years old, N = 8,910)

		Without any long-term illness N (%)	With a long-term illness N (%)	With type 1 DM N (%)
Total sample		7,053 (79.2)	1,759 (19.7)	98 (1.1)
Gender	Boys	3,587 (50.9)	836 (47.5)	58 (59.2)
	Girls	3,466 (49.1)	923 (52.5)	40 (40.8)
Age	11–12 years old	2,714 (38.5)	672 (38.2)	33 (33.7)
	13–15 years old	4,339 (61.5)	1,087 (61.8)	65 (66.3)
Self-rated health	fair or poor	642 (9.2)	316 (18.1)	19 (19.8)
Life satisfaction	low	1,194 (17.2)	375 (21.5)	22 (23.7)
Health complaints	≥2 symptoms at least once a week	3,634 (51.5)	1,046 (59.5)	60 (61.2)
Breakfast consumption	less than every school day	3,496 (50.5)	814 (46.9)	33 (34.0)
Sweets consumption	every day	2,428 (36.0)	608 (35.8)	30 (32.6)
Soft drinks consumption	every day	1,761 (25.7)	411 (23.9)	20 (21.5)

**Table 2.** Differences in health outcomes and eating habits between children with diabetes mellitus, a long-term illness and without any long-term illness: logistic regression (Slovakia 2014, 11–15 years old, N=8,910)

	Without any long-term illness OR (95% CI)	With a long-term illness OR (95% CI)	With diabetes mellitus OR (95% CI)
Self-rated health (fair or poor)	1	***2.16 (1.87–2.51)	***2.48 (1.49–4.13)
Life satisfaction (low, score 0–5)	1	***1.31 (1.15–1.49)	1.52 (0.94–2.47)
Health complaints ( $\geq 2$ symptoms at least once a week)	1	***1.37 (1.22–1.53)	**1.88 (1.18–2.98)
Breakfast consumption (less than every school day)	1	**0.56 (0.77–0.95)	**0.51 (0.33–0.77)
Sweets consumption (every day)	1	0.98 (0.88–1.09)	0.87 (0.56–1.35)
Soft drinks consumption (every day)	1	0.91 (0.81–1.03)	0.77 (0.47–1.26)

\*p<0.05; \*\*p<0.01; \*\*\*p<0.001

**Table 3.** Differences in perceived social support between children with diabetes mellitus, a long-term illness and without any long-term illness: general linear model (Slovakia 2014, 11–15 years old, N=8,910)

	Without any long-term illness M (SD)	With a long-term illness M (SD)	With diabetes mellitus M (SD)	Post hoc
Family support	24.51 (4.78)	24.30 (4.90)	22.88 (6.85)	1–3**, 2–3*
Classmate support	11.25 (2.39)	11.01 (2.39)	11.82 (2.61)	1–2***, 2–3**
Teacher support	10.68 (2.77)	10.68 (2.81)	11.59 (2.93)	1–3**, 2–3**

\*p<0.05; \*\*p<0.01; \*\*\*p<0.001

A higher score indicates higher family, classmate or teacher support.

adolescents with a long-term illness perceive higher support from the family in comparison to adolescents with T1DM. On the other hand, adolescents with T1DM perceive higher support from classmates and teachers in comparison to others. Moreover, adolescents with a long-term illness report significantly lower support from their classmates. The interaction of gender and age on associations of the presence of diabetes mellitus and long-term illness with perceived social support, including family, classmates and teachers, are not significant (not shown).

## DISCUSSION

Our objective was to analyse differences in health outcomes, eating behaviour and perceived social support between adolescents with T1DM and their peers with a long-term illness and adolescents without any medical condition. We found that there are significant differences in self-rated health, life satisfaction, health complaints and breakfast consumption between adolescents with diabetes mellitus and their peers. Moreover, these adolescents differed in perceived social support, including family, peers and teachers.

Our results showed that adolescents with T1DM reported worse health and more health complaints than adolescents with a long-term illness or without any medical condition. These findings were supported by the study of deWitt et al. (29), who found that adolescents with T1DM reported worse general health as well as lower physical well-being that influence their daily functioning in school or in leisure time. Moreover, adolescents with a long-term illness reported lower life satisfaction in comparison with healthy peers. Recent research suggests that living with a chronic condition might be related to higher risk for psychological well-being, and children might feel more frequently sad, nervous or irritated (30). More psychosocial problems and lower health-related quality

of life in children and adolescents with T1DM compared to their healthy peers were also found in another recent study (31). The results from a systematic review (32) revealed that generic quality of life of adolescents with diabetes mellitus is not impaired compared to healthy peers; however, disease-specific quality of life problems, including a negative impact of diabetes on daily functioning as well as diabetes-related worries were certainly present. The study of Berntsson et al. (33) concluded that adolescents with a long-term illness or disabilities experienced well-being when they were allowed to prepare for living a normal life integrated into society and when they felt support.

Adolescents with a long-term illness and T1DM in particular had a lower chance of having breakfast irregularly. On the other hand, daily consumption of sweets and soft drinks was high and was very similar among their healthy peers. Our findings are partially supported by the study of Nansel et al. (8), in which children with diabetes mellitus reported lower adherence to dietary guidelines, such as low fruit and vegetables intake or high saturated fat consumption. Similarly, Mehta et al. (9) suggested that consuming high-fat and low-fibre diets in adolescents with T1DM is comparable with youth in the general population. However, the study of Due et al. (34) found that more adolescents with T1DM reported healthy eating behaviour compared to national norms, particularly the prevalence of soft drinks and sweets use was significantly lower and the prevalence of daily breakfast higher compared to the general population. Regularity in meal times and routines in which the child and family sit down and eat together, which help to establish better eating practices and monitoring of food intake, has been shown to be associated with better glycaemic outcomes (2), and thus poorer adherence to a healthy diet may be associated with poor parent-child mealtime behaviours (7).

Significant differences were also found in perceived social support. Our data suggest that adolescents with T1DM perceive

more classmate and teacher's support in comparison with healthy adolescents or adolescents with a long-term illness. The support of diabetes management from teachers and friends seems to be an important factor for adolescents with T1DM in self-management tasks on school days (35). When adolescents perceive that their teachers understand and support diabetes management, they may feel more at ease completing self-management tasks during the school day without worry of being challenged or having to explain themselves (16). Such social relationships might be related to an adolescent's disease adaptation or quality of life (36), and reporting high levels of friends' support might be linked with more self-care or better well-being (12). Moreover, our data indicate that adolescents in general perceive high levels of family support, which is partially supported at the national level by the international HBSC study as well (23). Despite this, adolescents with diabetes mellitus feel less support from their parents in comparison with their peers. Similar findings were found in a study by Moore et al. (18), which indicate that the presence of diabetes mellitus has a strong effect on family activities and parents' emotional well-being. Although family support and involvement are important for successful management of T1DM in adolescence, recent studies have found that intrusive, controlling and restrictive behaviour on the part of parents has a negative effect on adolescents' treatment adherence (2, 12, 13, 15). As stressed by Malik and Koot (12), adolescents' experience regarding their parents' behaviour may differ not only in regard to the direction and intensity of supportiveness but also to the nature of effect that a specific behaviour may have (12).

This study has several strengths and limitations. The most important strengths of the study are the representativeness of our sample of adolescents and the use of internationally recognized instruments. In addition, our study provides important information with regards to health, eating behaviour and social support in adolescents with T1DM. Nevertheless, some limitations need to be considered. Firstly, all the analyses were based on self-reported data, which is more liable to recall bias, though measures have been in general well-validated (37). Furthermore, questions on sweets and soft drinks do not consider the amount but frequency of use. It seems to be an important issue among adolescents as well (38–40). Finally, our study has a cross-sectional design; therefore, we are unable to formulate conclusive statements about causality.

## CONCLUSIONS

Adolescents with chronic conditions have to face many limitations during their lives. It seems that adolescents with a long-term illness differ from their healthy peers in particular aspects of their health and social environment. Moreover, adolescents with diabetes mellitus differ especially in perceived social support in comparison with healthy peers or adolescents with a long-term illness. Further research and deeper analyses of the impact of social determinants on health might provide useful information to help improve interventions targeting the psychosocial adjustment of these children.

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## Conflict of Interests

None declared

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