

# Support in the Management of Type 1 Diabetes is Associated with Quality of Life and Metabolic Control in Portuguese Adolescents

## Nos Adolescentes Portugueses o Apoio na Gestão da Diabetes Tipo 1 Está Associado à Qualidade de Vida e ao Controlo Metabólico

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### Abstract

**Introduction:** The treatment of type 1 diabetes requires many “points of compliance” that constitute a burden on young people. The support in disease management can influence the outcome.

**Objective:** Determine whether support in the management of type 1 diabetes in Portuguese adolescents influences metabolic control and quality of life.

**Methods:** Participants included 179 adolescents with type 1 diabetes aged between 10 and 18 years followed for at least one year on intensive treatment regime. Mean age 14.3 years, 52.5% of boys, 70.4% normal weight, average disease duration of 6.4 years. Adolescents performed evaluation of metabolic control by determination of the levels of HbA1c, Portuguese *Kidscreen-52*<sup>®</sup> was used to assess quality of life and face scales were used to assess parental, friends and school support.

**Results:** Adolescents with more parental, friends and school support in the management of type 1 diabetes had a better quality of life. Moreover, metabolic control improved with better school support.

**Conclusion:** According to these findings, support can influence the life quality and metabolic control of adolescents with type 1 diabetes. These results reinforce the need to involve the family and the community in the therapeutic management of these adolescents.

**Keywords:** adolescents; metabolic control; quality of life; type 1 diabetes

### Resumo

**Introdução:** O tratamento da diabetes tipo 1 requer muitos “pontos de adesão” que constituem um fardo para os jovens. O apoio na gestão da doença pode influenciar o resultado.

**Objetivo:** Determinar se, em adolescentes portugueses, o apoio na gestão da diabetes tipo 1 influencia o controlo metabólico e a qualidade de vida.

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### > INTRODUCTION

Adolescence adds unique challenges to the adolescent with type 1 diabetes, their family and the multidisciplinary team of diabetes. <sup>(1)</sup> The main goals of treatment for type 1 diabetes in adolescence are good metabolic control, normal development (physical, psychological and social) and acquisition strategies to cope with their pro-

**Métodos:** Foram incluídos no estudo 179 adolescentes com diabetes tipo 1 (idade entre 10 e 18 anos) seguidos durante pelo menos um ano, em regime de tratamento intensivo. Média de idades 14,3 anos, 52,5% rapazes, 70,4% com peso normal, duração média da doença de 6,4 anos. O controlo metabólico dos adolescentes foi avaliado pela determinação dos níveis de HbA1c, a qualidade de vida com a versão portuguesa do *Kidscreen-52*<sup>©</sup> e o apoio dos pais, amigos e escola com as escalas faciais.

**Resultados:** Adolescentes com mais apoio dos pais, amigos e da escola na gestão da diabetes tipo 1 mostraram melhor qualidade de vida. Além disso, o controlo metabólico melhorou com melhor apoio escolar.

**Conclusão:** De acordo com os achados, nos adolescentes com diabetes tipo 1, o apoio pode influenciar a qualidade de vida e o controlo metabólico. Estes resultados reforçam a necessidade de envolver a família e a comunidade na gestão terapêutica desses adolescentes.

**Palavras-chave:** adolescentes; controle metabólico; qualidade de vida; diabetes tipo 1

blems.<sup>(1,2)</sup> Adolescents are recognized as the group with more difficulty in reaching haemoglobin A1c (HbA1c) levels below 7.5. Moreover, adolescence is often associated with a metabolic control deterioration due to endocrine changes of puberty (growth hormone and sex hormones), psychological challenges (identity and autonomy), higher independence in the treatment, erratic meal and exercise patterns, eating behavior disorders, risk taking behaviors, poor adherence to treatment regimens and mismanagement of diabetes (which is not a priority in their lives).<sup>(1,3)</sup> Although there are no rigorous scientific studies on optimal medical care to adolescents with diabetes, it is acknowledged that therapeutic approaches to chronic illness in adolescence cannot be limited to drugs prescription.<sup>(1,4)</sup> In fact, developmental, psychological and family factors are crucial in the management of the condition.<sup>(1,4)</sup> Intensive treatment of type 1 diabetes requires many “points of compliance” and “extra care” in the daily life that constitute an extra burden on young people. Some studies support that parental support and involvement during adolescence are associated with a better metabolic control.<sup>(5,6)</sup> Friendship plays a central role in adolescence and has been described as a protective factor on the physical and psychological health of adolescents with type 1 diabetes.<sup>(7)</sup> School is the place where teens spent most of their time, and therefore, assurance that a protective environment is provided and a safety integration in school activities takes place is a right of all adolescents with type 1 diabetes.<sup>(8)</sup>

The aim of our study was to determine whether support in the management of type 1 diabetes influences metabolic control and quality of life in adolescence.

## > METHODS

### Participants

The study included 179 adolescents between 10 and 18 years with type 1 diabetes undergoing a intensive treat-

ment regime and with diabetes duration of at least one year. Exclusion criteria were diagnosis of type 1 diabetes for less than 12 months, pregnancy, chronic debilitating disease (including cystic fibrosis) and cognitive impairment. Mean age was 14.3 years ( $\pm$  2.5), 52.5% of boys, 70.4% normal weight, mean disease duration of 6.4 years ( $\pm$  3.9) and mean HbA1c 9% ( $\pm$  1.7, range 6-14%). A convenience sample was used, where all patients who attended the *Associação Protetora dos Diabéticos de Portugal (APDP)* pediatric diabetes center for a period of 3 months and accepted to participate in the study were included. Selection took place according to availability of teenagers to answer to the questionnaire on the same day of their scheduled medical visit.

### Measurements

Body mass index (BMI) was classified according to BMI percentile curves of the CDC (2000) for gender and age. The assessment of metabolic control was performed by collecting a drop of capillary blood for measurement of HbA1c in the apparatus *DCA VANTAGE ANALYZER SIEMENS*<sup>®</sup>.

The questionnaire used for health-related quality of life (QOL) data collection was the Portuguese version of the *Kidscreen-52*<sup>©</sup>.<sup>(9)</sup> The *Kidscreen-52*<sup>©</sup> is a transcultural European instrument for measuring, monitoring and assessing the quality of life in children and adolescents aged 8 to 18 years. It is a self-report questionnaire, including ten dimensions, and taking 15 minutes to fulfill.<sup>(9)</sup>

To assess perceived support from family, friends and school was used a faces scale numbered from 0 to 5 where 0 corresponds to the maximum support and 5 corresponding to lack of support.

### Ethics

The study was approved by the Scientific Council of the Faculty of Medicine of Lisbon and the *APDP* Ethics Committee.

## Data Analysis

The data collected through the questionnaires were transferred to a SPSS database (*Windows-Statistical Package for Social Sciences version 20.0*). ANOVA test was used to compare the support in disease management according to gender and BMI categories. Pearson Test was used for correlational analyzes.

Multiple linear regression was carried out to determine predictors of QOL and metabolic control. To determine QOL predictors *Kidscreen-52*<sup>®</sup> was the dependent variable and the independent variables were disease duration, HbA1c, parental support, friends support, school support, disease acceptance and life satisfaction. To determine metabolic control predictors, HbA1c was the dependent variable and the independent variables were the *Kidscreen-52*<sup>®</sup> QOL ten dimensions, school support, disease acceptance and life satisfaction.

## > RESULTS

Results showed that good adolescent QOL was associated with better metabolic control. Table 1 shows that the HbA1c value relates negatively with QOL measured by *Kidscreen-52*<sup>®</sup> ( $r = -0.19$ ;  $p < 0.05$ ), i.e., the higher the HbA1c lower QOL is. The HbA1c value also showed to be negative relationship with physical well-being ( $r = -0.21$ ;  $p < 0.01$ ), psychological well-being ( $r = -0.23$ ;  $p < 0.01$ ), moods/emotions ( $r = -0.23$ ;  $p < 0.01$ ) and autonomy ( $r$

$= -0.19$ ;  $p < 0.05$ ): the higher the HbA1c lower the adolescents' perception in relation to these dimensions. These results were independent of age and gender.

Tables 2, 3, 4 and Figure 1 show the support in disease management data. The vast majority (90%) of adolescents feel supported by their parents, only 1.7% considered to have insufficient support and no one mentioned lack of support. More than two-thirds of the adolescents (78%) consider to have good friends support and two-thirds (69%) feel well supported at school however 10% feel school support as insufficient. Results showed no relationship between gender and parental, friends and school support. Parental support was associated with BMI [ $F(2,174) 03,1$   $p = 0.05$ ], suggesting that adolescents with higher BMI have less parental support. Neither friends nor school support were associated with BMI. We found a positive correlation between age and parental support ( $r = 0.18$ ;  $p < 0.05$ ) and between the length of time since diagnosis was made and support from friends ( $r = 0.18$ ;  $p < 0.05$ ), with higher adolescent's age associated with less parental support and a shorter disease duration associated with greater friends support. The study showed that school support was positively correlated with the value of HbA1c ( $r = 0.17$ ;  $p < 0.05$ ), i.e. a lower school is associated with a worse metabolic control. Finally, parental, friends and school support were negatively correlated with QOL ( $r = -0.49$ ,  $p < 0.01$ ;  $r = -0.34$ ,  $p < 0.01$ ;  $r = -0.45$ ,  $p < 0.01$ ).

**Table 1** - QOL reported by adolescents in *KidScreen52*<sup>®</sup> sub-scales and Pearson correlation with HbA1c.

	n	Mean	±SD	Range	α - Cronbach	HbA1c (r)
Physical Well-being	175	18.2	3.3	0-25	0.79	- 0.21**
Psychological Well-being	178	24.4	3.8	0-30	0.85	- 0.23**
Moods and Emotions	178	29.1	4.1	0-35	0.8	- 0.23**
Self-Perception	177	19.4	3.5	0-25	0.66	- 0.06
Autonomy	178	20.0	4.0	0-25	0.84	- 0.16*
Parent Relations and Home Life	178	24.9	4.3	0-30	0.85	- 0.03
Financial Resources	178	12.0	3.2	0-15	0.9	- 0.12
Social Support and Peers	178	25.0	4.2	0-30	0.82	- 0.54
School Environment	177	22.4	4.2	0-30	0.84	- 0.04
Social Acceptance (Bullying)	178	13.8	2.2	0-15	0.83	0.02
<i>KidScreen52</i> <sup>®</sup>	166	210	24.5	0-260	0.86	- 0.19*

\* $p < 0.05$ ; \*\* $p < 0.01$

**Table II - Descriptives for family, friends and school support.**

	n	Mean	±SD	Range
Parental support	177	0.41	0.76	0-4
Friends support	178	0.81	0.95	0-5
School support	176	1.09	1.07	0-5

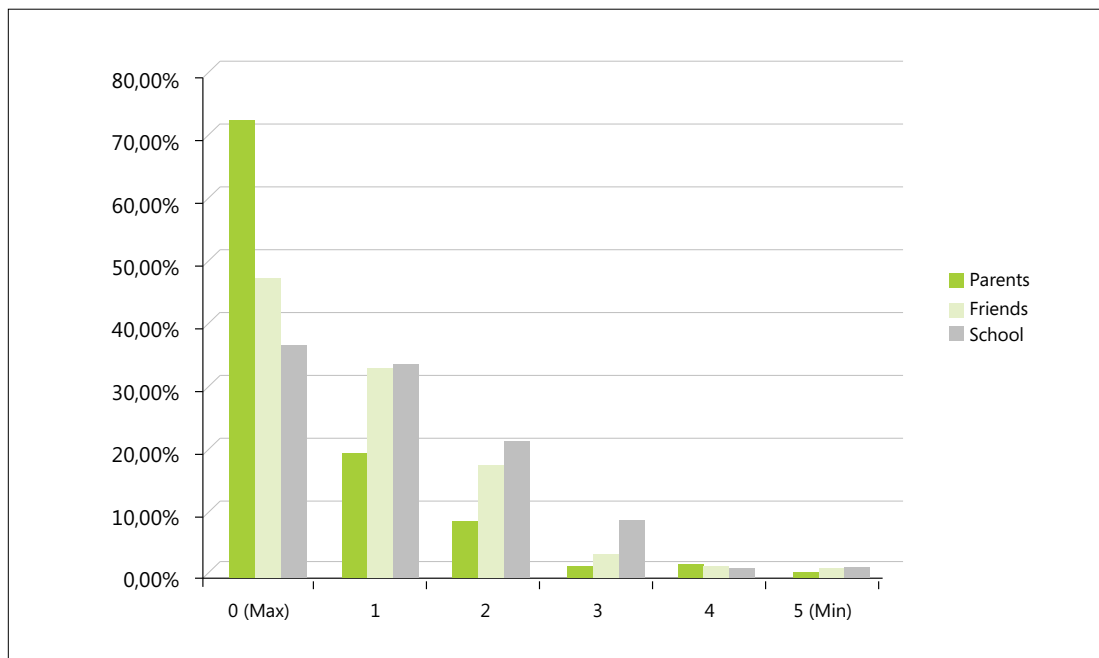
**Table III - Comparison between support in disease management and BMI.**

	Degrees of freedom	Normal weight		Pré-obesity		Obesity		F	P	Post Hoc Scheffe
		Mean	±SD	Mean	±SD	Mean	±SD			
Parental support	2.174	0.38	0.73	0.65	0.95	0.12	0.33	3.1	0.05*	n.s.
Friends support	2.175	0.84	1.0	0.77	0.81	0.71	0.85	0.19	0.82	n.s.
School support	2.173	1.06	1.06	1.2	0.96	1.06	1.35	0.25	0.78	n.s.

**Table IV - Pearson correlation between support in disease management and age, disease duration, metabolic control (HbA1c) and QOL.**

	Age (r)	Disease duration (r)	HbA1c (r)	KidScreen52 <sup>®</sup> (r)
Parental support	0.18*	0.12	0.10	- 0.49**
Friends support	- 0.12	0.18*	0.13	- 0.34**
School support	- 0.06	0.13	0.17*	- 0.45**

\*= p < 0.05 \*\*= p < 0.01



**Figure 1 - Percentages of reported parental, friends and school support in the management of type 1 diabetes.**

## > DISCUSSION

The finding that adolescents with more parental, friends and school support in management of DM1 have better QoL and, in the case of the school, better metabolic control, highlights the need for involving both the family and the community in the therapeutic management of these adolescents.

Findings for each type of support deserve to be analyzed separately.

Parental support data suggest that adolescents with higher BMI have less parental support. This is an interesting finding, however we were not able to find studies confirming or denying this association. Older adolescents had less parental support, which would be expected due to progressive desirable increase in autonomy during adolescence. In same line of this result, Cameron et al. found that older adolescents have more responsibilities in the management of type 1 diabetes. <sup>(10)</sup> Another study found that greater family support was associated with a younger age, shorter duration of illness and improved metabolic control. <sup>(11)</sup> In our study, disease duration and metabolic control were not related with parental support. However, some studies found an association between parental support and metabolic control. <sup>(5,6,12,13)</sup> Concerning QoL, our finding that parental support is associated with a better QoL is corroborated by many other studies. <sup>(6,12,13,14)</sup>

Friends support was lower when the disease duration was longer. We were not able to find studies confirming or denying this relation. Considering that adolescents with a longer duration of DM1 should be older, contrary to what might be expected, we did not find a relationship between age and friends support. Likewise, we did not find any association between metabolic control and friends support, contrary to what has been described in two other studies. <sup>(15,16)</sup> Although our data showed that support from friends was associated with a better QoL, what may in itself lead to an interesting field of research, there are no studies that confirm or deny this association. However, Hegelson *et al.* found that friendship has a protective role in physical and psychological health of adolescents with type 1 diabetes. <sup>(7)</sup>

School support data showed that the higher the support the better both QoL and metabolic control. In our view, this is very important finding that corroborates the need to adequately integrate children and teens safely in all school setting. <sup>(8)</sup> Despite we have not found studies to corroborate these associations we consider that school support could be a very interesting field of research. Additionally, we would like to emphasize that this data

showed that therapeutic education at school must be part of the health care provision to adolescents with type 1 diabetes.

This study has two main limitations: the use of a convenience sample and its transversal design. Despite these limitations, this study is to our knowledge the first in Portugal trying to identify the relationship between QoL and metabolic control in adolescents with type 1 diabetes. Furthermore, it highlights the importance of support in disease management in order to improve their QoL and metabolic control. <

### **Conflicts of interests/Conflitos de interesses:**

The authors declare that they have no conflicts of interests./Os autores declaram a inexistência de conflitos de interesses

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