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# The Influence of Depression, Diabetes-Related Stress, and Stress Coping Strategies on the Quality of Life in Parents of Children with Type 1 Diabetes

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**Purpose:** This descriptive correlational study investigated the influence of depression, diabetes-related stress, and stress coping strategies on the quality of life of parents of children with Type 1 diabetes.
**Methods:** Data were collected from 153 parents using structured questionnaires and analyzed with IBM SPSS/WIN 27.0 using descriptive and inferential statistics.
**Results:** Depression (β=-.42, $p$<.001) and diabetes-related stress (β=-.23, $p$<.001) were significant negative predictors of quality of life. Positive coping strategies were positively associated with higher quality of life.
**Conclusion:** Early interventions targeting depression and diabetes-related stress are essential. Interventions that strengthen positive coping strategies are recommended to enhance the well-being of parents of children with type 1 diabetes.

**Keywords:** Coping skills; Diabetes mellitus, Type 1; Depression; Stress, Psychological; Quality of life

## Introduction

### Background

Type 1 diabetes is a chronic disease in which the beta cells of the pancreas are destroyed by an autoimmune reaction, resulting in insulin deficiency [1]. The prevalence of type 1 diabetes among children and adolescents in Korea increased from 32.85 per 100,000 people in 2007 to 41.03 per 100,000 people in 2017 [2], and is expected to increase further to 67.36 per 100,000 people in 2024 [3,4]. In particular, during the period from 2017 to 2024, the total number of patients with type 1 diabetes decreased slightly, but the proportion of pediatric patients aged 9 to 18 increased [4], indicating the need for intensive management of this age group. Children with type 1 diabetes require meticulous self-management, including insulin administration, diet, and activity control, and parents' active involvement is essential due to the developmental characteristics of childhood and adolescence [5,6]. Meanwhile, their parents experience emotional exhaustion due to repeated fluctuations in blood sugar levels of their children, anxiety about emergencies, and the responsibility for continuous care [5-7]. These psychosocial burdens can lead to not only a decline in parents' quality of life [6,8-10] but also children's negative health outcomes, such as uncontrolled blood sugar levels, poor treatment compliance, and emotional problems [11,12]. Parents' quality of life is an important factor that not only affects their personal well-being but also influences the management and prognosis of their children's disease [12], and it is defined as an integrated indicator that encompasses physical health, emotional stability, and social function [13].

Depression is a common emotional problem reported by par-

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ents of children with type 1 diabetes, and these parents have been found to be more likely to experience moderate to severe depression than the general population [10,14-16]. Parents' depression can lead to a decline in quality of life as well as children's negative health outcomes, including reduced treatment adherence, and disruption of metabolic regulation [9-11]. Depression is a complex disorder composed of cognitive and emotional factors such as self-criticism, a feeling of helplessness, a sense of loss, and negative expectations about the future [17]. As a result, depression tends to lead parents of pediatric patients with diabetes to perceive their child's illness as threatening and uncontrollable, and thus it can further increase parent's care burden and lead to deterioration of family function [9,10,14]. However, in Korea, there is a lack of empirical research that comprehensively analyzed depression along with psychological and social factors and quality of life in parents of children with type 1 diabetes. Therefore, there is a need to clearly elucidate the role of depression as a major emotional factor affecting overall quality of life in parents of pediatric patients with type 1 diabetes.

Parents of children with type 1 diabetes experience disease-specific stress due to the lifelong disease acceptance process, anxiety about complications, and care needs such as continuous diabetic diet and blood sugar control, and this diabetes-related stress acts as a psychological burden that far exceeds general parenting stress [5]. In particular, parents must constantly monitor their children's blood sugar levels and frequently adjust their daily lives around the disease [7], and they are faced with the situation in which they repeatedly experience sleep disruptions due to the risk of nocturnal hypoglycemia [10,18]. Diabetes-related stress due to such chronic fatigue and emotional strain ultimately leads to parents' feeling of helplessness and loss of control [7,19], which not only reduces quality of life but can also lead to negative health outcomes, such as poor metabolic regulation and poorer treatment adherence in children [9,11,20,21]. Nevertheless, there has been limited domestic research to systematically measure diabetes-related stress experienced by parents of children with type 1 diabetes and empirically investigate the relationship between this diabetes-related stress and quality of life.

Stress coping serves as an important psychological mechanism for parents of children with type 1 diabetes in regulating the psychological burden experienced during the disease management process as well as maintaining quality of life [22]. According to Lazarus and Folkman's stress-coping-adaptation model, known as the Transactional Model of Stress and Coping, individuals recognize stressful situations, evaluate their resources and capabilities, and select appropriate coping strategies to restore psychological balance and achieve adaptation [22,23]. The types of coping strategies used in the process have a significant impact on quality of life. In other words, while active coping focused on problem solving or acceptance contributes to emotional stability and the improvement of quality of life, avoidant coping focused on avoidance or suppression can aggravate emotional distress such as depression and anxiety [11]. In particular, diverse types of coping strategies used by parents have been reported to directly and indirectly influence various aspects, including children's treatment compliance, metabolic regulation, and family interactions [11,20,21]. Nonetheless, there is a lack of domestic research on the impact of parents' stress coping strategies on parents' quality of life and children's health outcomes.

Although quality of life in parents of children with type 1 diabetes is known to be influenced by various factors such as social support, family function, and economic factors, recent studies have shown that psychological factors experienced by parents influence quality of life [6-8]. In particular, it has been found that depression is a common psychological experienced by parents caring for children with chronic diseases, and the need for continuous disease management and unpredictable changes in blood sugar levels are factors that can deteriorate parents' emotional well-being and thus lead to a significant decline in quality of life [9]. Moreover, unlike general stress, stress related to diabetes increases psychological pressure due to the responsibility for managing the life of one's child's and care needs [5,7], and thus, this diabetes-related stress is closely linked to a decline in the parents' quality of life [8]. Furthermore, there is a growing body of research reporting that the coping strategies used by parents in stressful situations act as factors that mitigate or exacerbate the impact of psychological difficulties, thereby serving as an important mechanism that explains the impact of psychological variables on quality of life [11,12]. Nevertheless, most previous studies have focused on social and family factors such as social support, family function, and care burden as major factors that explain quality of life in parents [6,8-10], and there is a severe lack of research using an integrated model to investigate how depression, diabetes-related stress, and different types of stress coping strategies interact to affect quality of life. In other words, although a number of analyses of the impacts of individual psychological factors have been conducted, there have been few studies to comprehensively analyze these factors through an integrated analysis. In particular, since parents of children with type 1 diabetes continuously experience great psychological burdens, such as daily care, preparation for emergencies, and adjustment of school and social environments [7,8,10], an analysis of quality of life in

parents of children with type 1 diabetes requires an approach that views psychological factors not as independent factors but as a complex system of factors that interact with each other.

Therefore, this study can be differentiated from previous studies in that it comprehensively analyzes psychological factors such as depression, diabetes-related stress, and stress coping strategies to clarify their impacts on quality of life. This comprehensive analysis not only provides a more accurate description of the psychological experiences of parents of children with type 1 diabetes, but can also practically contribute to designing evidence-based interventions through early screening of parents' psychological difficulties in clinical settings. For example, the results of this analysis can be used for providing appropriate emotional support through early screening for psychological risk factors or for developing education and counseling programs for enhancement of parents' stress coping ability. Additionally, the findings of the present study can also be utilized as basic data for family-centered nursing interventions. In this respect, this study is expected to provide important evidence for the development of psychological and emotional nursing strategies to improve quality of life in parents of children with type 1 diabetes.

### Main aim and objectives

The main aim of this study was to investigate the impacts of depression, diabetes-related stress, and stress coping strategies on quality of life in parents of children with type 1 diabetes in order to provide basic data for developing nursing interventions to improve the psychological health and quality of life of the parents. The specific objectives of this research are as follows:

1) To investigate the general characteristics of the participants and the levels of depression, diabetes-related stress, stress coping strategies, and quality of life among the participants;
2) to investigate differences in the level of quality of life according to the general characteristics of the participants;
3) to analyze the correlations between depression, diabetes-related stress, stress coping strategies and quality of life among the participants;
4) to identify the factors affecting quality of life among the participants.

## Methods

### Study design

This study is a descriptive correlational study to investigate the levels of depression, diabetes-related stress, stress coping strategies, and quality of life in parents of children with type 1 diabetes, analyze the relationships between these variables, and identify the factors affecting quality of life in the participants.

### Participants

The participants of this study were recruited from parents of children and adolescents aged 8 to18 with type 1 diabetes who met the WHO and ADA criteria for diagnosis of diabetes. More specifically, the participants were selected by the convenience sampling method from the members of the online community of the Korean Society of Type 1 Diabetes who voluntarily agreed to participate in the study. The sample size of the study was calculated using G*power 3.1.9.7. The minimum sample size was determined as 141 people by applying an effect size of .15, a significance level of .05, a power of .90, and 9 predictor variables, based on a previous study [24]. Considering a dropout rate of 10% [16], a total of 155 participants were recruited by adding approximately 14 people (the dropout rate) to the required minimum sample size. Then, excluding 2 parents of children with complications, a total of 153 people were finally included in the analysis. To ensure the reliability of the study, the purpose and methods of the study were fully explained to the participants and informed consent was obtained from them before conducting the survey, and functions such as reverse-coded items, prevention of non-response, prevention of duplicate participation, and limitation on the number of respondents were applied.

### Measures

*1. Quality of life*

Quality of life was measured using a Korean version of the WHOQOL-BREF developed by the World Health Organization (WHO). The WHOQOL-BREF is an abbreviated version of the WHOQOL-100 (World Health Organization Quality of Life assessment instrument-100) developed by the WHO. The Korean version of the WHOQOL-BREF was developed and validated for Koreans by Min et al. [13]. This questionnaire is designed to assess quality of life over the past two weeks, and consists of 26 items across five domains: physical health (7 items), psychological health (6 items), social relationships (3 items), environment (8 items), and overall quality of life (2 items). Each item is rated on a 5-point Likert scale, and higher scores indicate higher quality of life. The value of Cronbach's α was reported as .90 in the study by Min et al. [13] and it was calculated to be .94 in this study.

*2. Depression*

Depression was measured using a Korean version of the CES-D developed by Radloff [25], and the Korean version was developed through translation and adaptation by Jeon et al. [26]. This depression scale consists of a total of 20 items, and each item is assessed on a 4-point Likert scale. Higher scores indicate higher levels of depression. In other words, a score of 0~15 points is categorized as normal, a score of 16~20 points as mild depression, a score of 21~24 points as moderate depression, and a score of 25~60 points as severe depression. The value of Cronbach's α was reported as .91 in the study by Jeon et al. [29] and calculated as .95 in this study.

*3. Diabetes-related stress*

Diabetes-related stress was measured using the PAID-K presented by Park [28]. The PAID-K is a Korean translated and adapted version of the Problem Areas in Diabetes (PAID) developed by Polonsky et al. [27]. In this study, the PAID-K was used after partially revising its items to make them suitable for parents of children with type 1 diabetes (e.g., 'you' → 'you … your child's'). The revised version of the PAID-K was used after its face validity was assessed and reviewed by one professor in pediatric endocrinology and two nursing professors. This scale consists of a total of 20 items, and each item is rated on a 5-point Likert scale. Higher scores indicate higher levels of diabetes-related stress. The value of Cronbach's α was reported as .95 in the study by Park [28], and it was calculated as .95 in this study as well.

*4. Stress coping strategies*

The stress coping strategies were assessed using the Multidimensional Coping Scale developed by Jeon et al. [29]. This scale contains 64 items in total, and consists of 15 stress coping strategies in 3 subdomains: personal coping (active coping, passive withdrawal, emotional expression, active forgetting, restraint, perseverance, positive interpretation, positive comparison, accommodation, fatalism, self-criticism, emotional pacification), social coping (problem-solving support seeking, emotional support seeking), and religious coping (religious seeking). Each item is rated on a 4-point Likert scale, and a higher score indicates a greater degree of application of the relevant stress coping strategies. The value of Cronbach's α was reported as .69~.94 in Jeon et al. [29] and calculated as .57~.94 in this study.

**Data collection and ethical considerations**

Data collection was conducted from June 9 to August 1, 2023 after receiving an exempt determination from the Institutional Review Board of Kongju National University (IRB No.: KNU_IRB_2023-017). The participants were recruited through voluntary participation by posting the research participant recruitment notice with the survey link in the online community of the Korean Society of Type 1 Diabetes after receiving prior approval from the Society. An online survey was conducted after providing explanations about the purpose of the study, guarantee of anonymity, and possibility of withdrawal from the study at any time, and the participants were given a small gift as a token of appreciation. The research data were anonymized using unique identifier code numbers, and it will not be used for purposes other than research, and will be destroyed after it is retained for three years after the completion of the research.

**Data analysis**

The collected data was analyzed using SPSS/WIN 27.0. The general characteristics of the participants and the levels of depression, diabetes-related stress, stress coping strategies, and quality of life were analyzed by calculating the frequencies, percentages, means, and standard deviations. Differences in quality of life according to the general characteristics of the participants were analyzed using the independent *t*-test and ANOVA, and the post hoc test was performed using the Scheffé test. When the assumption of equal variances was not met, analysis was performed using the Brown-Forsythe test, and Tamhane's T2 test was used to perform the post hoc test. Correlations between depression, diabetes-related stress, stress coping strategies and quality of life were analyzed using Pearson's correlation coefficient. Multiple regression analysis was performed to identify the factors influencing quality of life in the participants.

## Results

**General characteristics of the participants**

Regarding the relationship of the participant (parent) to the child, among the parents of children with type 1 diabetes who participated in this study, 85% were the mothers of the children. In age, the 40-49 age group (73.2%) took up the majority of the parents. For children with type 1 diabetes, the average age was 12.41 ± 2.92 years, and the average age at the time of diabetes diagnosis was 8.53 ± 3.69 years. The average duration of disease was 3.87 ± 2.99 years, and the average HbA1c level (%) within the last 3 months was 6.59 ± 0.73 (Table 1).

**Table 1.** Quality of Life According to Participants' General Characteristics (*N*=153)

| Characteristics | Categories | n (%) | Mean ± SD | Quality of life | |
|---|---|---|---|---|---|
| | | | | Mean ± SD | t/F(*p*) Scheffe |
| Parent relation with child | Mother | 130(85.0) | | 3.14 ± 0.53 | -1.61 (.120) |
| | Father | 23(15.0) | | 3.40 ± 0.76 | |
| Parents' age (years) | ≤ 39 | 20(13.1) | 44.15 ± 4.57 | 3.20 ± 0.75 | 0.63 (.536) |
| | 40~49 | 112(73.2) | | 3.20 ± 0.55 | |
| | ≥ 50 | 21(13.7) | | 3.05 ± 0.52 | |
| Educational level | High school | 19(12.4) | | 2.93 ± 0.43 | 2.06 (.132) |
| | University | 106(69.3) | | 3.20 ± 0.61 | |
| | ≥ Graduate school | 28(18.3) | | 3.24 ± 0.48 | |
| Religion | Yes | 71(46.4) | | 3.29 ± 0.59 | 2.25 (.026) |
| | No | 82(53.6) | | 3.08 ± 0.54 | |
| Monthly income (10,000 KRW) | ≤ 400a | 27(17.6) | 755.16 ± 851.18 | 3.00 ± 0.59 | 11.24 (< .001) a, b < c |
| | 401-800[b] | 96(62.7) | | 3.10 ± 0.53 | |
| | > 800[c] | 30(19.6) | | 3.59 ± 0.50 | |
| Child's age (years) | 8-12 | 83(54.2) | 12.41 ± 2.92 | 3.18 ± 0.63 | 0.41 (.666) |
| | 13-15 | 43(28.1) | | 3.22 ± 0.53 | |
| | 16-18 | 27(17.6) | | 3.09 ± 0.46 | |
| Child's gender | Boys | 77(50.3) | | 3.24 ± 0.54 | 1.40 (.163) |
| | Girls | 76(49.7) | | 3.11 ± 0.60 | |
| Age at diagnosis (years) | ≤ 4 | 24(15.7) | 8.53 ± 3.69 | 2.98 ± 0.51 | 2.09[†] (.129) |
| | 5-9 | 65(42.5) | | 3.25 ± 0.66 | |
| | ≥ 10 | 64(41.8) | | 3.17 ± 0.48 | |
| Duration of disease (years) | ≤ 1 | 29(19.0) | 3.87 ± 2.99 | 3.17 ± 0.62 | 0.00 (.998) |
| | 1.1~5 | 94(61.4) | | 3.17 ± 0.55 | |
| | > 5 | 30(19.6) | | 3.18 ± 0.62 | |
| HbA1c (%) | ≤ 5.6 | 8(5.2) | 6.59 ± 0.73 | 2.95 ± 0.90 | 1.71 (.168) |
| | 5.7-6.4 | 63(41.2) | | 3.27 ± 0.55 | |
| | 6.5-7.5 | 72(47.1) | | 3.10 ± 0.52 | |
| | ≥ 7.6 | 10(6.5) | | 3.35 ± 0.71 | |

[†]Homogeneity of variance assumption not satisfied.

### Levels of depression, diabetes-related stress, stress coping strategies, and quality of life

The mean score for depression among the participants was 1.16 ± 0.64 out of 3 points. The severe depression group accounted for 42.5%, the normal group took up 32.7%, and the mild and moderate depression groups took up 12.4%, respectively. The mean score for diabetes-related stress was 2.20 ± 0.79 out of 4 points. Stress coping strategies were rated on a 3-point scale, and the stress coping strategies with relatively higher scores were 'active coping' (1.86 ± 0.59), 'emotional pacification' (1.75 ± 0.66), and 'positive interpretation' (1.67 ± 0.74), which belong to personal stress coping strategies.

The mean score for quality of life was 3.18 ± 0.57 out of 4 points, and among the subdomains of quality of life, 'environment' had the highest mean score of 3.44 ± 0.61 points, followed by 'social relationship' (3.25 ± 0.59 points), 'psychological health' (3.17 ± 0.69 points), 'physical health' (3.04 ± 0.70 points), and 'overall quality of life' (2.98 ± 0.79 points) in descending order (Table 2).

### Differences in quality of life according to the general characteristics of the participants

The analysis results of differences in the level of quality of life according to the general characteristics of the participants revealed that there were significant differences in quality of life according to religion (t = 2.25, $p$ = .026) and average monthly income (F = 11.24, $p$ < .001) (Table 1).

**Table 2.** The Levels of Depression, Diabetes-Related Stress, Stress Coping Strategies, Quality of Life (*N*=153)

| Variables | | | Rating | | |
|---|---|---|---|---|---|
| | | | Mean ± SD | Min~Max | Range |
| Depression | | | 1.16 ± 0.64 | 0.05~2.85 | 0~3 |
| Normal (0-15) | | 50 (32.7%) | 9.28 ± 3.99 | 1~15 | 0~15 |
| Mild depression (16-20) | | 19 (12.4%) | 18.68 ± 1.38 | 16~20 | 16~20 |
| Moderate depression (21-24) | | 19 (12.4%) | 22.53 ± 1.22 | 21~24 | 21~24 |
| Severe depression (25-60) | | 65 (42.5%) | 35.45 ± 8.30 | 25~57 | 25~60 |
| Total | | 153 (100%) | 23.21 ± 12.85 | 1~57 | 0~60 |
| Diabetes-related stress | | | 2.20 ± 0.79 | 0.30~4.00 | 0~4 |
| Stress Coping Strategies | Personal coping | Active coping | 1.86 ± 0.59 | 0.50~3.00 | 0~3 |
| | | Passive withdrawal | 0.34 ± 0.41 | 0.00~2.00 | |
| | | Emotional expression | 1.15 ± 0.61 | 0.00~3.00 | |
| | | Active forgetting | 1.09 ± 0.55 | 0.00~2.60 | |
| | | Restraint | 1.17 ± 0.56 | 0.00~2.75 | |
| | | Perseverance | 0.85 ± 0.65 | 0.00~3.00 | |
| | | Positive interpretation | 1.67 ± 0.74 | 0.00~3.00 | |
| | | Positive comparison | 0.99 ± 0.58 | 0.00~3.00 | |
| | | Accommodation | 1.08 ± 0.48 | 0.00~2.40 | |
| | | Fatalism | 0.95 ± 0.66 | 0.00~3.00 | |
| | | Self-criticism | 1.05 ± 0.71 | 0.00~3.00 | |
| | | Emotional pacification | 1.75 ± 0.66 | 0.00~3.00 | |
| | Social coping | Problem-solving social support seeking | 1.23 ± 0.68 | 0.00~3.00 | |
| | | Emotional social support seeking | 1.18 ± 0.73 | 0.00~3.00 | |
| | Religious coping | Religious seeking | 0.84 ± 0.91 | 0.00~3.00 | |
| Quality of life | | | 3.18 ± 0.57 | 1.00~4.54 | 1~5 |
| | | Physical health | 3.04 ± 0.70 | 1.00~4.57 | |
| | | Psychological health | 3.17 ± 0.69 | 1.00~4.67 | |
| | | Social relationships | 3.25 ± 0.59 | 1.00~4.67 | |
| | | Environment | 3.44 ± 0.61 | 1.00~5.00 | |
| | | Overall quality of life | 2.98 ± 0.79 | 1.00~5.00 | |

**Correlations between depression, diabetes-related stress, stress coping strategies, and quality of life**

Among the participants, quality of life had a negative correlation with depression ($r = -.70$, $p < .001$) and diabetes-related stress ($r = -.54$, $p < .001$, but showed a positive correlation with many stress coping strategies, such as active coping ($r = .46$, $p < .001$), positive interpretation ($r = .56$, $p < .001$), and emotional pacification ($r = .52$, $p < .001$) (Table 3).

**Factors affecting quality of life among the participants**

To identify factors affecting quality of life among the participants, multiple regression analysis was performed (Table 4). Among the general characteristics, religion and average monthly income, which were found to have a significant impact on quality of life, were treated as dummy variables, and depression, diabetes-related stress, and stress coping strategies were entered into the regression model as independent variables. To explore predictors for quality of life, this study used backward elimination multiple regression, which focuses on identifying the relative impacts between variables. As a result of testing the validity of the regression model, the tolerance value ranged from .55~.94 (threshold: > .1) and the Variance Inflation Factor (VIF) value ranged from 1.07 to 1.81 (threshold: < 10), indicating that there was no problem with multicollinearity among independent variables. The Durbin-Watson value was 2.08, indicating that the assumption of independence of residuals was satisfied. The final regression model was statistically significant ($F = 37.54$, $p < .001$), and had an explanatory power of 66%. Through regression analysis, depression ($\beta = -.42$, $p < .001$), diabetes-related stress ($\beta = -.23$, $p < .001$), and some types of stress coping strategies were identi-

**Table 3.** Correlations among Depression, Diabetes-Related Stress, Stress Coping Strategies, and Quality of Life ($N$=153)

| Variables | | | 1 | 2 | 3.1 | 3.2 | 3.3 | 3.4 | 3.5 | 3.6 | 3.7 | 3.8 | 3.9 | 3.10 | 3.11 | 3.12 | 3.13 | 3.14 | 3.15 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | r (*p*) | | | | | | | | | | | | | | | | | |
| 1. Depression | | | 1 | | | | | | | | | | | | | | | | | |
| 2. Diabetes-related stress | | | .57 (< .001) | 1 | | | | | | | | | | | | | | | | |
| 3. SCS† | Personal coping | 3.1 Active coping | -.30 (< .001) | -.21 (.009) | 1 | | | | | | | | | | | | | | | |
| | | 3.2 Passive withdrawal | .15 (.059) | .14 (.082) | -.30 (< .001) | 1 | | | | | | | | | | | | | | |
| | | 3.3 Emotional expression | .03 (.75) | .14 (.08) | .10 (.231) | -.01 (.874) | 1 | | | | | | | | | | | | | |
| | | 3.4 Active forgetting | -.23 (.004) | -.17 (.041) | .26 (.001) | .16 (.045) | .20 (.011) | 1 | | | | | | | | | | | | |
| | | 3.5 Restraint | -.16 (.046) | -.18 (.025) | .30 (< .001) | .04 (.602) | .09 (.262) | .46 (< .001) | 1 | | | | | | | | | | | |
| | | 3.6 Perseverance | -.22 (.006) | -.22 (.005) | .19 (.017) | .03 (.725) | .09 (.258) | .32 (< .001) | .52 (< .001) | 1 | | | | | | | | | | |
| | | 3.7 Positive interpretation | -.46 (< .001) | -.45 (< .001) | .61 (< .001) | -.16 (.044) | .03 (.719) | .49 (< .001) | .49 (< .001) | .35 (< .001) | 1 | | | | | | | | | |
| | | 3.8 Positive comparison | -.09 (.25) | -.06 (.472) | .12 (.126) | -.01 (.895) | .12 (.149) | .32 (< .001) | .15 (.072) | .08 (.345) | .35 (< .001) | 1 | | | | | | | | |
| | | 3.9 Accommodation | .07 (.377) | -.01 (.918) | .06 (.493) | .13 (.1) | -.01 (.87) | .28 (< .001) | .27 (.001) | .25 (.002) | .15 (.057) | .24 (.003) | 1 | | | | | | | |
| | | 3.10 Fatalism | -.01 (.899) | -.03 (.757) | .18 (.023) | .13 (.104) | .16 (.044) | .32 (< .001) | .35 (< .001) | .39 (< .001) | .27 (.001) | .25 (.002) | .32 (< .001) | 1 | | | | | | |
| | | 3.11 Self-criticism | .46 (< .001) | .43 (< .001) | -.17 (.036) | .17 (.035) | .24 (.003) | -.02 (.81) | -.22 (.006) | -.21 (.008) | -.29 (< .001) | .04 (.647) | .14 (.091) | .03 (.684) | 1 | | | | | |
| | | 3.12 Emotional pacification | -.38 (< .001) | -.35 (< .001) | .58 (< .001) | -.17 (.033) | -.04 (.61) | .46 (< .001) | .48 (< .001) | .37 (< .001) | .80 (< .001) | .26 (.001) | .24 (.003) | .26 (.001) | -.28 (< .001) | 1 | | | | |
| | Social coping | 3.13 Problem solving support seeking | -.24 (.003) | -.06 (.494) | .42 (< .001) | -.05 (.535) | .19 (.022) | .03 (.74) | .10 (.202) | .13 (.12) | .29 (< .001) | .25 (.002) | 0.03 (.739) | .14 (.087) | -.11 (.16) | .23 (.005) | 1 | | | |
| | | 3.14 Emotional support seeking | -.17 (.034) | -.03 (.69) | .29 (< .001) | .03 (.759) | .25 (.002) | .04 (.665) | .04 (.632) | .10 (.215) | .19 (.022) | .31 (< .001) | .14 (.078) | .17 (.037) | -.02 (.78) | .14 (.075) | .76 (< .001) | 1 | | |
| | Religious coping | 3.15 Religious seeking | -.14 (.09) | .07 (.415) | .15 (.068) | .02 (.767) | .003 (.966) | .03 (.698) | .20 (.012) | .06 (.476) | .17 (.033) | .17 (.032) | .25 (.002) | .06 (.449) | .11 (.195) | .20 (.014) | .35 (< .001) | .30 (< .001) | 1 | |
| 4. Quality of life | | | -.70 (< .001) | -.54 (< .001) | .46 (< .001) | -.24 (.003) | .01 (.911) | .21 (.010) | .24 (.003) | .27 (.001) | .56 (< .001) | .20 (.011) | .05 (.512) | .14 (.09) | -.36 (< .001) | .52 (< .001) | .34 (< .001) | .28 (< .001) | .30 (< .001) | 1 |

†SCS: stress soping strategies.

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**Table 4.** Factors affecting the subject's Quality of Life (*N*=153)

| Variables | | B | SE | β | t | *p* |
|---|---|---|---|---|---|---|
| (Constant) | | 3.73 | 0.16 | | 23.01 | < .001 |
| Depression | | -0.37 | 0.06 | -.42 | -6.78 | < .001 |
| Diabetes-related stress | | -0.16 | 0.04 | -.23 | -3.73 | < .001 |
| Stress coping strategies | Religious seeking | 0.11 | 0.03 | .18 | 3.43 | .001 |
| | Emotional pacification | 0.15 | 0.05 | .17 | 3.07 | .003 |
| | Emotional support seeking | 0.09 | 0.04 | .12 | 2.33 | .021 |
| | Passive withdrawal | -0.16 | 0.07 | -.12 | -2.39 | .018 |
| Monthly average income ≤ 4 million won | | -0.36 | 0.09 | -.24 | -3.91 | < .001 |
| Monthly average income > 4 million won to ≤ 8 million won | | -0.17 | 0.08 | -.14 | -2.21 | .029 |
| $R = .82$, $R^2 = .68$, $_{adj}R^2 = .66$, F = 37.54, $p < .001$ | | | | | | |
| Tolerance = .55~.94, VIF = 1.07~1.81, Durbin-Watson = 2.08 | | | | | | |

Dummy variables: (Monthly average income exceeding 8 million won =0)

fied as the significant factors affecting quality of life. Among stress coping strategies, passive withdrawal (β = -.12, $p$ = .018), emotional pacification (β = .17, $p$ = .003), religious seeking (β = .18, $p$ = .001), and emotional support seeking (β = .12, $p$ = .021) were found to be significant influencing factors. Additionally, in terms of monthly income, the group with an average monthly income of 4 million won or less (β = -.24, $p$ < .001) and the group with an average monthly income of 4.01 to 8 million won (β = -.14, $p$ = .029) showed a significantly lower level of quality of life compared to the group with an average monthly income of over 8 million won.

## Discussion

This study analyzed the relationships between depression, diabetes-related stress, stress coping strategies, and quality of life in parents of children with type 1 diabetes. As a result, depression, diabetes-related stress, some types of stress coping strategies (religious seeking, emotional pacification, emotional support seeking, passive withdrawal), and average monthly income were identified as the significant influencing factors for quality of life. This study employed the backward elimination method in regression analysis. Based on the stress-coping-adaptation theory proposed by Lazarus and Folkman, depression and diabetes-related stress were interpreted as 'stressors' and stress coping strategies as 'coping resources.' Therefore, in the process of interpreting the study results in alignment with the theoretical framework, the relationships between variables were analyzed in terms of the process in which stressors first had a negative impact on quality of life, and stress coping strategies either mitigate or amplify this relationship.

In this study, the mean score for the total domains of quality of life in parents of children with type 1 diabetes was above the medium level, but in terms of the levels of the sub-domains, the mean score of 'environment' was the highest, while the mean scores of 'overall quality of life' and 'physical health' was relatively lower. These results are in contrast to the findings of the study by Park et al. [16], which reported that 'physical health' had the highest score and 'environment' had the lowest score, suggesting that this disagreement in research findings may have reflected differences in disease characteristics, management methods, and care needs since the study by Park et al. [16] included the parents of both children with type 1 diabetes and those with type 2 diabetes. Although this study did not directly measure the 'environment' factor, the relatively high score of the 'environment' domain in this study may be interpreted as indicating that parents may have positively perceived their children's access to treatment and education services, health-related information, and medical and community resources. Meanwhile, the relatively lower scores of 'Overall quality of life' and 'physical health' are consistent with previous studies [5,7-9] that found that continuous blood sugar management, preparation for nocturnal hypoglycemia, and the burden of repetitive care lead to the accumulation of physical fatigue, sleep deprivation, and emotional exhaustion. In view of these results, nursing interventions for parents of children with type 1 diabetes should adopt a multidimensional approach and aim to reduce the physical burden on parents and restore their overall quality of life rather than simply providing care education. In particular, it is required to apply an intervention strategy that includes both providing psychological support and reducing parents' care burden.

In this study, analysis results revealed that depression was the

most significant factor affecting quality of life in parents of children with type 1 diabetes. Among the participants, 67.3% had depression, and 42.5% of them experienced severe depressive symptoms that require a clinical intervention. These results suggest that parents of children with type 1 diabetes may experience persistent emotional difficulties not only immediately after diagnosis but also afterward. In fact, a previous study reported that 61% of parents experienced severe depression in an early stage of diagnosis [30], and these findings are believed to show that this high depression rate in parents is an acute reaction resulting from the shock and anxiety at the time of diagnosis, and that caring for children with chronic diseases is likely to lead to the persistence or relapse of parental depression in the long term. The participants of this study are exposed to not only acute stress at the time of diagnosis, but also long-term and cumulative care needs, such as repeated blood sugar management, hypoglycemia prevention, nighttime monitoring, and the burden of ongoing care. In other words, the underlying cause of depression immediately after diagnosis is not limited to the single factor of initial shock, but this depression reflects the structural characteristics of caring for children with type 1 diabetes that cause continuous emotional difficulties for parents. In this respect, a contextual connection can be drawn between the high rates of depression in this study and previous research. Therefore, for families with children with type 1 diabetes, it is essential to provide continuous evaluation and intervention for emotional states in the long term as well as in the early stages of diagnosis. To this end, it is necessary to provide multi-layered, comprehensive measures, including early emotional screening, stress coping education, psychological counseling for parents, and strategies to reduce the burden of care [14,15].

In the study by Park et al. [16] using the Beck Depression Inventory (BDI), the rate of severe depression was relatively low at 3.7%, but this lower rate of severe depression may be attributed to the differences in the measurement tool and the degree of emotional adaptation depending on the elapsed time since diagnosis of the child's illness and the type of diabetes. On the other hand, in a study that applied the Hospital Anxiety and Depression Scale (HADS) to parents with pediatric patients who were diagnosed with diabetes more than one year ago, 55.4% of the participants reported anxiety and depression [10], confirming that parental mental health problems are long-term challenges. Parental depression has a negative impact on pediatric patients' treatment compliance, blood sugar control, and emotional development [11], and in particular, mothers have been reported to experience greater psychological and physical burdens [6,8-10]. Therefore, in nursing practice, it is important to assess mothers as a high-risk group and provide emotion-focused interventions. In addition, future research is required to use standardized tools to assess psychological and emotional variables such as quality of life, depression, diabetes-related stress, and stress coping strategies. Standardization of such tools is required because the use of different measurement tools in each study decreases consistency in the interpretation of scores, limits the possibility of comparison of analysis results with those of previous studies, and also makes it difficult to set criteria for selecting risk groups in clinical settings. The use of standardized tools can increase the reliability and validity of measurements, and also allows the integrated interpretations of research results across various studies, contributing to the accumulation of data for evidence-based nursing. In addition, during the developmental transition from childhood to adolescence, parent-child conflicts may intensify due to increased autonomy and role readjustment within the family [31], so it is required to develop family-centered psychosocial interventions appropriate for the transitional period.

In this study, diabetes-related stress was identified as the second strongest influencing factor for quality of life in parents of children with type 1 diabetes, and this factor showed a significant negative correlation with quality of life. The average score for diabetes-related stress was 2.20 points, which is identical to the measurement results of diabetes-related stress (2.20 points) in a previous study by Kim & Kang [5], and the finding regarding the impact of diabetes-related stress on quality of life in this study supports the results of previous studies reporting that diabetes-related stress negatively affects not only quality of life in parents but also physical and emotional health, interpersonal relationships, and family function [8,9,19,20]. According to previous studies, increased difficulty in disease control can lead to a decline in parents' life satisfaction and perceived health due to feelings of helplessness and fear [10,19], so it is necessary to provide nursing interventions that can practically reduce diabetes-related stress beyond simply providing information. In particular, early screening, family counseling, stress coping strategies training, and building a peer parent support network can be used as effective measures for reducing diabetes-related stress in parents of pediatric patients, and providing integrated emotional support from the early stage of diagnosis is expected to have a positive effect on parent-child relationships as well as maintenance of family health in the long term. In addition, previous studies have reported that parents' care burden increases as the child's age decreases, and that stress levels may increase during the child's adolescence due to increased autonomy and conflicts within the

family [9,31]. Based on these findings of previous studies, this study additionally examined differences in parents' ddiabetes-related stress levels by the child's age, but found no statistically significant differences (the table of analysis results not included). These results suggest that the limitations of this study's sample size and age distribution of children may have prevented the observation of notable or significant differences in parents' diabetes-related stress levels according to the child's age. Therefore, future studies need to use a larger, more sufficient sample size and include diverse age groups to more meticulously investigate the differences in parents' stress levels according to developmental stages of children.

In this study, among the sub-factors of stress coping strategies, 'religious seeking' and 'emotional pacification' were found to improve quality of life in parents, whereas 'emotional support seeking' and 'passive withdrawal' had a negative impact on quality of life. These results suggest that different types of stress coping strategies have different effects on quality of life. 'Religious seeking' acts as a resource for resilience by reinterpreting psychological pain through religious meaning and strengthening social support networks [32,33], while 'emotional pacification' promotes psychological well-being by relieving mental tension and regulating stress responses [29]. On the other hand, in the case of 'emotional support seeking', it is generally regarded as a positive coping strategy, but if the expected social support is not provided, 'emotional support seeking' may turn into helplessness and thus could negatively affect quality of life [34]. As for 'passive withdrawal', it is manifested in the form of avoidance or suppressing emotions in stressful situations, and can aggravate emotional problems in the long term, leading to a decline in quality of life [35]. These results indicate that the impacts of stress coping strategies may vary depending on the psychological, social, and cultural contexts of the individual, and suggest that differentiated approaches are required in nursing interventions to promote religious seeking and emotional pacification, but to reduce passive withdrawal and emotional support seeking. In particular, to ensure that seeking emotional support will not lead to frustration, it is necessary to implement practical strategies, such as linking the parents with community social resources, establishing a structural support system, building peer parent networks, and strengthening a linkage system for psychological counseling [34,36]

Lastly, regarding monthly income among general characteristics, lower average monthly income was found to be associated with lower quality of life in parents of children with type 1 diabetes. This finding is consistent with previous studies by Park et al. [16] and Han [37], and a foreign study also reported that income and residential area were identified as factors affecting quality of life [38]. Income is not simply a financial indicator but closely related to psychological resources and health behaviors, and thus acts as a protective factor for improving quality of life [6,7,16]. Therefore, interventions for parents of children with type 1 diabetes are required to apply multifaceted strategies that include reducing economic burdens and improving access to resources. In particular, such strategies should be accompanied by the establishment of psychosocial support programs and financial support systems for low-income families.

## Conclusions

This study investigated the impacts of depression, diabetes-related stress, stress coping strategies, and average monthly income on quality of life among parents of children with type 1 diabetes. The analysis results revealed that depression was the strongest influencing factor for quality of life. In addition, diabetes-related stress and stress coping strategies were found to be closely related to quality of life. Among stress coping strategies, religious seeking and emotional pacification positively affected quality of life, but emotional support seeking and passive withdrawal had a negative impact on it. Furthermore, although the overall average quality of life was above the medium level, there was an imbalance among the subdomains of quality of life: The score of 'environment' was highest, while the scores for 'overall quality of life' and 'physical health' were lowest. In addition, a lower level of monthly income was associated with a lower level of quality of life. These results suggest that as parents of children with type 1 diabetes experience accumulated psychological burdens, ineffective stress coping strategies, economic difficulties, and continuous care, these factors all act as structural factors that deteriorate their quality of life.

Based on the findings described above, the following suggestions are made.

First, considering that depression was identified as the most significant influencing factor for quality of life, it is necessary to implement a psychosocial intervention program for parents of children with type 1 diabetes to perform continuous screening for emotional states and relieve parents' depression from the early stage of diagnosis

Second, in this study, among stress coping strategies, religious seeking and emotional pacification had a positive impact on quality of life, while emotional support seeking and passive withdrawal had a negative effect. These findings suggest that there is a need to evaluate parents' stress coping strategies and strengthen

effective stress coping strategies through customized stress coping strategies training and family counseling.

Third, in this study, among the subdomains of quality of life, 'physical health' and 'overall quality of life' were found to have relatively lower scores, and these results suggest that a nursing intervention and a rest support system are required to alleviate parents' physical fatigue and emotional exhaustion due to repeated blood sugar management and preparation for nocturnal hypoglycemia.

Fourth, in the light of the fact that average monthly income was found to be significantly associated with a decline in quality of life, it is required to strengthen access to financial, educational, and community resources and establish an integrated support system for parents of children with type 1 diabetes from low-income families.

Fifth, this study selected key variables based on the stress-coping-adaptation theory, but used a multiple regression analysis using the backward elimination technique as the analysis method, rather than a hierarchical regression analysis that directly reflects the theoretical order. This analysis method was used to derive a concise model centered on statistically significant predictors in actual data after selecting variables based on the stress-coping-adaptation theory. However, the backward elimination technique has limitations in strictly verifying the theoretical structure. Thus, in follow-up studies, hierarchical regression analysis or structural equation modeling should be applied to more directly verify the paths of the theoretical model.

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## Conflict of interest

The authors declared no conflict of interest.

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None.

## Authors' contributions

Seok Min Song contributed to conceptualization, data curation, formal analysis, methodology, project administration, visualization, writing-original draft, writing-review & editing, investigation, validation. Hye Kyung Lee contributed to conceptualization, formal analysis, methodology, writing-review & editing. Supervision, and validation.

## Data availability

The datasets generated and/or analyzed during the current study are not publicly available due to ethical restrictions on human subjects' data but are available from the corresponding author on reasonable request.

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