

Attachment representations to parents and emotional-behavioral problems: A comparison between children with type I diabetes mellitus and healthy children in middle childhood

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Abstract

Type I diabetes mellitus (T1D) is one of the most demanding chronic diseases for children and their families, since controlling diabetes involves a process of co-regulation with attachment figures. However, there is insufficient evidence in middle childhood on psychological mechanisms involved that might complicate the adaptation of these children. Therefore, 106 children ($N=31$ with T1D and $N=75$ as matched healthy group [HG]) aged 8 to 13 were assessed using the *Child Attachment Interview*, the *Child Behavior Checklist*, and the measure of glycated hemoglobin. Results showed that insecure T1D children did not have worse diabetes control than the secure ones. However, T1D children differed from HG for higher levels of idealization to father and withdrawn/depressed problems. Moreover, T1D children with insecure attachment to mother scored significantly higher in anxious/depressed, withdrawn/depressed, attention problems, and rule-breaking behavior, while T1D children with insecure attachment to father scored significantly higher only in the withdrawn/depressed scale compared to the remaining children. Therefore, diabetes does not in itself determine a psychological vulnerability in middle childhood, but the presence of an insecure attachment, especially to the mother, worsens the psychological adaptation of T1D children. Psychological support should be provided for these young patients and their families.

Keywords

Attachment representations, emotional-behavioral problems, type I diabetes mellitus, middle childhood, Child Attachment Interview

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Introduction

Type 1 diabetes mellitus (T1D) represents the most common chronic disease in children: three-quarters of all cases of T1D are diagnosed in childhood (American Diabetes Association [ADA], 2017). It is one of the most demanding chronic diseases for children and their families since controlling diabetes depends heavily on daily care, which includes continuous monitoring of blood glucose, the administration of insulin, and constant attention to the physical activity and nutrition of the child (Lewandowski & Drotar, 2007). Good control of diabetes guarantees health similar to that of healthy children, yet nevertheless, any breakdowns can have very serious outcomes, such as microvascular complications, diabetic kidney diseases, retinopathy, and neuropathy (ADA, 2017).

Studies on children with T1D have shown that they are more likely than their peers to develop mental health problems (Fazeli Farsani et al., 2016). In particular, they have more problems both in social competence, and in emotional-behavioral domains, as anxiety/depression, withdrawal, and aggressive behaviors, and this has an important impact on treatment adherence and metabolic control increasing the risk for complications (e.g. Akbas et al., 2009; Kongkaew et al., 2014).

Concerning the management of these children, attachment and mentalization-based approaches may play a key role (Luyten & Fonagy, 2016). Indeed, the management of T1D involves a process of co-regulation, which takes place within a relationship with an attachment figure (Chisholm et al., 2011). As sustained by Costa-Cordella et al. (2020a), diabetes represents an important source of stress that mostly comes from the body. When stress responses are triggered by a threat to the individual's survival, both physiological and psychological systems are activated to attempt to down-regulate the stress response and restore bodily integrity (Spangler & Grossmann, 1993). If this process proceeds successfully, the individual achieves a sense of safety and the attachment system is deactivated. On the contrary, if the attachment strategies adopted are insufficient to downregulate the stress response (e.g. hyperactivation and deactivation strategies), the co-regulation of stress through reliance on attachment figures is typically impaired (Bowlby, 1969). In turn, this produces more stress, creating a second vicious circle that also affects the individual's capacity to reflect or mentalize the self (and particularly the bodily self) and others (Luyten & Fonagy, 2016).

According to this, diabetes studies have shown that insecurely attached children (i.e. characterized by experiences with inconsistent parental responses rather than experiences with consistent parental responses to attachment bids; Bowlby, 1969) are more prone to experience increased and prolonged influence of stress hormones (Radobuljac & Shmueli-Goetz, 2015); secure T1D children show higher level of quality of life than insecure ones, and secure males show lower level of diabetes control than secure females (Costa-Cordella et al., 2020a); child and maternal reflective functioning are higher in the dyad with good diabetes control than in these with poor diabetes control and are negatively correlated with levels of glycated hemoglobin (Costa-Cordella et al., 2020b); individuals with dismissing attachment show worse diabetes outcomes rather than secure and insecure preoccupied ones (Ciechanowski et al., 2004); maternal perceptions of more secure adolescents' attachment are associated with better glycemic control (Rosenberg & Shields, 2009); infants with diabetes-specific autoantibodies are more likely to have insecurely attached mothers (Sepa et al., 2004).

However, there is only a scarcity of data on psychological mechanisms, as the quality of parent-child relationship and mental health problems, involved in diabetes young patients focusing on specific developmental phases as middle childhood (Costa-Cordella et al., 2020a). On the contrary, more studies have been conducted in adulthood focusing on parenting as risk factor for child's diabetes (e.g. Ciechanowski et al., 2004; Rosenberg & Shields, 2009; Sepa et al., 2004). Thus, the focus on the psychological processes of middle childhood may help clinicians to understand their impact on adaptation and consequently on the management of this chronic disease. In this way, middle childhood is

a relevant period for profound emotional, cognitive and social changes in which the independence from parents increases, there is a greater investment in peer relationships, and the conflicts with parents increase (Bosmans & Kerns, 2015; Kamza, 2019). Concerning T1D children in middle childhood, they may be more vulnerable to have a weakened image of one's identity and feel horizontal relationships more difficult; there may be a desire not to reveal one's illness, as well as hiding from, and even failing to complete, therapeutic practices. Furthermore, in middle childhood, diabetes management gradually passes from the family to the patient (Duke et al., 2008), and in this transition, the quality of the parent-child relationship (Berg et al., 2011; Manfredi et al., 2019) or a premature transfer of diabetes care to the child can cause non-adherence and deterioration in the control of blood glucose levels (Lewin et al., 2006; Sweenie et al., 2014). As sustained by Pianta et al. (1996), the quality of parent-child relationship serves as a resource for the child's health and psychological adjustment. Indeed, parents faced with the diagnoses of T1D in children are shaken by the 'loss' of the perfect child which is tantamount to the 'death' of parents' hopes and expectations on their imagined or anticipated child, and it needs a long adaptation process that should culminate in the parents' reconciliation and acceptance of their child's disease. If this occurs, it facilitates diabetes self-management and limits emotional-behavioral problems in adolescence (Goldberg & Wiseman, 2016).

The present study

Although there is growing evidence for the role of attachment and emotional-behavioral problems in child somatoform disorders (e.g. Bizzi, 2019; Bizzi et al., 2015, 2018, 2019; Bizzi, Riva et al., 2020), no study to date has simultaneously investigated the quality of child attachment to both parents and emotional-problems in T1D children. Therefore, the main purpose of this study was to compare children with T1D with a matched healthy group (HG) in middle childhood about attachment representations to both parents using an age-adapted semi-structured interview and emotional-behavioral problems through a parent-report. We expected that: (1) insecure T1D children would have worse diabetes control than secure one; (2) children with T1D would show more insecurity than HG children in that diabetes represents an important source of stress that affects the individual's capacity to regulate the stress response within attachment system; (3) children with T1D would show more emotional-behavioral problems regardless of attachment representations compared to HG; and (4) insecure T1D children would show more emotional-behavioral problems as a maladaptive outcome with respect to other children.

Material and methods

Participants

In total, 106 children participated in this study, including a clinical group ($N=31$) of T1D patients and a healthy group ($N=75$) recruited from the general population. Inclusion criteria were middle childhood ages and fluency in Italian. For the clinical group only, patients had to receive a diagnosis of T1D at least 3 years before participating in the study to detect an effective response to chronicity, beyond the strategies and resources put in place to face the initial impact. The overall exclusion criterion was the diagnosis of psychotic disorders. No participants recruited for the study declined to participate in the HG, while there were nine cases of declining to participate in the clinical group. The reason for this was mostly related to logistical difficulties, such as parents' work commitments and children's school commitments. According to the doctor, the patients who did not respect medical appointments were the same ones who did not make available for the research or who were absent at the scheduled meetings.

Table 1. Demographic characteristics of the participants (TID vs. HG).

Characteristics	TID (N=31)	HG (N=75)	Statistics
Median age in years (Min-Max)	12.00 (8–13)	11.60 (9–13)	Mann–Whitney <i>U</i> test = 1083.500, <i>p</i> = .583
% Boys	68	72	Fisher exact test, <i>p</i> = .648
% Only child	16	8	Fisher exact test, <i>p</i> = .295
% Living with two parents	87	93	Fisher exact test, <i>p</i> = .442

Note. TID = Type 1 Diabetes; HG = Healthy Group.

All the participants were Caucasian, were born and living in the north-west of Italy, and came from families with an average socioeconomic status (according to report 2017 on data of Italian National Statistical Institute). The HG was selected to attempt to match the clinical group participants on demographic factors (age, gender, and family composition). The demographic characteristics of the participants are reported in Table 1.

Measures

Attachment. The *Child Attachment Interview* (CAI; Shmueli-Goetz et al., 2008) was used to assess the child's attachment. It is a video-recorded interview designed to assess the children's self-representations and representations to each primary attachment relationship in the children's lives, which are gradually internalized and provide a schema for interpreting subsequent interpersonal experiences (Bretherton & Munholland, 1999). The current CAI protocol contains 19 questions (CAI revised edition VIII; Shmueli-Goetz et al., 2008), tapping into the child's self-representation, representations of his/her primary caregivers and times of conflict, distress, illness, hurt, separation, and loss. The interview lasts about 40 minutes and is transcribed verbatim. The coding is based on narrative and behavioral analysis among several attachment-related dimensions (emotional openness, balance of positive and negative reference to attachment figures, use of examples, preoccupied anger, idealization, dismissal, resolution of conflicts, and overall coherence) with a score of 1 to 9, and four attachment classifications with each caregiver (secure, insecure-dismissing, insecure-preoccupied, and insecure-disorganized). In this study, we considered only the secure-insecure attachment classification in line with existing literature (Costa-Cordella et al., 2020a; Rosenberg & Shields, 2009). The Italian version of the CAI has good psychometric properties (Bizzi, Shmueli-Goetz et al., 2020; Cavanna et al., 2018), with excellent inter-rater reliability (*k* values between 0.85 and 0.97 in line with the guidance provided by Landis & Koch, 1977), good temporal stability (after 3 and 12 months), proper divergent and convergent validity and criterion validity in terms of the capacity to discriminate between clinical and non-clinical groups. In this study, the CAI interviews were coded by two Italian expert independent coders (first author and a collaborator) who have attended specific training on administration and coding and have received a reliability certificate by the author of CAI (YSG), and inter-rater reliability (ICCs = 0.95) was demonstrated in 71% of cases.

Emotional-behavioral problems. The *Child Behavior Checklist* (CBCL 6/18; Achenbach & Rescorla, 2001) was used to assess emotional and behavioral problems. It is a widely used 112-item parent-report; each item is scored on a 3-point scale, ranging from 0 to 2. The CBCL 6-18 identifies the following syndrome scales: anxious/depressed, withdrawn/depressed, somatic complaints, social problems, thought problems, attention problems, rule-breaking behavior, aggressive behavior, and other problems. Furthermore, the CBCL has two groupings of syndromes: internalizing problems

(grouped as anxious/depressed, withdrawn/depressed, and somatic complaints); and externalizing problems (grouped as rule-breaking behavior and aggressive behavior). The CBCL has good psychometric properties (Achenbach & Rescorla, 2001), and the Italian version was validated by Frigerio et al. (2004), displaying good validity and reliability with good internal consistency, cut-offs comparable to the American population, and interrater agreement similar to the values reported by Achenbach. In our study, the instrument was completed by both parents, and it demonstrated adequate internal consistency ($\alpha=0.92$).

Diabetes control. Measurements of glycated hemoglobin (HbA1c) were used to assess diabetes control. Each HbA1c measurement indicated the average blood glucose levels during the past 90 to 120 days, and HbA1c is considered to be the main indicator of glycemic control (DiMeglio et al., 2018). A common target level for HbA1c is below 7, and values above 7.5 are considered to represent a risk of complications (ADA, 2017). For this study, we evaluated both the results of the HbA1c measurement as reported by the medical record at the time of the psychological evaluations and the average of the HbA1c values relative to the evaluations of the previous year to have values less influenced by contingent events. As there were no significant changes, we used the most recent HbA1c value for our analyzes as a diabetes control index.

Procedure

The study was approved by the Ethics Committee of the Hospital XXX for the T1D group and by the Ethics Committee of the Department XXX of University XXX for the HG. Data were collected over 2 years. All participants and their families provided informed and written consent and were advised about their option to withdraw their participation in the research at any time should they wish to do so. The T1D group was recruited during hospital visits for diabetes monitoring from the doctor responsible, who asked the patients to and their families to consider participating, while the HG was recruited from a population of Italian students through study information leaflets posted at schools inviting pupils to participate in the study as part of a healthy group. The assessment was conducted in a private room at the hospital for the T1D group and at home for the HG by a psychologist/researcher who had been trained in administering the CAI measure. In an individual session, lasting approximately 50 minutes, children completed the CAI, while their caregivers provided demographic information and responded to the CBCL in a separate room. During the assessment, the doctor responsible reported to the psychologist/researcher the scores for the child's HbA1c measurements as well as data on the child's treatment adherence (adherent or not adherent).

Statistical analysis

Statistical analyses were run using Statistical Package for the Social Science (SPSS, Version 24.0). The data analysis was carried out by categorizing children into secure (S) and insecure (I) groups. Data were analyzed using non-parametric methods (i.e. Fisher's exact test, Chi-Square exact test, Mann-Whitney *U* test, Kruskal-Wallis test), which are appropriate for variables of the type used in this study because the Kolmogorov-Smirnov test showed that the sample population was not normally distributed (Siegel & Castellan, 1988). The level of significance for all analyses was $p < .05$.

Results

Considering the clinical group, 71% of patients showed a high level of HbA1c, and 29% of them was not adherent to treatment (diet, sports activity, glycated hemoglobin values, and compliance

Table 2. Attachment representation to both parents (secure vs. insecure) comparing T1D and HG.

	CAI attachment	T1D	HG	Statistics
Attachment to the mother	% secure	58	63	Fisher exact test, $p = .667$
	% insecure	42	37	
Attachment to the father	% secure	55	63	Fisher exact test, $p = .515$
	% insecure	45	37	

Note. T1D = Type 1 Diabetes; HG = Healthy Group.

with medical appointments) as estimated by the doctor during the interviews. In addition, attachment representations to both parents and emotional-behavioral problems proved to be independent of all demographic characteristics of the participants (p range from .174 to .575).

Regarding the first hypothesis, comparing T1D children with a high level of HbA1c to those with HbA1c level below 7, no significant differences concerning attachment to both caregivers (secure-insecure) were found (p range from .060 to .709). Therefore, children with a high level of HbA1c were not more prone to experience inconsistent parental responses to the attachment.

Regarding the second hypothesis, comparing regarding attachment representations between T1D group and HG in children with T1D and HG, we firstly examined the concordance of attachment with respect to the mother and father. Overall, a high concordance of attachment to mother and father (over 90%) was found in both groups. As reported in Table 2, attachment distribution did not differ between children with T1D and HG, showing similar percentages of secure and insecure attachment representations to both parents. Considering the CAI's attachment-related dimensions (Table 3), T1D children showed higher levels of idealization to the father than HG children ($U = 819.500$, $p = .005$).

Regarding the third hypothesis, T1D children scored higher in the withdrawn/depressed scale at the CBCL compared to HG children (Mean rank_{T1D} = 69.19, Mean rank_{HG} = 47.01; $U = 676.000$, $p = .001$).

When considering the attachment representations to the mother and the father with regard to the diabetes condition (fourth hypothesis), T1D children with insecure attachment showed increased scores in some scales of the CBCL compared to the remaining children. We carried out the canonical methodological path by conducting the Kolmogorov-Smirnov test, and subsequently, given the significance $< 5\%$, we performed the Mann-Whitney U test. Two-by-two comparisons showed that T1D children with insecure attachment to the mother scored significantly higher in the following CBCL scales: anxious/depressed, withdrawn/depressed, attention problems, and rule-breaking behavior (Table 4). However, this was not found with respect to the thought problems scale, where significant differences were found comparing the T1D secure group with the T1D insecure group (Mean rank_{T1Dsecure} = 12.39, Mean rank_{T1Dinsecure} = 21.00; $U = 52.000$, $p = .008$), the T1D secure group with the HG insecure (Mean rank_{T1Dsecure} = 18.06, Mean rank_{HGinsecure} = 27.00; $U = 154.00$, $p = .023$), but not comparing the T1D insecure group with the HG secure (Mean rank_{T1Dinsecure} = 37.81, Mean rank_{HGsecure} = 28.48; $U = 210.500$, $p = .083$). T1D children with insecure attachment to the father scored significantly higher only in the withdrawn/depressed scale compared to the remaining children (Mean rank_{T1Dsecure} = 61.06, Mean rank_{T1Dinsecure} = 79.07, Mean rank_{HGsecure} = 46.88, Mean rank_{HGinsecure} = 47.23; Kruskal-Wallis test = 14.658, $p = .002$).

Discussion

In this study, we investigate attachment representations to parents and emotional-behavioral problems comparing children with T1D and HG during middle childhood. Concerning the first

Table 3. CAI's attachment-related dimensions comparing T1D and HG.

CAI scales	T1D (N=31) mean rank	HG (N=75) mean rank	Statistics Mann-Whitney U test	p
EO	49.20	54.52	1011.000	.416
BAL	52.16	53.35	1121.000	.854
UoE	46.82	55.47	939.500	.186
IA-M	57.06	52.03	1052.000	.349
IA-F	52.50	53.91	1131.500	.786
ID-M	54.69	51.57	1063.500	.614
ID-F	63.56	48.57	819.500	.017*
DS-M	45.48	56.81	914.000	.065
DS-F	45.76	56.70	922.500	.073
RES	48.31	54.97	1001.500	.304
COH	50.10	54.91	1057.000	.461

Note. T1D=Type 1 Diabetes; HG=Healthy Group; EO=Emotional Openness; BAL=Balance of positive and negative reference to attachment figures; UoE=Use of Examples; IA-M/F=Preoccupied Anger to mother/father; ID-M/F=Idealization to mother/father; DS-M/F=Dismissal to mother/father; RES=Resolution of Conflicts; COH=Overall Coherence.

* $p < .05$.

hypothesis, the findings of this study do not confirm attachment differences between T1D children with and without good control of diabetes. In contrast to the literature (Ciechanowski et al., 2004; Costa-Cordella et al., 2020a; Radobuljac & Shmueli-Goetz, 2015), children with low control of diabetes were not more prone to experience inconsistent parental responses to attachment. In other words, this suggests that despite diabetes is a complex pathological, inconsistent caregiving is not enough to undermine the diabetes control in middle childhood when children move from dependency to independence to caregivers, the influence of peers increases, and the diabetes management gradually passes from the family to the patient (Duke et al., 2008). Other psychological mechanisms may have a greater impact on diabetes control in middle childhood and future studies are needed.

Considering the second hypothesis on attachment differences between T1D group and HG, findings do not confirm the hypothesis showing a prevalence of secure attachment representation to both the mother and the father without significant differences. The high correspondence between mother and father attachment suggests that the process, which leads to the development of a unified and integrated representation of attachment relationships, occurs both in children with chronic pathology and in healthy subjects (Shmueli-Goetz et al., 2008). Moreover, the attachment distribution of both samples is in line with the normative group of the CAI's validation study of Bizzi et al. (2020), suggesting once again that the presence of inconsistent caregiving is not enough to develop a clinical condition as diabetes. However, T1D children tend to describe the relationship with their fathers with very positive generalized statements – sometimes not supported. In other words, T1D children tend to avoid negative emotions about fathers using a defensive strategy to deactivate attachment-based feelings, experiences, and needs. This does not occur with respect to the child-mother relationship. Despite, these data must be monitored over time, the high idealization toward the father is reminiscent of a dismissing attachment pattern in which children tend to avoid relying on others and this can be a problem in managing the disease (Ciechanowski et al., 2004). Autonomy without sufficient responsibility and maturity could be dangerous. However, it is usually the mother who supervises the correct management of diabetes and this can reduce the risks: a not so idealized mother can adequately accompany toward a child's healthy autonomy.

Table 4. Relation between attachment to the mother (secure vs. insecure) and emotional-behavioral problems in TID and HG.

	TID with secure attachment (N=18) mean rank	TID with insecure attachment (N=13) mean rank	HG with secure attachment (N=47) mean rank	HG with insecure attachment (N=28) mean rank	Statistics Kruskal-Wallis test	p*
Anxious/depressed	41.75	70.62	48.80	59.93	9.483	.024*
Withdrawn/depressed	59.94	82.00	46.40	48.04	16.010	.001*
Somatic complaints	39.83	62.62	51.79	60.93	6.613	.085
Social problems	44.17	72.04	50.90	55.25	7.078	.069
Thought problems	38.28	69.27	52.70	57.30	8.651	.034*†
Attention problems	42.64	72.96	49.85	57.57	9.131	.028*
Rule-breaking behavior	45.75	76.65	51.81	50.57	9.671	.022*
Aggressive behavior	47.03	69.92	50.43	55.20	5.136	.162
Other problems	49.78	74.08	52.23	48.30	7.099	.069
Internalizing problems	46.14	74.73	50.74	53.00	7.662	.054
Externalizing problems	44.53	73.35	51.71	53.05	7.177	.066

Note. TID = Type 1 Diabetes; HG = Healthy Group.

*p < .05.

†Not significant in two-by-two comparisons (Mann-Whitney test).

Concerning the third hypothesis, T1D children show as hypothesized higher level of emotional-behavioral problems than HG children. In particular, they are significantly more withdrawn/depressed than HG children regardless of attachment representations. As this dimension is the only significant difference in the comparison of T1D and HG children, it could be interesting to investigate this dimension in a longitudinal perspective to better understand if it could be an answer to the diagnosis of a disease or a symptom that appears later. Furthermore, this result highlights the presence of withdrawn/depressed symptoms that are compatible with depressive aspects according to the literature (Kongkaew et al., 2014), showing a risk of depressive problems in T1D children. This suggests the importance of evaluating emotional-behavioral problems in T1D children, because depression may have important clinical implications for the management of diabetes and the patient's well-being. It may limit the adherence to dietary, weight loss, and physical activity recommendations, increasing, in turn, the risk for complications (Akbas et al., 2009; Kongkaew et al., 2014). In this way, the role of the caregiver may be important to limit complications regarding diabetes self-management (Duke et al., 2008) monitoring diabetes at the right distance without hindering the autonomy of the child.

Furthermore, regarding the last hypothesis, this study confirms that insecure T1D children show more emotional and behavioral problems than other children. Diabetes does not in itself determine a psychological vulnerability in middle childhood, but the presence of an insecure attachment, especially to the mother, worsens the psychological adaptation of children with T1D. This suggests that repeated experiences of unavailability of the caregiver may lead to dysfunctional cognitions about the self and others, higher stress levels, and lower emotion regulation in children, thus increasing the psychological problems (Spruit et al., 2020), and consequently undermining the child's adaptation to T1D. In this way, insecure T1D children are more vulnerable to mental health problems and may fail to complete therapeutic practices when they should take care of themselves as in middle childhood. The representations of insecure attachment to the father do not affect psychological problems – except for the withdrawn/depressed scale – which can be interpreted concerning the different weight that fathers and mothers have in the Italian context and the specific age group considered: diabetes care and daily management activities children continue to be under the responsibility of the mother figure. The fact that emotional and behavioral problems (i.e. anxious/depressed, attention problems, rule-breaking behavior) emerge in the condition in which both diabetes and insecure attachment to the mother are present is of great importance in the management of treatment.

Providing psychological support to all diabetic patients is not practicable, but since the data highlight the key role of attachment in this chronic illness to child's adaptation rather than to diabetes control, the psychological intervention can be directed where there are vulnerable conditions. In this way, the focus on attachment as dimensions can help clinicians assess in which areas there are vulnerabilities, and the use of CAI represents a good tool for clinicians to collect clinically helpful information (Bizzi, Shmueli-Goetz et al., 2020). Moreover, families at risk should be identified during hospitalization for the diagnosis of the disease, and support should be offered immediately. In this sense, the treatment for diabetes in youth may incorporate attachment-focused techniques involving also the parents to improve the child's adaptation for the parent to be able to provide the trusted secure base and secure haven the child needs. In this way, interventions such as the 'Connect Parenting Program' (Moretti & Obsuth, 2009) or the 'Secure Cycle' program (Kobak et al., 2015) may be helpful as they reinforce parental skills and the parent-child communication. Despite several attachment-based treatments that are effective in reducing emotional and behavioral problems in adolescence (Moretti & Obsuth, 2009), none focus on young patients with diabetes. Therefore, future studies should examine whether treating attachment insecurity can prevent emotional problems in middle childhood.

There are several limitations of this study that reduce the generalizability of the results, such as: (i) the size of the sample; (ii) the cross-sectional design of the study that does not detect a causal relationship; (iii) the lack of consideration of other child factors (e.g. mentalization and emotional regulation) which could have been related to T1D in middle childhood and potentially aggravate the psychological adaptation of these children; and (iv) the lack of assessment of parental functioning. Despite these limitations, however, this study has important implications for professionals focusing on attachment as a key variable to better understanding and intervening in adjustment problems manifested by T1D children (Radobuljac & Shmueli-Goetz, 2015).

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Ethical approval statement

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all patients included in the study.

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Data availability statement

The data that support the findings of this study are available from the authors, upon reasonable request.

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