

# Analysis of the Positive Feelings of Caregivers in Children with Type 1 Diabetes Mellitus and Its Influencing Factors

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## ABSTRACT

In order to explore the positive feelings of caregivers of children with type 1 diabetes mellitus and its influencing factors. The general data questionnaire, caregiver positive feeling scale, caregiver care ability of type 1 diabetes patients and Zarit care burden scale were used to investigate 193 caregivers of type 1 diabetes in Qingdao. The results of multiple stepwise regression analysis showed that caregivers' educational level, care ability and care burden were important influencing factors of caregivers' positive feelings. These factors could predict 95.6% of the variation of caregivers' positive feelings. Medical staff should provide targeted support and help according to the specific situation of children and caregivers, cultivate caregivers' care ability, reduce caregivers' burden, help to improve T1DM caregivers' positive feelings, and improve caregivers' well-being and physical and mental health.

**Keywords:** type 1 diabetes; child; caregivers; questionnaires; positive aspect; influencing factors

## INTRODUCTION

Type 1 diabetes (T1DM) is a chronic metabolic disease characterized by lifelong treatment and regular follow-up. It has brought enormous burden to children and families, especially caregivers. In the process of providing intensive care for children, caregivers will undertake the basic tasks of frequent blood glucose monitoring, insulin injection and diet adjustment, and consider the influencing factors such as carbohydrate intake and physical activity to prevent acute complications [1]. Children with T1DM have high care needs [2], and cumbersome care tasks bring caregivers emotional distress such as anxiety, depression and loneliness [3-5], which leads to health problems such as sleep disorders and sleep deprivation [6]. Negative feelings and positive feelings can exist simultaneously in chronic disease caregivers [7]. Positive feelings refer to the sense of honor, subjective harvest and personal growth experience generated by caregivers in the process of providing care, which are manifested in strong coping ability, better subjective health status and higher quality of life, so as to buffer the burden of care and improve the quality of care [8]. The purpose of this study is to investigate the current situation of positive feelings of caregivers of children with T1DM and further explore its potential influencing factors, in order to provide basis for family intervention of children with T1DM.

## OBJECT AND METHOD

### Object

Objective to investigate the caregivers of T1DM children in Qingdao from May to August 2021. Inclusion criteria: (1) diagnosed as type 1 diabetes mellitus [9]; (2) The course of disease was  $\geq 6$  months; (3) Daily care duration  $\geq 8$  hours; (4) The caregivers agreed to participate and signed the informed consent form. Exclusion criteria: (1) children with asthma, congenital heart disease or epilepsy and other

chronic metabolic diseases; (2) Caregivers with language communication difficulties; (3) Caregivers with mental illness; (4) The children's siblings suffer from chronic diseases.

### Method

#### • Research tool

(1) General information questionnaire: self-designed, including children's gender, age, caregiver's age, education level, work status, and family per capita monthly income. (2) Caregiver positive feelings scale: this scale was developed by American scholar Tarlow et al. [10] to evaluate the positive feelings of caregivers of patients with dementia. Introduced by Zhang Rui in 2007, there are 9 items in total. Each item is scored from "very disagree" to "very agree". The higher the score, the higher the level of positive feelings of caregivers. The Cronbach's  $\alpha$  coefficient for the scale was 0.90, including Cronbach's  $\alpha$  of self-affirmation dimension and life outlook dimension. The coefficients are 0.89 and 0.83 respectively. The scale has been widely used to study the positive feelings of caregivers such as children with cerebral palsy [11], premature infants [12], children with enterostomy [13]. (3) The scale of caregivers' care ability for children with type 1 diabetes: the scale was designed by the researchers, and it was used to assess the caregivers' care ability of children with type 1 diabetes, and there were 36 items. Likert grade 5 score was adopted, and 1-5 scores were calculated from "very disagree" to "very agree". The higher the score, the higher the level of caregiver's care ability. The coefficient of the cronbach's  $\alpha$  of the scale is 0.949, The coefficient of the cronbach's  $\alpha$  for each dimension is between 0.826 and 0.966, which has good reliability. (4) Zarit Caregiver Burden Scale: the caregiver burden scale prepared by American scholar Zarit [14] is adopted, including two dimensions of personal burden and responsibility burden, with a total of 22 items.

The scale adopts Likert grade 5 score. The higher the score, the heavier the burden of care. The total score of the scale <20 indicates no burden; 20~39 points indicate mild burden; 40~59 indicates moderate burden; >60 indicates heavy burden. The coefficient of the Chinese version of the total Cronbach's  $\alpha$  is 0.87, in which the dimension of personal burden and the dimension of responsibility burden of the coefficients of Cronbach's  $\alpha$  are 0.7 and 0.83 respectively, which have good reliability.

#### • Data collection

This study conducted a questionnaire survey on the caregivers of T1DM children in the endocrine and metabolism clinic. Before the survey, explain the purpose and significance of this study and the filling method of the questionnaire to the respondents, and guide them to sign the informed consent form and fill in the questionnaire. Collect and check the questionnaire on the spot to ensure the effectiveness of the questionnaire. In this survey, a total of 200 questionnaires were distributed, 196 were recovered, 3 invalid questionnaires were excluded, 193 valid questionnaires were valid, and the effective recovery rate was 96.5%.

#### • Statistical method

After the questionnaire is collected, the questionnaire is sorted out according to the collection order, the database is established by EpiData 3.1 software, the data is entered by two people, and the data is analyzed by SPSS 26.0 software. Use frequency, percentage description and mean standard deviation for statistical description; Pearson correlation analysis was used; T-test and analysis of variance were used for comparison between groups.

Multiple linear regression analysis was used to analyze the influencing factors of positive feelings of caregivers in children with T1DM ( $P < 0.05$ ).

#### • Quality Control

Before the questionnaire collection, the team members were trained uniformly and strictly to guide them to adopt unified guidelines to ensure that the caregivers of children understand the purpose of the survey. Therefore, the questionnaires were filled in by the caregivers themselves, and the items that they did not understand were objectively explained without guidance.

#### • Ethical principles

The study was filed with and approved by the hospital ethics committee (ethics application batch number: QFELL-YJ-2020-37). During the implementation of the study, the principles of informed consent and confidentiality were strictly followed. A confidentiality agreement was signed with the patient at the beginning of the study. The patient information was not provided to any institution or individual unrelated to the study. All materials were only used for this academic study.

## RESULTS

### Comparison of general data of T1DM children and their caregivers and the scores of their caregivers' positive feelings

Among 193 children, there were 85 males and 108 females, aged from 3 to 14 years. The general data of T1DM children and caregivers are shown in Table 1. The results of univariate analysis and pairwise comparison show that only the age of children, the education level of caregivers and the per capita monthly income of families have a significant impact on the positive feeling scores of caregivers of children with T1DM, as shown in TABLE 1.

**TABLE 1:** Comparison of positive perception scores of general data factors between children with T1DM and caregivers (n = 193)

Project	Group	N (%)	Positive feeling score	t / F value	P value
Child sex	female	108 (56)	40.72±4.24	0.098	0.92
	male	85 (44)	40.66±4.28		
Child age	3~6	20 (10.4)	45	209.32	0.00
	6~12	146 (75.6)	41.64±2.62		
	>12	27 (14)	32.33±1.78		
Caregiver	-	-	-	0.39	0.68
Age	<30	40 (20.7)	40.20±4.49	-	-
	30~39	82 (42.5)	40.70±4.25		
	>40	71 (36.8)	40.94±4.16		
degree of education	Below junior and intermediate level	76 (39.4)	36.36±3.43	252.78	0.00
	high school	55 (28.5)	42.20±0.97		
	Junior college or above	62 (32.1)	44.65±0.48		
Working condition	full-time	65 (33.7)	40.22±4.66	2.74	0.068
	Part time	67 (34.7)	41.66±3.72		
	in operation	61 (31.6)	40.11±4.23		
Monthly per capita household income (yuan)	<2000	59 (30.1)	35.24±3.06	351.31	0.00
	2000~4000	93 (47.4)	42.25±1.45		
	>4000	41 (20.9)	44.98±0.16		

### Scores of positive feelings and care burden of caregivers in children with T1DM

The total score of positive feelings of caregivers in children with T1DM was (40.68±4.25), as shown in TABLE 2.

Among the caregivers of children with T1DM, 184 cases had moderate care burden, accounting for 95.6%, and 9 cases had mild care burden, accounting for 4.7%. The caregiver burden and scores of each dimension of T1DM children are shown in TABLE 3.

**TABLE 2:** Positive feeling score of caregivers in children with T1DM (n = 193)

Dimension	Number of entries	Score ( $\bar{X} \pm S$ )	Theoretical value range
Self-affirmation	6	28.16±3.14	6~30
Life outlook	3	12.52±1.07	3~15
Total score of positive feeling	9	40.68±4.25	9~45

**TABLE 3:** Caregiver burden score of children with T1DM (n = 193)

Dimension	Number of entries	Score ( $\bar{X} \pm S$ )	Theoretical value range
Personal burden	13	26.87±2.51	13~65
Burden of responsibility	8	16.44±2.36	8~40
Total score of care burden	22	45.53±3.36	22~110

**Correlation analysis of caregivers' positive feelings, care ability and care burden in children with T1DM**

Pearson correlation analysis was carried out between the total score of positive feeling and each dimension and the total score of caring ability, the total score of caring burden and each dimension.

The results showed that the total score of caregivers' positive feeling and the scores of each dimension were positively correlated with the score of caring ability and negatively correlated with the score of caring burden. See TABLE 4 for details.

**TABLE 4:** Correlation analysis of caregivers' positive feelings, care ability and care burden in children with T1DM

Variable	Total score of positive feeling	Self-affirmation	Life outlook
Personal burden	-0.513**	-0.468**	-0.596**
Burden of responsibility	-0.452**	-0.552**	-0.590**
Total score of care burden	-0.707**	-0.759**	-0.874**
Total score of caring ability	0.881**	0.694**	0.972**

Note: \*\* $p < 0.01$

**Multivariate score of influencing factors of caregivers' positive feelings in children with T1DM**

Taking the total score of caregivers' positive feelings as the dependent variable, according to the results of one-way anova and correlation analysis, the statistically significant factors were used as independent variables for multiple linear stepwise regression analysis, with an input=0.05 and aoutput=0.01.

Finally, the caregivers' educational level, total score of care burden and total score of care ability that enter the regression equation model are shown in TABLE 5. R2 is 0.956, indicating that these three factors can predict 95.6% variation.

**TABLE 5:** Multiple linear regression analysis of influencing factors of caregivers' positive feelings in children with T1DM

Independent variable	Regression coefficient	Standard error	Standard regression coefficient	t value	p value
Constant	19.884	2.651	-	7.500	$P < 0.001$
Caregiver education	0.644	0.142	0.128	4.521	$P < 0.001$
Total score of care burden	-0.117	0.042	-0.092	-2.801	0.006
Total score of caring ability	0.174	0.007	0.792	26.087	$P < 0.001$

Note:  $R = 0.978$ ,  $R^2 = 0.957$ ,  $Adjust R^2 = 0.956$ ,  $F = 1397.877$ ,  $P < 0.001$ .

**DISCUSS**

**Caregivers of children with T1DM had a higher level of positive feelings**

The results of this study show that the total score of caregivers' positive feelings is (40.68±4.25), which is at a high level. The average scores of self-affirmation and life outlook are 12.52 and 28.16, which are higher than the research results of Jia Lili [13] and Wang Xiaoyan [12]. It shows that T1DM caregivers recognize their value in caring for children and have high self-affirmation. The reason: on the one hand, it may be that under their own care, the children's condition is stable, so they are easy to

obtain positive feelings such as satisfaction and happiness. On the other hand, emerging therapies such as closed-loop insulin pump system, islet transplantation and stem cell therapy have shown good therapeutic effects in clinical application [15]. In particular, the use of closed-loop insulin pump not only reduces the puncture frequency and pain of children, but also better protects the privacy of children. The progress of medical treatment has helped caregivers to establish a firm belief in treatment, which is full of hope for the treatment of children's diseases.

### Analysis of caregivers' care burden in children with T1DM

This study shows that the total score of caregivers' care burden of children with T1DM is  $(45.53 \pm 3.36)$ , which is consistent with the research results of Li Yanchun [16], TEASDALE [17] and FERRITO [18], and higher than the research results of Zhao Jingwei [19]: the average score of parents' care burden of children  $(38.05 \pm 18.78)$ . The reason may be: in view of the complexity of T1DM management, coupled with the inability of T1DM children to clearly express their treatment needs or the symptoms of hypoglycemia or hyperglycemia, caregivers will hesitate to leave the children to others, limiting their social activities and work opportunities. Caregivers have the responsibility to explain and teach T1DM management to other adults in children's life, and also need to explain T1DM care to children, which brings a heavy burden of responsibility to caregivers. Despite the caregivers' efforts to keep the children in normal daily life, it is still difficult for them to accept the fact that the child is ill.

### Analysis of influencing factors of caregivers' positive feelings in children with T1DM

#### • Caregiver's educational level affects the positive feelings of caregivers in children with T1DM

The results of this study show that the educational level of caregivers in children with T1DM is the main factor affecting the score of caregivers' positive feelings. The higher the educational level of caregivers, the higher the positive feelings. On the one hand, highly educated caregivers have a wide range of knowledge and strong learning ability. They can deeply understand and understand the causes of diseases and nursing methods, and it is easier to master the knowledge of disease care. On the other hand, caregivers with higher education are more likely to choose positive coping styles in the face of diseases, find and contact better relevant resources, strengthen the cultivation of care skills, and provide fine care for children, so that caregivers feel they are needed and increase their positive feelings. Further research shows that [20] positive coping style can help caregivers better solve the difficulties in the care process, and enable caregivers to better eliminate adverse psychological problems, so as to effectively alleviate negative emotions and promote the expression of positive emotions.

#### • The burden of care affects the positive feelings of caregivers in children with T1DM

The results of this study showed that there was a significant negative correlation between the caregiver's burden of care and the caregiver's positive feelings in children with T1DM ( $P < 0.01$ ), indicating that the higher the score of the total burden of care and each dimension of the burden of care, the lower the caregiver's positive feelings. The possible reasons are: caregivers should not only take care of children, but also bear the care responsibilities of other family members and huge medical expenses. They are worried that children will be isolated and discriminated in study, life and work, which leads to their own anxiety and depression. Multiple pressures and role conflicts make their health poor and easy to form a sense of physical fatigue. Sometimes, even if the treatment plan is strictly implemented, abnormal blood glucose will occur, especially when the remedial measures are ineffective, caregivers will have negative emotions such as helplessness, depression and self-denial [21].

#### • Caring ability affects the positive feelings of caregivers of children with T1DM

The results of this study showed that there was a significant positive correlation between caring ability and caregivers' positive feelings ( $P < 0.01$ ), indicating that the

higher the level of caregivers' caring ability, the higher the caregivers' positive feelings. Caregivers with a higher level of emotional regulation can easily obtain their own emotional regulation [22]. Research shows that the stronger the ability of caregivers to solve problems in taking care of children's diseases, the stable blood glucose control of children, so as to alleviate the negative emotions of caregivers and improve their health status [23]. Therefore, when the caregivers provide careful care for the children and the children's condition is stable, this can bring positive feedback to the caregivers themselves and enhance their sense of achievement, satisfaction and acquisition. This positive attitude enables caregivers to actively deal with care difficulties or problems, learn care skills, help them maintain good health and reduce the burden of care, so as to further improve their care ability.

### CONCLUSION

In conclusion, the caregivers of children with type 1 diabetes in Qingdao have a higher level of positive feelings. Caregivers' educational level, care ability and burden of care are important factors influencing their caretakers' positive feelings. It is suggested that medical staff should pay attention to the caregiver's care burden, cultivate the caregiver's care ability, and provide targeted support and help according to the specific situation of children and caregivers, so as to improve the positive feeling level of T1DM caregivers, improve the caregiver's happiness, physical and mental health, and reduce the caregiver's burden.

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