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Original article

Does family cohesiveness and parental alexithymia predict glycaemic control in children and adolescents with diabetes?

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Abstract

Aim. – Several studies indicate that family functioning and parental expressiveness can influence children's glycaemic control. However, previous studies have had contradictory findings. Furthermore, no previous work has simultaneously explored the mother's and father's perception of family cohesiveness together with maternal and paternal alexithymia in relation to a child's diabetic control. In this study, we examined whether the parental perception of family cohesion and the parents' degree of alexithymia could predict their child's or adolescent's glycaemic control (severe hypoglycaemia, hospitalizations for hyperglycaemia and HbA_{1c}) after adjusting for demographic variables.

Methods. – The study included 45 Belgian families with at least one type 1 diabetic child aged six to 18 years (25 girls and 20 boys). Parents completed demographic questionnaires about themselves and their children. Information on type 1 diabetes in their child and the family-medical history were also collected. The number of severe-hypoglycaemic events and hospitalizations for hyperglycaemia were documented for the last 12 months, as were HbA_{1c} levels over the last 16 months. Finally, family cohesiveness (FACES-III) and parental alexithymia (TAS-20) were assessed.

Results. – Hierarchical regression analyses showed that the perception of family cohesion by mothers ($P < 0.05$) was a predictor of the number of severe hypoglycaemic events in the last 12 months. Parents' demographic variables (marital and professional status, $P < 0.001$) and maternal alexithymia ($P < 0.05$) were found to be predictors of the number of hospitalizations for hyperglycaemia in the last 12 months. As for HbA_{1c}, only two parental demographic variables were significant predictors (marital and professional status, $P < 0.01$ and $P < 0.05$, respectively).

Conclusion. – The maternal perception of family cohesiveness and maternal alexithymia predict on glycaemic control in children and adolescents with diabetes.

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Résumé

La cohésion familiale et l'alexithymie parentale peuvent-elles prédire le contrôle glycémique des enfants et adolescents diabétiques ?

Objectif. – Aucune étude n'a exploré la perception de la mère et du père par rapport à la cohésion familiale ni l'alexithymie maternelle et paternelle en relation avec l'équilibre glycémique de l'enfant. Dans cette étude, nous examinons la cohésion familiale et le niveau d'alexithymie des parents en lien avec le contrôle glycémique de leur enfant. Nous émettons l'hypothèse que la perception parentale de la cohésion familiale et l'alexithymie des parents pourraient prédire le contrôle glycémique de l'enfant diabétique (hypoglycémies sévères, hospitalisations pour hyperglycémie et HbA_{1c}), et ce, après avoir contrôlé l'effet des variables démographiques.

Méthodes. – L'échantillon inclut 45 familles belges avec un enfant âgé de six à 18 ans (25 filles et 20 garçons) souffrant de diabète de type 1. Les parents ont complété un questionnaire démographique pour eux-mêmes et pour leur enfant. Un questionnaire d'informations à propos du diabète de type 1 et de l'histoire médicale familiale a également été complété. Le nombre d'hypoglycémies sévères et d'hospitalisations pour hyperglycémie ont été collectés sur les 12 derniers mois et les taux d'HbA_{1c} sur les 16 derniers mois. La cohésion familiale (FACES-III) et l'alexithymie parentale (TAS-20) ont été évaluées.

Résultats. – Des analyses de régressions hiérarchiques montrent que la perception de la cohésion familiale par les mères ($P < 0,05$) prédit le nombre d'hypoglycémies sévères sur les 12 derniers mois. Les variables démographiques parentales (statut marital et professionnel $P < 0,001$) et l'alexithymie maternelle ($P < 0,05$) prédisent le nombre d'hospitalisations pour hyperglycémie au cours des 12 derniers mois. En ce qui concerne l'HbA_{1c}, seules les variables démographiques des parents (statut marital et professionnel) étaient significatives (respectivement, $P < 0,01$ et $P < 0,05$).

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Conclusion. – La perception maternelle de la cohésion familiale et l'alexithymie maternelle prédisent le contrôle glycémique des enfants et adolescents diabétiques.

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Keywords: Type 1 diabetes; Family cohesion; Parental alexithymia; Glycaemic control

Mots clés : Diabète de type 1 ; Cohésion familiale ; Alexithymie parentale ; Contrôle glycémique

1. Introduction

Type 1 diabetes has a considerable influence on the live of children and adolescents. The disease also has important psychological consequences on family functioning [1], which, in turn, is strongly associated with glycaemic control [2–4].

One crucial aspect of family functioning that has been neglected when examining type 1 diabetes is family cohesiveness – the degree of separation or connection among family members. The literature distinguishes four levels of family cohesion, ranging from extremely low to extremely high and referred to as “disengaged”, “separated”, “connected” and “enmeshed” [5]. Children whose families were characterized as disengaged had a significantly greater number of hypoglycaemic events and six times as many episodes of ketoacidosis as other children with diabetes [6]. At the other end of the spectrum, enmeshed relationships in the family, which comprise ambiguous roles, rules and a breakdown of hierarchy, are also associated with family difficulties in coping with the treatment regimen for children with diabetes [7]. However, parental involvement in connected and enmeshed families was associated with diabetes control in adolescents [8] and intimacy in mother–daughter relationships was associated with lower-glycosylated haemoglobin (HbA_{1c} levels) [9]. In fact, better glycaemic control was predicted by greater family cohesion [10]. But previous studies have also uncovered contradictory findings and none has yet studied the mothers' and fathers' perceptions separately.

Other studies have shown that family dysfunction is associated with alexithymia [11,12]. This multifaceted construct includes features, such as difficulty in identifying one's own feelings, difficulty in describing one's feelings to other people and a reduced capacity to engage in fantasy and other imaginative activities. These latter characteristics are usually referred to as an externally oriented thinking style. Collectively, all of these traits are thought to reflect a deficit in the cognitive processing and regulation of emotional states [13]. In particular, difficulty in identifying one's feelings is related to dysfunctional family-affective involvement, externally oriented thinking is related to deficient family-behavioural control and impaired imagination is related to inadequate family problem-solving [11]. Moreover, family's levels of cohesiveness, conflict, disengagement, sociability, enmeshment, organization and parenting style can predict their alexithymia scores [12].

In fact, the emotional expressiveness of each parent can influence his or her child's diabetes. Maternal and paternal emotions are linked to diabetic control, with greater emotional involvement of parents being associated with better glycaemic control [14]. Moreover, the encouragement to act openly and

express feelings directly can improve glycaemic control in children [10]. However, mothers and fathers have different roles. The coalition between mother and child, the lack of paternal involvement and “infantilization” of the suffering child are family characteristics associated with metabolic-control problems [7]. Highly expressed maternal emotions and, in particular, the mothers' emotional over-involvement is also related to poor-metabolic control in children [15]. Other studies show that excessively-low and excessively-high emotional investments can negatively influence children's metabolic control. These findings strongly suggest that alexithymic characteristics may interfere with healthcare use and the diabetic child's ability to manage the illness [16,17].

Consistent with these findings, several studies indicate that family functioning and parental emotional expressiveness can influence children's glycaemic control. However, earlier research revealed contradictory findings and no previous studies have simultaneously explored either the mother's or father's perception of family cohesiveness separately, the degrees of maternal and paternal alexithymia and their influences on children's diabetic control. In this study, we examined whether parental perception of family cohesion and the parents' level of alexithymia could predict their children's or adolescents' glycaemic control (severe hypoglycaemic events, hospitalizations for hyperglycaemia and levels of HbA_{1c}) after adjusting for demographic variables (see the list of variables below). In addition, we explored the intercorrelations between family cohesiveness and parental alexithymia. Our hypothesis is that strong family cohesiveness is associated with less parental alexithymia. We further hypothesized that this inverse relationship would hold true for both mothers and fathers.

2. Methods

2.1. Study sample

The study was conducted at the Diabetology Clinic of the Children's University Hospital Queen Fabiola in Brussels, Belgium. Between April and May 2004, all patients born between 1986 and 1998, and their parents, were invited to participate in our study. The final sample comprised 45 families (75% acceptance rate). These 45 families included 25 girls and 20 boys, aged six to 18 years, with diabetes. The children's mean age was 12.2 years (± 3.4). These 45 families also included 43 mothers and 42 fathers, and all were the parents with whom the diabetic children lived. The parents' mean age was 42.8 years (± 5.9). Of these 85 parents, 68 (80%) were Belgian citizens, 76 were employed (89%) and 74 (82%) lived together (as a two-parent family). Regarding the family variables, the mean number of children

with diabetes per family was 1.1 (± 0.3). Among the study sample, five families had two children, each with diabetes, but only one child per family was included (the recruited child was chosen by physician consultation). The mean number of family members (close and distant relations) with type 1 diabetes was 0.4 (± 0.5).

Glycaemic control indices were determined by the number of severe hypoglycaemic events (coma and/or convulsions and/or forced administration of a sweet substance), which had a mean of 1.2 (± 2.3) within the last 12 months and the number of hospitalizations for hyperglycaemia, with a mean of 0.2 (± 1.1) also in the last 12 months. In addition, glycaemic control was measured by determination of HbA_{1c} levels, using high-performance liquid chromatography (HPLC). The upper normal limit is 6.2%, whereas the participating children's mean HbA_{1c} was 7.5% ($\pm 1.5\%$). Of the 45 studied children, 38 were being treated with a regimen of two-daily insulin injections and seven with a basal-bolus regimen and the mean time since the diagnosis was 5.2 (± 3.5) years. The mean number of glycaemic measures per day was four. Treatment details are published elsewhere [18–20]. None of the patients had subclinical complications [21].

Of the 43 mothers and 42 fathers, one mother and four fathers refused to respond to the cohesion and alexithymia questionnaires and mentioned concerns regarding privacy as reasons for their refusal. Also, for one family, we had only the mother's answers because the father was out of town on a business trip. Thus, 42 mothers and 37 fathers responded to the questionnaires out of a final sample of 45 families with 45 children with diabetes.

2.2. Design and methods

After approval of the study by the ethics committee of the participating hospital, consent forms were presented to the patients and their parents. After each physician's routine appointment, medical staff suggested study participation to the families. On agreeing to participate, the staff introduced the first author (J.M.) to the patient and accompanying parents. After informed consent was given, the parents' and children's demographic data were collected as well as information on the type 1 diabetes and the family's medical history. Some of this information was available from medical files. The two questionnaires measuring family cohesiveness and alexithymia were explained and given with a self-addressed stamped envelope to the parents, who were instructed to complete the questionnaires on their own (without consulting the other parent). The following dependent variables were considered:

- the number of severe hypoglycaemic events in the last 12 months;
- the number of hospitalizations for hyperglycaemia in the last 12 months;
- HbA_{1c} values in the last 16 months (from January 2003 to April 2004).

All analyses were performed using SPSS software, version 12.0.

2.3. Questionnaires

2.3.1. Demographic data and diabetes information

This questionnaire collected the parents' demographic characteristics:

- age of each parent (in years);
- citizenship (Belgian or other);
- professional status (employed or unemployed);
- marital status (two-parent or single-parent family).

It also included information about the family: the number of children with type 1 diabetes in the family and the number of family members (close and distant relations) with type 1 diabetes. The following data were collected from the children or taken from their medical files:

- gender;
- age (in years);
- number of insulin injections and glycaemic measures taken per day;
- year of diagnosis;
- number of severe hypoglycaemic events and hospitalizations for hyperglycaemia over the past 12 months;
- HbA_{1c} values during the past 16 months;
- types of chronic complications (neuropathy, retinopathy, nephropathy and macroangiopathy).

2.3.2. Family Adaptability and Cohesion Evaluation Scale-III (FACES-III)

The Family Adaptability and Cohesion Evaluation Scale-III (FACES-III) is a validated 20-item self-reporting scale [5,22]. The French version was validated in 976 healthy subjects from 457 families [23]. It is used to obtain the parent's perceptions of two general aspects of family functioning: cohesiveness and adaptability [5,22]. Studies have demonstrated that family adaptability and cohesion are distinct traits [24,25], with cohesiveness being a more predictive and powerful variable than adaptability [26]. Therefore, although the participants were asked to fill out the entire questionnaire, only the cohesion dimension (the emotional bonding that family members have towards one another) was used in the analyses. The internal reliability of the cohesion dimension in the validated study was high (Cronbach's $\alpha = 0.79$) [23]. The dimension is assessed by five subscales:

- C1, "emotional links", reflects the degree of family members' independence and proximity;
- C2, "family support", assesses support offered by family members;
- C3, "family boundaries", reflects internal and external boundaries;
- C4, "time spent with family and common friends", assesses the time spent with family members and friends;
- C5, "recreational activities shared with the family", reflects individual or family activities.

Table 1
Parents' perception of family cohesiveness and its concepts

	Mothers			Fathers		
	Mean	S.D.	Min–Max	Mean	S.D.	Min–Max
Emotional links	9.3	1.0	7–10	8.9	1.5	3–10
Family support	7.1	1.8	4–10	6.6	1.8	3–10
Family boundaries	7.4	1.5	4–10	7.1	1.8	3–10
Time spent with family and friends	8.0	1.5	4–10	7.5	1.9	2–10
Recreational activities shared with the family	8.1	1.5	4–10	7.3	1.8	2–10
Cohesiveness	39.9	4.8	29–48	37.6	6.5	15–48

S.D.: standard deviation.

Table 2
Parental alexithymia and its factors

	Mothers			Fathers		
	Mean	S.D.	Min–Max	Mean	S.D.	Min–Max
Difficulty identifying feelings	14.2	5.2	7–26	14.5	6.3	7–30
Difficulty describing feelings	11.9	3.2	5–19	14.1	4.1	5–23
Externally oriented thinking style	17.8	4.7	9–28	18.5	4.9	9–30
Alexithymia	43.9	10.1	26–67	47.1	11.5	28–77

S.D.: standard deviation.

Each aspect contains two items, for a total of 10 items. All items were answered on a five-point scale from 1 (“scarcely ever”) to 5 (“almost always”). Thus, the lowest possible score is 10 and the maximum score is 50 and the higher the score, the stronger the family's cohesiveness [5,22]. Table 1 presents the means and standard deviations and the minimum and maximum values for the parents' perception of family cohesion and its subscales.

2.3.3. The Toronto Alexithymia Scale-20 (TAS-20)

The Toronto Alexithymia Scale of 20 items (TAS-20), another self-reporting scale, is the most widely used measure of alexithymia. Its concurrent, predictive, convergent and discriminant validity, reliability and stability have all been demonstrated [27,28]. The questionnaire involves rating 20 items on a five-point Likert scale (from 1 to 5). We used the French language version of the scale [29]. The TAS-20 has a three-factor structure [11,16]:

- F1, “difficulty identifying feelings”, assesses the respondents' capacity to identify feelings and to distinguish between feelings and bodily sensations of emotional arousal;
- F2, “difficulty describing feelings”, reflects the degree of difficulty in communicating feelings to others;
- F3, “externally oriented thinking style”, assesses the degree to which respondents are more concerned with external, objective events than their own internal-psychological state.

The lowest possible score is 20 and the highest possible score is 100 and the higher the score, the stronger the alexithymia tendencies [13]. Table 2 presents the means and standard deviations and the minimum and maximum values for parental alexithymia and its factors.

3. Results

First, we examined the relationships between family cohesiveness and parental alexithymia (Table 3) and found significant correlations. For mothers, as was hypothesized, a negative relationship was observed between maternal cohesion perception and maternal alexithymia ($R = -0.32$; $P = 0.040$). However, for fathers, no such link was observed. Finally, maternal and paternal cohesion perception and maternal and paternal alexithymia were all found to be positively correlated ($R = 0.55$; $P = 0.001$ and $R = 0.41$; $P = 0.015$, respectively).

For each of the three dependent variables (number of severe hypoglycaemic events in the last 12 months, number of hospitalizations for hyperglycaemia in the last 12 months and mean HbA_{1c} values over the last 16 months), only those variables that had a correlation (Bravais–Pearson) of $P < 0.10$ were considered to be predictors (Table 4). For each dependent variable, these predictors were block-entered into the hierarchical regression analyses in the following order:

Table 3
Pearson product moment correlations between family cohesiveness (maternal–paternal) and parental alexithymia (maternal–paternal)

	Maternal cohesiveness	Paternal cohesiveness	Maternal alexithymia
Paternal cohesiveness	0.55**	–	–
Maternal alexithymia	–0.32*	–0.38*	–
Paternal alexithymia	–0.21	–0.26	0.41*

Family cohesiveness is measured by the Family Adaptability and Cohesion Evaluation Scale-III (FACES-III, Olson, 1985). Parental alexithymia is measured by the Toronto Alexithymia Scale-20 (TAS-20, Bagby, Taylor and Parker, 1994).

* $P < 0.05$.

** $P < 0.01$.

Table 4

Pearson product moment correlations between demographic and medical variables, family cohesiveness and parental alexithymia

	Hypoglycaemia	Hyperglycaemia	HbA _{1c}
<i>Demographic variables</i>			
Child			
Gender	−0.12	0.06	−0.05
Age	0.09	0.23	0.19
Parents			
Age	−0.11	0.15	0.30*
Citizenship	0.29*	−0.31**	−0.24
Unemployment	−0.05	0.49***	0.53***
Marital status	0.17	−0.33**	−0.55***
Family			
Number of children with type 1 diabetes	−0.13	−0.08	−0.13
Family members with type 1 diabetes	−0.27*	−0.10	−0.05
<i>Medical variables</i>			
Number of insulin injections per day	−0.02	−0.07	0.11
Number of glycaemic measures per day	0.06	−0.01	0.10
Time in years since the diagnosis	0.04	−0.08	0.22
<i>Family cohesiveness</i>			
Maternal cohesiveness			
Emotional links	0.26*	−0.33**	−0.27*
Family support	−0.12	−0.15	−0.12
Family boundaries	0.09	−0.04	0.15
Time spent with family and friends	0.31**	−0.28*	−0.22
Recreational activities shared with the family	0.20	−0.36**	−0.33**
Cohesiveness	0.19	−0.33**	−0.22
Paternal cohesiveness			
Emotional links	−0.34**	0.01	−0.20
Family support	−0.29*	−0.25	−0.26
Family boundaries	−0.17	−0.11	−0.15
Time spent with family and friends	−0.09	0.13	0.12
Recreational activities shared with the famil	−0.21	0.07	−0.05
Cohesiveness	−0.29*	−0.04	−0.14
<i>Parental alexithymia</i>			
Maternal alexithymia			
Difficulty identifying feelings	0.10	0.40**	0.20
Difficulty describing feelings	0.18	0.17	0.03
Externally oriented thinking style	−0.19	0.14	0.05
Alexithymia	0.02	0.32**	0.14
Paternal alexithymia			
Difficulty identifying feelings	−0.22	0.17	0.12
Difficulty describing feelings	−0.03	−0.09	0.05
Externally oriented thinking style	−0.20	0.19	0.08
Alexithymia	−0.21	0.14	0.12

For gender: 1 = girls and 2 = boy; for citizenship: 2 = two Belgian parents, 1 = one Belgian parent and 0 = no Belgian parents; for unemployment: 0 = two parents work, 1 = one parent is unemployed and 2 = two parents are unemployed; for marital status: 1 = single-parent family and 2 = two-parent family; family cohesiveness is measured by the Family Adaptability and Cohesion Evaluation Scale III (FACES III, Olson, 1985); parental alexithymia is measured by the Toronto Alexithymia Scale-20 (TAS-20, Bagby, Taylor and Parker, 1994).

* $P < 0.10$.

** $P < 0.05$.

*** $P < 0.001$.

- demographic characteristics (child, parents and family);
- maternal and paternal cohesion variables;
- maternal and paternal alexithymia characteristics.

The demographic variables were entered first as they represented the most common predictors of type 1 diabetes difficulties and these were followed by the family-cohesion variables to examine the extent to which they explained glycaemic control above and beyond the patient's demographics. Finally, alexithymia factors were entered as another potential explanation of glycaemic control. We included cohesiveness before alex-

ithymia in the regression models because parental alexithymia is related to the parents' psychological functioning and, thus, was considered to be less directly related to the child's indicators of glycaemic control.

The variables included as the child's demographics were gender (1 = girls and 2 = boys) and age, whereas those for the parents were age, citizenship (2 = two Belgian parents, 1 = one Belgian parent and 0 = no Belgian parent), number of unemployed parents (0 = two parents working, 1 = one parent unemployed and 2 = two parents unemployed) and marital status (1 = single-parent family and 2 = two-parent family). The

Table 5
Hierarchical regression analysis predicting the number of severe hypoglycaemic events in the last 12 months

	B	Standard error	β	<i>t</i> value	R2	R2adj	R2chg	df	F	Fchg
Block 1: demographic variables					0.16	0.11		2–32	3.04 ⁺	
Parents										
Citizenship	0.16	0.09	0.29 ⁺	1.78 ⁺						
Family										
Family members with type 1 diabetes	–0.25	0.14	–0.28 ⁺	–1.74 ⁺						
Block 2: Family cohesiveness					0.43	0.31	0.27	6–28	3.58 ^{**}	3.40 [*]
Maternal cohesiveness										
Emotional links	0.20	0.09	0.41 [*]	2.19 [*]						
Time spent with family and friends	0.06	0.07	0.18	0.98						
Paternal cohesiveness										
Emotional links	–0.11	0.06	–0.36 ⁺	–1.97 ⁺						
Family support	–0.02	0.05	–0.06	–0.34						

For citizenship: 2 = two Belgian parents, 1 = one Belgian parent and 0 = no Belgian parents; family cohesiveness is measured by the Family Adaptability and Cohesion Evaluation Scale-III (FACES-III, Olson, 1985); parental alexithymia is measured by the Toronto Alexithymia Scale-20 (TAS-20, Bagby, Taylor and Parker, 1994).

⁺ $P < 0.10$

^{*} $P < 0.05$

^{**} $P < 0.01$.

variables considered to be family-demographic characteristics were the number of children in the family with type 1 diabetes and the number of family members (close and distant relations) with type 1 diabetes. Family cohesiveness was measured by the five dimensions of FACES-III, each assessed separately for the mother and for the father. Alexithymia was scored by the three factors in the TAS-20, again each one assessed separately for the mother and the father.

Table 5 indicates that the demographic variables and family cohesiveness were predictors for the number of severe hypoglycaemic events experienced by the child in the last 12 months. The effect of the demographic variables was only marginal, with Belgian citizenship ($P = 0.085$) and fewer people in the family with type 1 diabetes being associated with poor-glucose control ($P = 0.092$). Family cohesion was an important predictor, with a large increase in explained variance (27%). Those mothers who perceived that their family had stronger emotional links ($P = 0.037$) and those fathers who perceived their family to have weaker emotional links ($P = 0.059$) had children with a greater frequency of severe hypoglycaemic events.

Table 6 presents the predictors for the number of hospitalizations for hyperglycaemia in the last 12 months. The results indicate that a large part of the variance was explained by demographic variables (69%), with a higher number of unemployed parents ($P = 0.001$), single-parent families ($P = 0.001$) and non-Belgian citizenship ($P = 0.092$) all associated with more hospitalizations. Family cohesiveness explained a significant additional part of the variance, but none of the specific predictors was statistically significant. Finally, alexithymia was an additional significant predictor (4%). Higher-maternal scores for difficulty in identifying feelings ($P = 0.043$) were related to more hospitalizations for hyperglycaemia.

Finally, for HbA_{1c}, only the demographic predictors were found to be significant. A higher number of unemployed parents ($P = 0.001$) and single-parent families ($P = 0.001$) were the only significant predictors, but they explained a large proportion of the variance (62%).

4. Discussion

4.1. Intercorrelations

Regarding the correlations between family cohesion and parental alexithymia, we found that, for mothers, the stronger the perception of family cohesion, the lower her alexithymia. However, among fathers, there was no link between paternal cohesion and alexithymia. We explain these results by the fact that mothers play a more important role in the caring and educational tasks within the family and in reading their children's behavioural cues [30,31].

4.2. Predictive factors of severe hypoglycaemic events

The following sections only discuss those predictors that were statistically significant ($P < 0.05$). Family cohesiveness was an important predictor of severe hypoglycaemia, with a large increase in explained variance (27%) above and beyond its prediction by demographic variables. Mothers who perceived their family to have stronger emotional links accounted for a significantly higher number of severe hypoglycaemic events. Given that the mothers' perceptions reflect their own cohesiveness with their children, the present study's results suggest that if the child–mother emotional links are too strong, the child is more likely to suffer from severe hypoglycaemic events. Consistent with this interpretation, previous research has found that maternal emotional over-involvement and excessive detail (a subcategory of emotional over-involvement) were related to poor-metabolic control in the child [15]. Conversely, maternal collaboration was associated with better compliance and metabolic control. The optimal level of maternal involvement may need to be adjusted to be consistent with the child's level of development [32]. Thus, maternal cohesiveness is an essential new variable to consider in the treatment of children and adolescents with type 1 diabetes.

Table 6
Hierarchical regression analysis predicting the number of hospitalisations for hyperglycaemia in the last 12 months

	B	Standard error	β	<i>t</i> value	R2	R2adj	R2chg	df	F	Fchg
Block 1: demographic variables					0.69	0.67		3–35	6.39***	
Parents										
Citizenship	–0.14	0.08	–0.17 ⁺	–1.73 ⁺						
Unemployment	0.88	0.17	0.51***	5.15***						
Marital status	–1.56	0.31	–0.49***	–5.13***						
Block 2: Family cohesiveness					0.74	0.70	0.05	3–32	4.42***	2.13
Maternal cohesiveness										
Emotional links	–0.13	0.08	–0.18	–1.57						
Time spent with family and friends	–0.05	0.06	–0.10	–0.80						
Recreational activities shared with the family	0.02	0.06	0.04	0.35						
Block 3: Parental alexithymia					0.78	0.73	0.03	1–31	4.88***	4.47*
Maternal alexithymia										
Difficulty identifying feelings	0.03	0.01	0.20*	2.11*						

For citizenship: 2 = two Belgian parents, 1 = one Belgian parent and 0 = no Belgian parents; for unemployment: 0 = two parents work, 1 = one parent is unemployed and 2 = two parents are unemployed; for marital status: 1 = single-parent family and 2 = two-parent family; family cohesiveness is measured by the Family Adaptability and Cohesion Evaluation Scale-III (FACES-III, Olson, 1985); parental alexithymia is measured by the Toronto Alexithymia Scale-20 (TAS-20, Bagby, Taylor and Parker, 1994).

⁺ $P < 0.10$.

* $P < 0.05$.

*** $P < 0.001$.

4.3. Predictive factors of hospitalizations for hyperglycaemia

In this case, demographic variables explained 69% of the variance, with having both parents unemployed and a single-parent family being significant vulnerability factors. As for unemployed parents, some studies have demonstrated an association between lower-family socioeconomic status and higher HbA_{1c} values [33], a variable that is closely related to the number of hyperglycemic events. Also, children from single-parent families were more often hospitalized for hyperglycaemia compared with children from two-parent families. Some studies have shown an association between single-parent families and poorer-metabolic control. Such a link could be explained by poor compliance of the child to the treatment regimen, more hospital admissions overall and weak family cohesiveness [34–38].

Parental alexithymia was found to be a significant predictor of a child's glycaemic control (a 4% increase in explained variance) and also showed that children's hospitalizations for hyperglycaemia increased when the mother has more difficulty identifying her emotions. Family measures of expressiveness have already been linked to differences in long-term patterns of glycaemic control. Children in families characterized by high-emotional expressiveness have better diabetic control than those in families with low-emotional expressiveness [39]. Patients from the least openly expressive families show the greatest deterioration in glycaemic control. Members of these families perceive themselves as least open to mutual discussion and the expression of feelings [10]. Moreover, correlations in the present study reveal a negative relationship between maternal alexithymia and family cohesion. This result may be due to the fact that mothers who are alexithymic are more distant and less attentive to their child. However, this effect is found only with mothers, perhaps because they have a more important role in their child's education [30,31]. In addition, the correlation

was found only for the alexithymia factor “difficulty identifying feelings” perhaps because, if mothers do not have the capacity to distinguish between feelings and bodily sensations of emotional arousal, they are also likely to be less involved [11] and less able to read their child's behavioural cues and to provide appropriate care for their child. This means that their coping reaction to signs of poor glycaemic control will be less successful and that “difficulty identifying feelings” is an important aspect that should be routinely considered in clinical practice.

4.4. Predictive factors of HbA_{1c}

The mean HbA_{1c} level found in the present study compares favourably with those found in the literature [18]. For this variable, only demographic predictors were significant. A higher number of unemployed parents and having a single-parent family were the two significant predictors that explained 62% of the variance. In the literature, lower family-socioeconomic status has already been found to be associated with a significantly higher HbA_{1c} [33]. As for the link with having only one parent, other studies have found that family structure is a significant predictor of young people's health. Non-traditional family structures (single-parent or blended families) are the best predictor of behavioural problems and are related to poor-metabolic control [38]. Children with diabetes being raised by mothers on their own have poorer-metabolic control than do children from two-parent families [35] and those living with a single parent were more likely to be admitted to hospital with a diabetes-related problem [36]. Single-parent household status and lower levels of compliance partially account for the poorer-glycaemic control [34]. In contrast, children with two (married) parents have better glycaemic control than those with single, separated or divorced parents. These results suggest that diabetes-care providers need to be aware of changing family situations as patients may require

additional and appropriate support during more stressful times [37].

4.5. Limitations and future perspectives

The present study is not without limitations. Our sample included two different populations – children and adolescents. In future, it may be worthwhile considering larger groups to assess factors specifically related to children versus adolescents in the management of diabetes. Therapeutic interventions also need to be adapted according to age, as the inclusion of parents in the therapeutic process is more important in the case of diabetic children [30,40]. Future studies will also need to be replicated with a larger number of participants to allow for the testing for interactions between affect-regulation and family-cohesion variables. It may also be of interest to include an interview in addition to questionnaires to gather further information on family cohesiveness. In addition, regarding cohesion and alexithymia, although in the present study, parents were asked to complete their questionnaires separately, there is no certainty that this instruction was followed. Moreover, the retrospective nature of the data does not rule out a feedback effect from the level of glycaemic control to cohesion and alexithymia dimensions. Indeed, prospective studies are necessary to completely eliminate such a possibility.

In clinical practice, diabetes-team members need to pay attention to several demographic and psychological family characteristics. The parents' employment status, marital status, child–mother-emotional ties and the mother's capacity to identify her emotions are all significant predictors of glycaemic control in children and adolescents with diabetes. Family cohesiveness could be assessed with family intervention sessions provided to achieve a more functional level of cohesion. Moreover, maternal alexithymia (particularly, in terms of the “difficulty identifying feelings” dimension) could be reduced by using, for instance, hypnotic imaging techniques [41].

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