Available online at
ScienceDirect
www.sciencedirect.com
Elsevier Masson France
EM|consulte
www.em-consulte.com/en
Diabetes & Metabolism xxx (2016) xxx–xxx
Diabetes & Metabolism

Research letter

Difficulties describing feelings to others still predicts glycaemic control up to 24 months later in children with type 1 diabetes

1. Introduction

Screening for personal vulnerability factors is useful for increasing diabetes patients' self-management abilities and reducing the pernicious effects of poor glycaemic control.

In this study, we will examine the role of alexithymia factors.

Alexithymia is a personality trait that involves a lack of emotion regulation abilities [1]. Individuals who score high on this construct take little interest in their inner emotional and fantasy life; have a cognitive style that is literal, utilitarian and externally orientated; and experience difficulties in identifying emotions and describing what they feel to others [1]. Alexithymia has been described as a vulnerability factor for various mental disorders [2], and is also becoming increasingly known as a risk factor for physical disorders, too [3].

More specifically, some research has explored the specific relationship between alexithymia and chronic disease management. A few years ago, one study showed that maternal alexithymia and familial cohesiveness had an impact on glycaemic control in diabetic children [4]. Another study conducted in adults with type 1 diabetes (T1D) showed that scoring higher on the alexithymia factor 'difficulty describing feelings' (DDF) was associated with raised levels of glycated haemoglobin (HbA_{1c}) [5]. This result suggests that, in adulthood, DDF is a vulnerability factor for the severity and evolution of diabetes. It was then also shown that, in childhood, higher scores on the DDF alexithymia factor were related to poorer glycaemic control [6].

The goal of the present study was to assess the longitudinal association between childhood alexithymia and glycaemic control. This 2-year follow-up study examined the respective contributions of time 1 (T1) measures (demographics, medical variables and alexithymia characteristics) in the prediction of follow-up measures of glycaemic control (HbA_{1c}) in a sample of children, aged 8–12 years, with T1D. One central issue was to test whether the DDF factor could still predict glycaemic control in the long term, over and above the usual sociodemographic and health variables.

2. Methods

2.1. Study population

The present study was conducted at the Diabetology Clinic of the University Children's Hospital Queen Fabiola in Brussels, Belgium. The experimental mortality rate for follow-up measures was 6% (two participants failed to attend later consultations, and one patient with highly unstable glycaemic control for unexplained reasons was excluded).

The final sample for this follow-up study included 42 participants (21 girls, 21 boys) with T1D, ranging from 8 to 12 years at T1 and from 10 to 14 years at time 5 (T5). A total of 23 children (55%) were Belgian citizens.

2.2. Measures of demographics, medical variables and alexithymia characteristics

Sociodemographic, health condition and psychological variables were not measured again during the follow-up. (For additional T1 details, please refer to the method described in [6]). The following five predictors divided in three blocks of predictors, which were significantly associated with HbA_{1c} at T1, were considered during the follow-up:

- demographic details [parental level of education (majority of parents achieved secondary school: 11.4 ± 4.3 years)] and marital status [most parents (86%) lived together];
- health condition [diabetes duration (60 ± 35 months; range: 8–136)] and number of self-monitored blood glucose (SMBG) readings (64% did four readings/day);
- DDF factor according to the Alexithymia Questionnaire for children [7] (five items, scores 0 to 10), where a higher score indicates greater difficulty in communicating feelings to other people.

The French version of this questionnaire was adapted in 2007 by Lahaye and Luminet (unpublished document), and includes items such as 'I find it difficult to say how I feel inside' and 'I find it hard to say how I feel about other people'. The children's mean DDF score was 4.12 ± 2.40 (range: 0–8).

http://dx.doi.org/10.1016/j.diabet.2015.12.003

2.3. Assessment of glycaemic control during follow-up

Glycaemic control was measured by determination of HbA_{1c} levels, using high-performance liquid chromatography (HPLC) and an HA 8160 analyzer (A. Menarini Diagnostics, Florence, Italy), which allowed calculation of the glycaemic control profile for the past 2 months. The HbA_{1c} upper limit of normal is 6.2% [6]. An average value of HbA_{1c} for a 6-month period was calculated based on information reported in the participants' medical records. In general, patients came for a hospital consultation every 2 months. Thus, three measurements were collected per each 6-month period for most participants (minimum of two measurements, maximum of four). This calculation was based on four consecutive 6-month periods and corresponds to mean HbA_{1c} values for time point 2 (T2; 6 months later), T3 (12 months later), T4 (18 months later) and T5 (24 months later).

Follow-up mean HbA_{1c} values were close to 7.5% and were relatively stable over time, with extreme values always staying between 5.90% and 11.10%. These values were also representative of the mean HbA_{1c} level achieved by all of the T1D children followed in hospital [8]. For more descriptive information on the study HbA_{1c} measures, see Fig. 1.

2.4. Statistical analysis

All analyses were performed with Statistical Package for Social Sciences (SPSS) version 18.0 software. To test the long-term predictive power of departure-point significant predictors on follow-up measures of glycaemic control (T2 to T5), five hierarchical regression analyses (one for each time point) were run, using the same order of entry (in three blocks) as in [6]: demographic variables in the first block; medical variables in the second one; and, finally, the alexithymia factor DDF in the third.

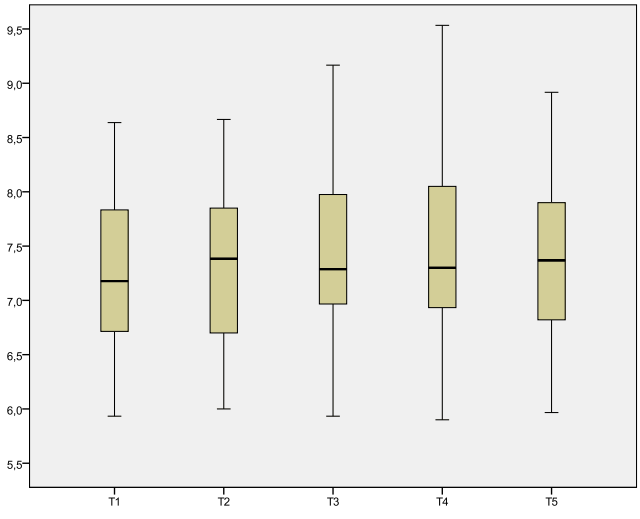

Fig. 1. Longitudinal HbA_{1c} distributions over follow-up (Tukey box plot). Horizontal axis (x): HbA_{1c} measures at five time points; vertical axis (y): HbA_{1c} values as percentages. Minimum: Q1 (percentile 25); Q2 (percentile 50/median); and Q3 (percentile 75); maximum: excluding outliers and extreme scores.

3. Results

The final regression models were significant for all five time point measurements. The same variables as in our previous report [6] predicted levels of HbA_{1c}. The three blocks of predictors all contributed significantly to variations in HbA_{1c}, with T4 hierarchical regression being the only exception in that two predictors (parental education and DDF) did not predict HbA_{1c}. Comparison analyses of sample pairs of T1 mean HbA_{1c} values with HbA_{1c} measures at later time points showed that the T4 HbA_{1c} values were marginally different from T1 [$t(42) = -1.722$, $P = 0.093$]. This suggests that some uncontrollable events might have taken place in the weeks preceding the measurement of the T4 values.

Results are summarized in Table 1. They indicate that, similar to what was found at T1, three variables predicted lower HbA_{1c} values (better glycaemic control): a two-parent family; higher parental level of education; and more frequent SMBG measurements/day. In addition, two variables predicted higher HbA_{1c} values (poorer glycaemic control): longer diabetes duration; and higher scores on the DDF factor of alexithymia.

Sociodemographic and health condition variables were robust and stable predictors of glycaemic control from T2 to T5, with R^2 measures ranging from 0.18 to 0.39, and from 0.13 to 0.37 of glycaemic control variance, respectively, over a period of 2 years. The DDF predictive value tended to decrease over time, with the highest value of 0.12 at T1 decreasing to 0.05 at T5. At T5, each increase of 1 unit in DDF score was associated with a 0.09 increase in HbA_{1c} value, with a theoretical maximum gain of 0.93. Knowing the mean T5 HbA_{1c} value and standard deviation for the whole group ($7.4 \pm 0.9\%$), it may be concluded that different DDF scores can make the difference between good ($HbA_{1c} \leq 7.5\%$) and insufficient or poor ($> 7.5\%$) glycaemic control in children, as defined by the International Society for Pediatric and Adolescent Diabetes (ISPAD) [9].

4. Discussion

4.1. Predictive factors of HbA1c during follow-up

Hierarchical regression analyses carried out with longitudinal measures of HbA_{1c} allowed the conclusion that sociodemographic, medical variables and the alexithymia DDF factor measured at T1 are still able to significantly predict the variance of HbA_{1c} measured at later time points [1] over a period of at least 2 years. Longitudinal data show that these three categories of variables are robust predictors of long-term glycaemic control.

However, the T4 HbA_{1c} showed a relatively different pattern from the other HbA_{1c} time point measurements. As comparison analyses of sample pairs indicated that the T4 HbA_{1c} was marginally, but not significantly, different from the T1 measure,

Please cite this article in press as: Housiaux M, et al. Difficulties describing feelings to others still predicts glycaemic control up to 24 months later in children with type 1 diabetes. Diabetes Metab (2016), http://dx.doi.org/10.1016/j.diabet.2015.12.003

Table 1
Hierarchical regression analysis predicting 2-year longitudinal HbA_{1c} values (final β and explained variance).

Patients ($n = 42$)	Final β						R^2 change					
	2010 article ($n = 45$)	T1	T2	T3	T4	T5	2010 article ($n = 45$)	T1	T2	T3	T4	T5
Step 1: demographics							0.18*	0.23**	0.39**	0.28**	0.18*	0.34**
Marital status[a]	–0.340**	–0.458**	–0.492**	–0.406**	–0.291*	–0.452**						
Parental education[b]	–0.280*	–0.375**	–0.366**	–0.297*	–0.127[e]	–0.334**						
Step 2: health condition							0.18**	0.13*	0.19**	0.20**	0.37**	0.20**
Diabetes duration (months)	0.320**	0.201+	0.365**	0.402**	0.478**	0.389**						
SMBG readings/day	–0.280*	–0.262*	–0.302*	–0.267*	–0.443*	–0.287*						
Step 3: emotional incompetence							0.12**	0.11**	0.07*	0.04[e]	0.01[d]	0.05*
DDF[c]	0.340**	0.341**	0.260*	0.211[e]	0.102[d]	0.237*						

T1–T5: time point 1 to time point 5; SMBG: self-monitored blood glucose; DDF: difficulty describing feelings.
[a] –1 = separated, divorced or widower (one-parent family); 1 = together or married (two-parent family).
[b] Number of years of education after first year of primary school, without counting repeats of a year or higher diplomas obtained.
[c] As measured by Alexithymia Questionnaire [7] for children.
[d] Not significant.
[e] $P < 0.10$.
* $P < 0.05$.
** $P < 0.01$.

and no other variables were measured that might have an impact on disease management (such as puberty, school or treatment transitions), it is not possible to explain the different pattern for T4.

Also, contrary to other variables for which the power to predict HbA_{1c} stayed relatively stable over time, the power of the DDF tended to decrease. However, its predictive role in glycaemic control was still significant 2 years later. Thus, practitioners are encouraged to consider DDF (and more generally, alexithymia) as a complementary diagnostic tool to help identify those at risk of poor glycaemic control. The scale is short and easy to administer, and it can help to achieve required levels of glycaemic control. When the children scoring higher on DDF are identified, they will then need particular psychological interventions through which the expression of emotions is encouraged in a secure and safe environment.

4.2. Limitations and future perspectives

Before planning the new complete collection of data and considering the exploratory nature of the present research, it was considered desirable to first check whether the T1 independent variables (sociodemographic, medical and personality factors) could still predict glycaemic control at later time points. However, as no follow-up information was collected for the independent variables measured at T1, it was not possible to determine whether they evolved over time. Some of the independent variables are subject to possible changes over time, such as parental status, daily SMBG frequency and alexithymia characteristics. Previous studies have shown that alexithymia is a stable personality trait in adulthood [2] as well as in late adolescence [10]. Thus, new studies are needed to test whether alexithymia is already stable in childhood.

Another limitation is that our original sample size, which was already rather small, decreased even further over time. Future studies need to involve larger samples.

4.3. Practical implications

The difficulty that diabetic children have in expressing their feelings to others has a long-term impact on their glycaemic control. From the perspective of a global care approach, practitioners should systematically screen children for their emotional competencies. Such a complementary diagnostic tool is helpful for identifying, at the onset of diabetes treatment, those who are most at risk of poor glycaemic control and then allowing the implementation of tailor-made interventions for their specific needs [11].

Disclosure of interest

The authors declare that they have no competing interest.

Acknowledgements

We are grateful to all the paediatric diabetology staff for the fruitful collaboration between medical and psychological scientists. This study was supported by grant 1.5.175.06 from the Belgian National Fund for Scientific Research (FRS-FNRS).

References

[1] Taylor GJ, Bagby RM. New trends in alexithymia research. Psychother Psychosom 2004;73:68–77.
[2] Luminet O, Bagby RM, Taylor GJ. An evaluation of the absolute and relative stability of alexithymia in patients with major depression. Psychother Psychosom 2001;70:254–60.
[3] Kauhanen J, Kaplan GA, Cohen RD, Julkunen J, Salonen JT. Alexithymia and risk of death in middle-aged men. J Psychosom Res 1996;41:541–9.

Please cite this article in press as: Housiaux M, et al. Difficulties describing feelings to others still predicts glycaemic control up to 24 months later in children with type 1 diabetes. Diabetes Metab (2016), http://dx.doi.org/10.1016/j.diabet.2015.12.003

[4] Meunier J, Dorchy H, Luminet O. Does family cohesiveness and parental alexithymia predict glycaemic control in children and adolescents with diabetes? Diabetes Metab 2008;34:473–81.
[5] Luminet O, de Timary P, Buysschaert M, Luts A. The role of alexithymia factors in glucose control of persons with type 1 diabetes: a pilot study. Diabetes Metab 2006;32:417–24.
[6] Housiaux M, Luminet O, Van Broeck N, Dorchy H. Alexithymia is associated with glycaemic control of children with type 1 diabetes. Diabetes Metab 2010;36:455–62.
[7] Rieffe C, Oosterveld P, Terwogt MM. An alexithymia questionnaire for children: factorial and concurrent validation results. Pers Individ Dif 2006;40:123–33.
[8] Dorchy H. One center in Brussels has consistently had the lowest HbA1c values in the 4 studies (1994–2009) by the Hvidoere International Study Group on childhood diabetes: What are the "recipes"? World J Diabetes 2015;6:1–7.
[9] Rewers MJ, Pillay K, de Beaufort C, Craig ME, Hanas R, Acerini CL, et al. Assessment and monitoring of glycemic control in children and adolescents with diabetes. Pediatr Diabetes 2014;15(Suppl. 20):102–14.
[10] Karukivi M, Pölönen T, Vahlberg T, Saikkonen S, Saarijärvi S. Stability of alexithymia in late adolescence: results of a 4-year follow-up study. Psychiatry Res 2014;30(219(2)):386–90.
[11] Delamater AM, de Wit M, McDarby V, Malik J, Acerini CL. Psychological care of children and adolescents with type 1 diabetes. Pediatr Diabetes 2014;(Suppl. 20):232–44.

M. Housiaux [a]
O. Luminet [a,b,*]
H. Dorchy [c]

[a] *Department of Psychology, Université catholique de Louvain (UCL), Research Institute for Psychological Sciences, 10, Place Cardinal-Mercier, 1348 Louvain-la-Neuve, Belgium*
[b] *Belgian National Fund for Scientific Research (FRS-FNRS), Belgium*
[c] *Diabetology Clinic, University Children's Hospital Queen Fabiola, Université libre de Bruxelles (ULB), 15, Avenue J.J.-Crocq, 1020 Bruxelles, Belgium*

* Corresponding author. Department of Psychology, Université catholique de Louvain (UCL), Research Institute for Psychological Sciences, 10, Place Cardinal-Mercier, 1348 Louvain-la-Neuve, Belgium.
E-mail address: olivier.luminet@uclouvain.be (O. Luminet)

Received 14 July 2015
Received in revised form 10 December 2015
Accepted 11 December 2015

Please cite this article in press as: Housiaux M, et al. Difficulties describing feelings to others still predicts glycaemic control up to 24 months later in children with type 1 diabetes. Diabetes Metab (2016), http://dx.doi.org/10.1016/j.diabet.2015.12.003