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An Examination of the Psychological Symptoms and Healthy Lifestyle Behaviors of Adolescents with a Sibling with Type 1 Diabetes Mellitus[1]

Tip 1 Diyabetli Kardeşi Olan Ergenlerde Psikolojik Belirtilerin ve Sağlıklı Yaşam Biçimi Davranışlarının İncelenmesi[1]

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ABSTRACT

Introduction: Having a sibling with Type 1 diabetes mellitus may influence adolescents' psychological symptoms and healthy lifestyle behaviors. Examining this relationship can guide the development of family-based support programs that promote adolescents' well-being.

Aim: This study examined the psychological symptoms and healthy lifestyle behaviors of adolescents with siblings who have Type 1 diabetes.

Method: This descriptive and correlational study was conducted at a university hospital between November 2020 and July 2021. The study involved 100 healthy siblings aged 12 - 18 years of 170 children with Type 1 diabetes registered at the hospital's paediatric endocrinology clinic. The data was collected using personal information form, the Brief Symptom Inventory, and the Healthy Lifestyle Behaviours Scale II. Data were analyzed using descriptive statistics, ANOVA, nonparametric tests, and Spearman correlation.

Results: Among the healthy adolescent siblings who participated in the study, 60% stated that they were afraid of developing diabetes, and 42% said that their sibling's disease negatively affected their lives. The mean total scores for the adolescents were 36.09 ± 29.71 on the Brief Symptom Inventory and 137.01 ± 21.66 on the Healthy Lifestyle Behaviours Scale II. It was determined that there was a statistically significant negative correlation between the total scores of the Brief Symptom Inventory and the Healthy Lifestyle Behaviours Scale II ($p < 0.05$).

Conclusion: As a result of this study, it was determined that having a sibling with diabetes can affect siblings' mental states and healthy lifestyle behaviours. It was also found that there was a relationship between psychological symptoms and healthy lifestyle behaviours in healthy adolescent siblings.

Keywords: Adolescent; health behaviour; mental health; sibling; Type 1 diabetes mellitus

ÖZ

Giriş: Tip 1 diyabetli bir kardeşe sahip olmak, ergenlerde psikolojik belirtileri ve sağlıklı yaşam davranışlarını etkileyebilir. Bu durumun incelenmesi aile temelli destek programlarının geliştirilmesine katkı sağlayacaktır.

Amaç: Bu araştırma, Tip 1 diyabetli kardeşi olan ergenlerde psikolojik belirtilerin ve sağlıklı yaşam biçimi davranışlarının incelenmesi amacıyla yapıldı.

Yöntem: Tanımlayıcı ve korelasyonel tasarımda olan bu çalışma, Kasım 2020–Temmuz 2021 tarihleri arasında bir üniversite hastanesinde gerçekleştirildi. Araştırma, hastanenin pediatrik endokrinoloji kliniğinde kayıtlı 170 Tip 1 diyabetli çocuğun 12 - 18 yaş arasındaki 100 sağlıklı kardeşi ile yürütüldü. Verilerin toplanmasında, Kişisel Bilgi Formu, Kısa Semptom Envanteri ve Sağlıklı Yaşam Biçimi Davranışları Ölçeği II kullanıldı. Veriler tanımlayıcı istatistikler, ANOVA, parametrik olmayan testler ve Spearman korelasyonu kullanılarak analiz edildi.

Bulgular: Araştırmaya katılan kardeşlerin %60'ı diyabet hastalığına yakalanmaktan korktuklarını, %42'si ise kardeşlerinin hastalığının kendi yaşamlarını olumsuz etkilediğini belirtmiştir. Ergenlerin KSE toplam puan ortalamaları 36.09 ± 29.71, Sağlıklı Yaşam Biçimi Davranışları Ölçeği II toplam puan ortalamaları ise 137.01 ± 21.66 olarak bulundu. Kısa Semptom Envanteri toplam puanı ile Sağlıklı Yaşam Biçimi Davranışları Ölçeği II toplam puanları arasında istatistiksel olarak anlamlı, negatif yönlü ve düşük düzeyli ilişki olduğu sonucuna varıldı ($p < 0.05$).

Sonuç: Bu çalışmanın sonucunda, diyabetli bir kardeşe sahip olmanın kardeşlerin ruhsal durumlarını ve sağlıklı yaşam tarzı davranışlarını etkileyebileceği tespit edilmiştir. Ayrıca, sağlıklı ergen kardeşlerde psikolojik belirtiler ile sağlıklı yaşam tarzı davranışları arasında bir ilişki olduğu da bulunmuştur.

Anahtar Kelimeler: Adölesan; sağlık davranışı; ruh sağlığı; kardeş; Tip 1 diyabet

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Introduction

Chronic disease is the persistence or recurrence of a disorder or weakness for a long time, adversely affecting the person's general condition. Such diseases lead to social, physical, emotional and occupational limitations (Halfon & Newacheck, 2010). Type 1 diabetes mellitus (T1DM), one of the diseases with a chronic course, is one of the most common metabolic diseases in childhood (Grulich-Henn & Klose, 2018). T1DM is seen as a family disorder that creates various obstacles in various contexts in the network of social and family relationships (Zysberg & Lang, 2015). Type 1 diabetes causes changes in previous family life, and the whole family, including healthy siblings, must constantly focus on diabetes and its management (Overgaard, Lundby-Christensen, & Grabowski, 2020). Children and their families try to cope with the challenges of diabetes management, including dietary management, insulin administration, glycaemic control, blood glucose monitoring, physical activity, and exercise (Committee, 2023). The daily routines and psychological functions of the siblings of the sick child may also be affected by these changes (Alderfer et al., 2010). The needs of healthy siblings may be pushed to the background when parental attention is focused on the sick child (Er, 2006). Psychological problems, including anxiety, fear, jealousy, anger, antisocial behaviours, and somatic complaints, may occur in healthy siblings (Hollidge, 2001; Herrman, 2006; Driscoll, Raymond, Naranjo, & Patton, 2016; Sand, Blom, Forsander, & Lundin, 2018; Baker & Claridge, 2023). At the same time, they may assume responsibility for caring for their sick siblings to support family functioning (Wennick, Lundqvist, & Hallström, 2009). The quality of sibling relationships may be affected by this situation (Hollidge, 2001). Lifestyle behaviours in healthy siblings may also be affected by this situation. In studies, it was found that children with siblings with diabetes experienced changes in their eating habits and daily activities (Gül & Bayat, 2005; Herrman, 2010).

A healthy lifestyle is essential during adolescence. A healthy lifestyle significantly affects mental health (Maenhout et al., 2020). It has been found that healthy lifestyle behaviours such as healthy eating and physical activity contribute positively to adolescents' mental health (O'neil et al., 2014; Biddle, Ciaccioni, Thomas, & Vergeer, 2019). Therefore, family-centred programmes are recommended to promote healthy living among families of children with T1DM and to bring families closer together (Chan & Shorey, 2022). Siblings are an integral but often overlooked component of family-centred care (Herrman, 2010). Since parents tend to focus on the sick child's needs, they may provide less attention and emotional support to siblings (Alderfer & Hodges, 2010). While research on children with chronic disease has increased significantly, much less attention has been paid to the siblings of these children. It is essential to consider siblings' perspectives on diabetes and potential problems they may face (Chan & Shorey, 2022). When the literature was reviewed, no study was found on the examination of psychological symptoms and healthy lifestyle behaviours in adolescents with siblings with T1DM disease. In this context, it is anticipated that this study will contribute to understanding the emotional and behavioural difficulties experienced by healthy adolescent siblings and to the development of appropriate support strategies for their needs. The study, which aims to fill this gap in the literature, is also expected to contribute to the understanding of the mediating role of family interactive care in chronic diseases by emphasizing the regulation of family dynamics and the importance of family-centred care.

Aim

This study was conducted to examine psychological symptoms and healthy lifestyle behaviours in adolescents with a sibling with Type 1 diabetes.

Study questions

1. Do adolescents with siblings with type 1 diabetes have psychological symptoms?

2. What is the level of healthy lifestyle behaviours in adolescents with siblings with type 1 diabetes?

3. Do the demographic characteristics of adolescents with siblings with type 1 diabetes affect their psychological states and healthy lifestyle behaviours?

4. Is there a relationship between psychological symptoms and healthy lifestyle behaviours in adolescents with siblings with type 1 diabetes?

Method

Study Design

This study had a descriptive and correlational design.

Study Setting and Sample

The study population consisted of healthy siblings aged 12 - 18 years of children with Type 1 diabetes (n = 170) enrolled in a university hospital in eastern Turkey. No sampling method was used, and 106 siblings of 170 children with Type 1 diabetes registered between the study dates (November 2020 and July 2021) who met the research criteria were reached. Six siblings were excluded because they declined to participate in the study. The study was completed with 100 healthy siblings. In the post hoc power analysis to determine the adequacy of the sample size for this study, it was determined that the study had power of 0.99 at the 95% confidence interval and the 0.05 significance level (Correlation H1 = 0.48, lower critical r = -0.97, Upper Critical r = 0.197, power 0.99). This value shows that the research sample is sufficient.

Inclusion Criteria of the Study

Can read and write, 12 - 18 years old, has a sibling diagnosed with Type 1 diabetes for at least six months, no chronic diseases or mental problems, and adolescents who volunteered to participate in the study were included.

Data Collection Tools

Personal information forms, a Brief Symptom Inventory, and a Healthy Lifestyle Behaviours Scale II collected the data.

Personal Information Form: In this form, prepared by the researcher after reviewing the literature (Gül & Bayat, 2005; Herrman, 2010; Overgaard et al., 2020), there are 10 questions, including descriptive characteristics of the child and information about the sibling's disease.

Brief Symptom Inventory (BSI): The Turkish adaptation of the BSI, developed by Sahin and Durak, is used for psychopathological

assessment. BSI is a 5-point Likert-scale inventory comprising 5 sub-dimensions and 53 items. High scores on the scale indicate that the individual's mental symptoms increase. The Cronbach Alpha coefficient of the BSI is 0.95 (Sahin & Durak, 1994). In this study, the Cronbach's Alpha coefficient was 0.95.

Healthy Lifestyle Behaviours Scale II (HLBS II): The HLBS II, the Turkish validity and reliability of which were examined by Bahar in 2008, measures individuals' health-promoting behaviours related to healthy lifestyles. The HLBS II is a 4-point Likert scale comprising six sub-dimensions and 52 items. A high score on the whole scale indicates that healthy lifestyle behaviours are beneficial, and a low score suggests that they are harmful. The Cronbach Alpha coefficient of the HLBS II is 0.92 (Bahar, 2008). In this study, the Cronbach's Alpha coefficient for the HLBS II was 0.92.

Ethical Principles of Research

Ethical approval was obtained from the Ataturk University Faculty of Medicine Ethics Committee (Number: B.30.2.ATA.0.01.00/403 Date: 01.10.2020) to conduct the study. Written permission was obtained from Ataturk University Health and Research Centre Directorate (Number: 42190979-302.08.01-E.2000278316 Date: 09.11.2020). The purpose of the study was explained to the children and their parents who met the research group criteria, and their verbal and written consent was obtained. Parents and children were informed that the data collected during the research would be processed confidentially, would not be used outside the research, and that they could withdraw from the research at any time. Since the study is based on the use of data obtained from human beings, it is necessary to observe personal rights, so the relevant ethical principles of "Volunteering", "Informed Consent", and "Protection of Confidentiality Its principles were respected.

Data Collection

The research data were collected by contacting the families of children with Type 1 diabetes registered at the Ataturk University Health and Research Centre Directorate. When families brought their children for control or when children were hospitalized at the clinic, the researcher interviewed the families. The purpose of the study was explained to the children's families, and permission and an appointment were obtained to survey their healthy children who met the research criteria. Interviews with the children of the families were conducted in the education room designated in the hospital. Before starting the study, a preliminary study was conducted to determine whether the questions were understandable. The study's purpose was explained again, and data were collected from healthy adolescent siblings. Each application took an average of 10 - 15 minutes.

Statistical Analyses

The Statistical Package for the Social Sciences for Windows 22 program was used to analyze the data. Before starting the analyses, the conformity of the numerical data to normal distribution was examined by the Skewness and Kurtosis tests. Number, percentage, and mean were used to calculate categorical data. Independent groups t-test, analysis of variance, Pearson correlation analysis, Mann-Whitney U analysis, Kruskal-Wallis analysis, Spearman correlation analysis, and Cronbach α coefficient calculation were used to evaluate the data. The magnitude of correlation coefficients was interpreted according to threshold values recommended in the literature. Accordingly, |r| values between 0.00 – 0.29 were considered weak, 0.30 – 0.49 as moderate, and 0.50 and above as strong correlations (Cohen, 1988). The statistical significance level was accepted as $p < 0.05$ for all tests.

Results

Table 1. According to the results obtained, 57% of the adolescents were female, 44% had a mother who graduated from primary school, 30% had a father who graduated from high school, 68% had an income equal to their expenses, 82% lived in a nuclear family type, 60% had a fear of getting diabetes, 50% learned what they knew about diabetes from a nurse/doctor, and 42% said that their lives were negatively affected by their siblings having diabetes. The mean age of the adolescents was 15.17 ± 2.31 years, and the mean duration of the siblings' diabetes diagnosis was 5.44 ± 2.47 years (Table 1).

Table 1. Demographic Characteristics of Healthy Adolescents and Their Diabetic Siblings (n=100)

		n	%
Gender	Female	57	57.0
	Male	43	43.0
Mother's Educational Status	İlliterate	7	7.0
	Primary school	44	44.0
	Secondary school	30	30.0
	High school	10	10.0
	Undergraduate	9	9.0
Father's Educational Status	Primary school	28	28.0
	Secondary school	25	25.0
	High school	30	30.0
	Undergraduate	17	17.0
Income Levels	Income<Expense	32	32.0
	Income=Expense	68	68.0
Family Types	Nuclear family	82	82.0
	Extended family	18	18.0
Fear of developing diabetes*	I'm scared	60	60.0
	I'm not scared	40	40.0
The source of information about diabetes*	Parents	50	50.0
	Nurse or doctor	50	50.0
The perceptions of how the sibling's disease affects the life of the adolescent*	Negative impact	42	42.0
	Positive and negative impacts	41	41.0
	Didn't have any impact	17	17.0
Continuous variables	**Minimum-Maximum**	**X ± SS**	
Age	12 - 18	15.17 ± 2.31	
The amount of time since the sibling's diagnosis (year)	1 - 13	5.44 ± 2.47	

*According to personal statements of adolescents. ± SS = mean ± standart deviation

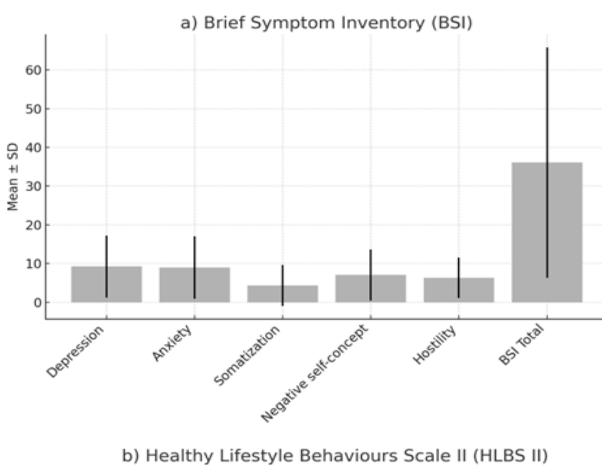
Table 2. Comparison of BSI and HLBS II Scores by Demographic Characteristics

		Total BSI Median (Q1 - Q3)	Total HLBS II X ± SS
Gender	Female	37 (20 - 63)	139.21 ± 19.30
	Male	16 (12 - 39.5)	134.09 ± 24.37
	Test	U = 673.500	t = 1.134
	p	**P = 0.000**	p = 0.260
Mother's Educational Status	Illiterate	41 (31 - 44)	121.86 ± 12.98
	Primary school	24.5 (14 - 47)	134.64 ± 22.57
	Secondary school	27 (15 - 50)	139.90 ± 19.49
	High school	38 (14 - 76)	144.90 ± 24.08
	Undergraduate	21 (20 - 49)	142.00 ± 23.34
	Test	x^2_{KW} = 0.981	F = 1.612
	p	p = 0.806	p = 0.178
Father's Educational Status	Primary school	21.5 (11.5 - 42)	128.96 ± 20.93
	Secondary school	26 (14 - 57)	139.32 ± 20.80
	High school	34 (19 - 56)	143.33 ± 22.10
	Undergraduate	21 (16 - 49)	135.71 ± 20.78
	Test	x^2_{KW} = 4.258	F = 2.347
	p	p = 0.235	p = 0.078
Income levels	Income < Expense	41.5 (15.5 - 54)	136.50 ± 24.05
	Income = Expense	23 (14 - 47.5)	137.25 ± 20.63
	Test	U = 917.500	t = -0.161
	p	p = 0.208	p = 0.873
Family types	Nuclear family	25 (14 - 49)	139.33 ± 21.57
	Extended family	42 (17 - 56)	126.44 ± 19.28
	Test	U = 639.000	t = 2.336
	p	p = 0.374	**p = 0.022**
Fear of developing diabetes	I'm scared	41.5 (19 - 54.5)	138.25 ± 21.83
	I'm not scared	15.5 (9 - 34.5)	135.15 ± 21.55
	Test	U = 661.000	t = 0.699
	p	**p = 0.000**	p = 0.486
The source of information about diabetes	Parents	40.5 (18 - 53)	139.90 ± 21.63
	Nurse or doctor	19.5 (13 - 41)	134.12 ± 21.52
	Test	U = 858.000	t = 1.339
	p	**p = 0.007**	p = 0.184
The perceptions of how the sibling's disease affects the life of the adolescent	Negative impact	49 (20 - 79)	138.67 ± 23.41
	Positive and negative impacts	22 (15 - 43)	136.17 ± 22.16
	Didn't have any impact	14 (0 - 17)	134.94 ± 16.08
	Test	x^2_{KW} = 22.161	F = 0.228
	p	**p = 0.000**	p = 0.797

*Non-parametric variables are presented as median (Q1 – Q3). Comparisons were performed using the Mann–Whitney U and Kruskal–Wallis tests. Parametric variables are presented as mean ± standard deviation.

Figure 1 shows the distribution of the scores obtained by adolescents from the BSI, HLBS II, and its sub-dimensions. When the mean scores obtained from the subscales of the BSI scale by adolescents were examined, it was determined that they scored 9.25 ± 8.01 on the depression subscale, 9.01 ± 8.04 on the anxiety subscale, 4.38 ± 5.30 on the somatization subscale, 7.08 ± 6.59 on the negative self subscale, and 6.37 ± 5.22 on the hostility subscale. The total score obtained from the BSI was determined as 36.09 ± 29.71. When the mean scores of the adolescents obtained from the sub-dimensions of the HLBS II scale were analyzed, they scored 26.50±4.68 from the interpersonal relations sub-dimension, 22.06 ± 4.01 from the nutrition sub-dimension, 20.36 ± 4.78 from the health responsibility sub-dimension, 17.45 ± 5.40 from the physical activity sub-dimension, 21.20 ± 4.59 from the stress management sub-dimension, and 29.44 ± 4.09 from the spiritual development sub-dimension. The total score they obtained from the HLBS II was 137.01 ± 21.66.

Table 2. The difference in the mean total score of the BSI by gender, fear of developing diabetes, source of diabetes information, and the effect of sibling disease on adolescents' lives was statistically



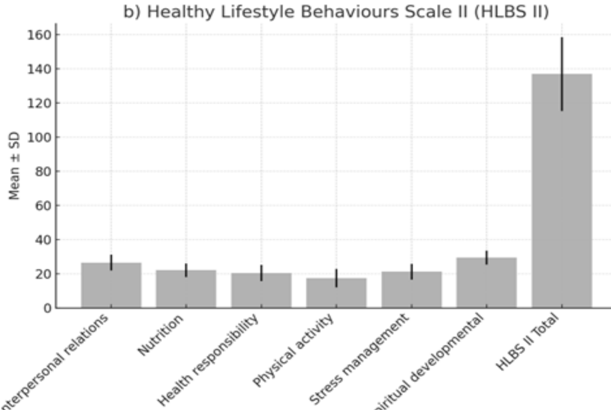


Figure 1. Statistics on the Scales Included in the Research

significant ($p < 0.05$). The mean scores were higher among girls, those who reported fear of developing diabetes, and those who received diabetes-related information from their parents. Furthermore, a significant difference was found according to the perceived impact of the sibling's illness on life. Post hoc analysis revealed that participants who reported being negatively affected had higher scores than those who reported both positive and negative effects or no effect at all.

The difference in the mean total score of BSI according to the adolescents' education level, mother's employment status, mother's education status, father's education status, father's occupation, income level, social security status, family type, place of residence, and gender of the sibling with diabetes was not statistically significant ($p > 0.05$, Table 2). According to adolescent family type, the difference in the mean total score on the HLBS II was statistically significant ($p < 0.05$). The mean scores were higher among participants living in nuclear families. According to gender, education level, mother's education level, father's education level, mother's employment status, father's occupation, social security status, income level, place of residence, gender of the sibling with diabetes, fear of getting diabetes, the place where information about diabetes was received and the effect of the sibling's disease on life, the difference in the mean total score of the HLBS II was not statistically significant ($p > 0.05$, Table 2).

As seen in Table 3 and figure 2, it was determined that there was a statistically significant, harmful and low-level correlation between depression score and spiritual development score; between somatization score and physical activity, spiritual development, health responsibility, stress management and HLBS II total scores; between negative self-score and physical activity score; between hostility score and physical activity, health responsibility, nutrition, stress management, spiritual development and HLBS II total scores; between BSI total score and physical activity, spiritual development and HLBS II total scores ($p < 0.05$). It was determined that as the depression score of the adolescents increased, the spiritual development score decreased; as the somatization score increased, physical activity, stress management, health responsibility, spiritual development and HLBS II total score decreased; as the negative self-score increased, physical activity score decreased; as the hostility score increased, nutrition, physical activity, health responsibility, stress management, spiritual development and HLBS II total score decreased; as the BSI total score increased, physical activity, spiritual development and HLBS II total scores decreased.

Table 3. The Relationship Between Adolescents' BSI and HLBS II Scores

		Interpersonal relations	Nutrition	Health Responsibility	Physical activity	Stress management	Spiritual developmental	**HLBS II Total Scores**
Depression	r	0.139	-0.064	-0.019	-0.190	-0.088	-0.240	-0.097
	p	0.168	0.529	0.849	0.058	0.385	**0.016**	0.336
Anxiety*	r	0.101	-0.027	-0.113	-0.194	-0.034	-0.164	-0.099
	p	0.318	0.787	0.263	0.053	0.735	0.104	0.329
Somatization*	r	-0.022	-0.146	-0.211	-0.343	-0.221	-0.203	-0.261
	p	0.831	0.148	**0.035**	**0.000**	**0.027**	**0.043**	**0.009**
Negative self-concept*	r	0.122	-0.080	-0.067	-0.316	-0.108	-0.171	-0.129
	p	0.226	0.429	0.508	**0.001**	0.284	0.089	0.201
Hostility	r	-0.122	-0.299	-0.292	-0.302	-0.294	-0.328	-0.345
	p	0.226	**0.003**	**0.003**	**0.002**	**0.003**	**0.001**	**0.000**
BSI Total Scores*	r	0.028	-0.147	-0.194	-0.339	-0.154	-0.235	-0.226
	p	0.786	0.144	0.053	**0.001**	0.125	**0.018**	**0.024**

* The data were not normally distributed; *Spearman Correlation analysis was performed

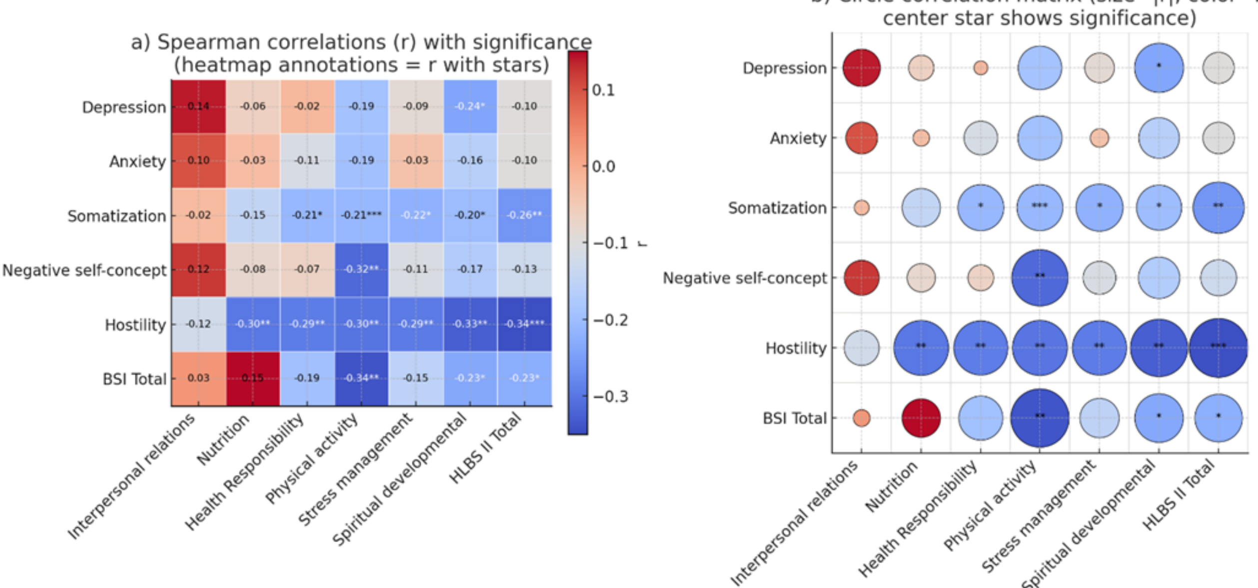


Figure 2. Correlation Matrix BSI and HLBS II Scores

Discussion

This study was conducted to examine the psychological symptoms experienced by adolescents with siblings with Type 1 diabetes and the effects of this condition on their healthy lifestyle behaviours. Although there are many studies on the psychological states and family effects of individuals with type 1 diabetes, studies addressing the specific effects of this condition on healthy siblings are limited. While existing studies generally focus on the impact on the parents or caregivers of the individual with diabetes, the psychological and behavioural difficulties experienced by siblings have not been adequately examined (Chan & Shorey, 2022; Blamires, Foster, Rasmussen, Zgambo, & Mörelius, 2024). This study aims to fill this gap and to detail adolescent siblings' psychological states and healthy lifestyle behaviours. The findings obtained in this research were discussed in line with the literature.

In our study, the majority of adolescents with a sibling with Type 1 diabetes stated that they were afraid of getting diabetes, half of them learned what they knew about diabetes from a nurse/doctor, and the majority indicated that their sibling's disease harmed their lives. It is known that when a child is diagnosed with diabetes, siblings face various problems (Herrman, 2006). Studies (Sand et al., 2018; Overgaard et al., 2020; Chan & Shorey, 2022) have found that siblings of children with diabetes may have unique concerns about the disease and management. Healthy siblings may experience fears related to lack of knowledge about the disease, perceived responsibility for causing it, sibling rivalry, jealousy, the possibility of being diagnosed with diabetes in the future, and the potential death of their sibling (Wennick et al., 2009; Vermaes, Van Susante, & Van Bakel, 2012; Sand et al., 2018). It seems that our research results are compatible with the literature and that adolescents with siblings with diabetes may have complex emotions.

In this study, it was determined that healthy adolescent siblings may experience psychological symptoms and are most prone to depression and anxiety. It has been found that children with siblings with chronic diseases experience damaging psychological and emotional symptoms such as post-traumatic stress symptoms, especially depression and anxiety, low quality of life, or peer problems (O'Brien, Duffy, & Nicholl, 2009; Sand et al., 2018; Mariñez et al., 2022; Martinez et al., 2022). In studies examining the psychosocial functioning of siblings of children with chronic diseases, it has been observed that there is generally increased negative mood, internalization problems, somatic symptoms, a decrease in quality of life, and an increase in qualitative descriptions of maladjustment in siblings (Vermaes et al., 2012; Incledon et al., 2015; Knecht, Hellmers, & Metzing, 2015). These findings may be related to healthy siblings often occupying a "secondary position" within the family system. As the care demands of the child diagnosed with a chronic illness increase, parents' time, attention, and emotional resources may become primarily directed toward the ill child, potentially leading healthy siblings to experience feelings of neglect or invisibility. This situation, particularly during adolescence—a developmental period characterized by heightened identity formation and a strong need for belonging—may increase emotional vulnerability and contribute to the emergence of internalizing symptoms.

According to the results of this research, the healthy lifestyle behaviours of healthy adolescent siblings were at a moderate level. Diabetes treatment usually requires lifestyle changes (Sand et al., 2018). In their studies, Sleeman et al. (2010) and Herrman (2010) determined that there were changes in the eating habits of siblings of children with T1DM (Herrman, 2010; Sleeman, Northam, Crouch, & Cameron, 2010). In another study, it was determined that children with siblings with diabetes experienced changes in their daily living activities and eating habits (Gül & Bayat, 2005). Within the family, the dietary and lifestyle adjustments required for diabetes management may involve all members. While this may support the development

of certain health-promoting behaviors in healthy siblings, disease-related stress and shifts in family roles may limit their sustainability. Therefore, the moderate level of healthy lifestyle behaviors may reflect the combined influence of family-based adjustments and psychosocial burden.

According to this research, it was determined that sisters experienced more psychological symptoms than brothers. Girls and boys during adolescence may be exposed to different gender role expectations and encounter various problems (Sahin & Uğurtaş, 2002). When the literature is examined, it is seen that depression, anxiety, negative self, anger and hostility symptoms are highly prevalent in adolescents (Gürsu, 2012; Körük & Aypay, 2017). It has been determined in studies that female adolescents experience symptoms of anxiety, depression, negative self, somatization and anger/hostility more than male adolescents (Körük & Aypay, 2017; Serin & Topses, 2017). In case your sibling gets sick, While girls tend to show internalizing symptoms such as depression and withdrawal, boys show externalizing symptoms such as hyperactivity and aggression (O'Brien et al., 2009). The differences in how boys and girls respond when their siblings become ill may be related to child-rearing practices and sociocultural factors. In our cultural context, boys are often treated more permissively, whereas girls may be raised under more restrictive expectations. The mismatch between girls' personal desires and societal expectations, their greater caregiving responsibilities compared to boys, and more limited social networks and activities may contribute to these differences.

According to this research, it was determined that siblings who expressed fear of getting diabetes experienced more psychological symptoms. In the study conducted by Loos and Kelly, siblings of children with T1DM they have also shared their fear of developing T1DM themselves (Loos & Kelly, 2006). In another study, healthy siblings of children with diabetes stated that they were highly concerned about their health and that they could not share their thoughts for fear that this statement would anger their parents or cause additional stress on the family (Hollidge, 2001). Based on these results, it is thought that adolescents with siblings with diabetes experience fear about their health and that this fear may lead to the emergence of psychiatric symptoms in adolescents. It is believed that it is essential to inform adolescents accurately about the disease, answer their questions, support them in expressing their feelings and thoughts, and alleviate their fears.

This study found that mean total psychological symptom scores were higher among siblings who received information about diabetes from their parents than among adolescents who received information from a nurse or doctor. Evidence shows that healthy siblings often know little about their brother or sister's chronic medical condition (Opperman & Alant, 2003; Kao, Romero-Bosch, Plante, & Lobato, 2012). In another study conducted to determine the difficulties experienced by siblings of children with diabetes, 52.1% of healthy siblings received information about diabetes; 70.5% of those who did received it from their parents, and 23.5% received it from others. It has been determined that the patient received it from health personnel (a nurse or a doctor) (Gül & Bayat, 2005). Parents may feel significant uncertainty about how much information to give healthy siblings for various reasons, such as not wanting to upset them, not wanting to involve them in medical matters, or thinking the healthy sibling is too young to understand the disease (White et al., 2017). Pals et al. In their research on children with diabetes and their families, they found that parents did not want their siblings to be too interested in diabetes and, therefore, did not talk much about diabetes between siblings. As a result, there was a mutual silence between parents and siblings (Pals, Coyne, Skinner, & Grabowski, 2021). It has been concluded that these systems established to protect each other may become problematic because they reduce communication and cause family members to suppress their needs (Deavin, Greasley, & Dixon, 2018). Parents need to provide more support and guidance in providing information to their healthy children, and for health professionals to address healthy siblings when giving information to the child and family with a life-threatening or life-limiting medical condition, answer their questions, and support the family in this regard.

According to this study, it was found that the average total psychological symptom score of adolescents who reported that their sibling's disease hurt their lives was high. The lives of children who have a sibling with a chronic disease may be affected positively or negatively by this situation (Gan, Lum, Wakefield, Nandakumar, & Fardell, 2017). Sharpe et al. Their study concluded that diseases that require a comprehensive daily management regimen, such as diabetes, have a more negative impact on the sibling than those that require a less intensive daily regimen (Sharpe & Rossiter, 2002).

In this study, it was determined that siblings living in nuclear families had higher healthy lifestyle behaviours. Following the diagnosis of a disease in a family member, parents focus on the needs of the sick child. Therefore, they can provide less attention and emotional support to the siblings (Alderfer et al., 2010). It is thought that an increase in the number of individuals in the household may negatively affect individuals' ability to care for their health, as household budgets are calculated based on the number of individuals.

When the relationship between psychological symptoms and healthy lifestyle behaviours is examined in this study, It was determined that healthy lifestyle behaviours decreased as psychological symptoms increased in healthy adolescent siblings. Mental health is affected by constantly changing and developing physical, psychological, and social competencies, critical periods, and environmental factors (Velten, Bieda, Scholten, Wannemüller, & Margraf, 2018). The prevalence of psychological symptoms seen in childhood is increasing in Turkey (Mutluer et al., 2023). Studies have found that adolescents' healthy lifestyle behaviours, such as healthy nutrition and physical activity, positively contribute to their mental health (O'neil et al., 2014; Biddle et al., 2019). Since a healthy lifestyle can be beneficial for a person's spiritual and mental health, determining healthy lifestyle choices that support psychological well-being and reduce mental problems appears to help prevent mental disorders (Velten et al., 2018). Psychological distress may reduce motivation, self-regulation, and the capacity to maintain health-promoting behaviors, thereby contributing to unhealthy lifestyle patterns. Conversely, unhealthy behaviors such as irregular nutrition and low physical activity may

also negatively affect psychological well-being. This suggests that the relationship may be reciprocal and dynamic rather than unidirectional. Furthermore, this association may be influenced by third variables such as family stress levels, social support, and coping mechanisms.

Conclusion and implications for practice

As a result of the research conducted to examine psychological symptoms and healthy lifestyle behaviours in adolescents with siblings with type 1 diabetes, it was determined that having a diabetic sibling caused positive and negative effects on the lives of the adolescents included in the study and that they had fears of becoming diabetic in the future. It was determined that the demographic characteristics, psychological conditions, and healthy lifestyle behaviours of healthy adolescent siblings were affected. Additionally, a relationship was found between psychological symptoms and healthy lifestyle behaviours in adolescents. In line with these results, supporting adolescents with siblings with type 1 diabetes, family members, and health professionals, knowing that adolescents with siblings with diabetes may have psychological symptoms, monitoring adolescents, supporting them to express their feelings and thoughts comfortably, providing the necessary opportunities for them to develop healthy lifestyle behaviours, and understanding the experiences of family members. It is recommended that siblings be included in the evaluations, that families and healthcare professionals be aware of the needs of healthy siblings, and that they be encouraged to interact with support services to maximize and maintain well-being.

Strengths and Limitations

Since this research was conducted only in a specific period, it prevents monitoring long-term effects and changes on adolescents. Additionally, since the findings of this research were conducted within a particular age group, socioeconomic status or cultural context, generalizing these findings to other groups or cultures is within the limitations of the research. It is recommended that future studies use longitudinal designs to observe changes in psychological symptoms and healthy lifestyle behaviours over time, and qualitative research methods should be included to understand the experiences of individuals to be included in the sample group more deeply.

Ethical Considerations: Ethical approval was obtained from the Ataturk University Faculty of Medicine Ethics Committee for this study (Number: B.30.2.ATA.0.01.00/403 Date: 01.10.2020).

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