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The Relationship Between Self-Efficacy, Health Literacy, and Self-Care Behaviors among Adolescents with Type 1 Diabetes in Palestine

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Thesis Approval

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Declaration

I declare that, except where explicit reference is made to the contribution of others, this thesis is substantially my own work and has not been submitted for any other degree at the Arab American University or any other institution.

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Dedication

I dedicate this work ,,,,,,,,

To those who have supported me in my master journey, my supporter, benefactor, and lover enthusiast “To my loving “parents” who taught me the meaning of patience and strength. To my “dear husband” who strengthened me with this achievement to fulfill my dream”.

Moreover, I dedicate this work to my daughters (Suhila, Mayar, and Sandy) and my son (Wadee’) who inspire me to continue my journey.

Special thanks to those who taught me that achieving goals is possible, but the road is not easy, these goals are achieved with patience, perseverance, and self-confidence.

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Student Name: Feda Ayed Mousa Mousa

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The Relationship Between Self-Efficacy, Health Literacy, and Self-Care Behaviors among Adolescents with Type-1 Diabetes in Palestine.

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Abstract

Background: Type 1 diabetes (T1D) is considered the most prevalent chronic disease during adolescence. Self-care behaviors are the cornerstone in diabetes control. There are limited studies assessed the factors correlated with self-care behaviors among adolescents with T1D in Arab World including Palestine. Therefore, this study aimed to investigate the association between self-efficacy, health literacy, and selected demographic variables and self-care behaviors among adolescents with T1D in Palestine.

Methods: A cross-sectional correlational study was used, and 157 adolescents aged 14-18 were selected by convenience sampling method from primary healthcare settings in Palestine. A self-structured questionnaire included the socio-demographic data, the Diabetic Health Literacy Scale, Self-Efficacy for Diabetes Scale (SED), and Self-Care Inventory Scale (SCI) was utilized to collect data. Descriptive statistics, Pearson's and Point biserial correlation tests, and Multiple Linear regression test were utilized to examine the relationship between the variables and predictors of self-care behaviors. The data were collected during the 20th of February to the 1st of June 2024.

Results: The participants reported high level of self-efficacy (M= 108.80, SD=141.92), low levels of health literacy (M=2.12, SD=0.78), and low-level self-care behaviors (M=33.82, SD=7.76). Self-efficacy was correlated positively with self-care behavior ($r = 0.396$, $p < 0.01$). Age and HbA1c had a negative relationship with self-care behavior ($r = -0.249$, $p < 0.01$; r = p.b. $r = -0.173$, $p < 0.05$), respectively. Self-efficacy and age were the main predictors of self-care behaviors ($\beta = 0.196$, $p < 0.001$ and $\beta = -1.256$, $p < 0.01$), respectively.

Conclusions: This study help policymakers, healthcare professionals, and parents develop strategies to enhance self-care behaviors through targeted interventions and educational programs. the findings may guide any future educational program or training sessions in order to increase self-efficacy and self-care behaviors among adolescents.

Keywords: Adolescents; Health literacy; Self-care behaviors; Self-efficacy; Type 1 diabetes.

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List of Definitions of Abbreviations

Abbreviations	Title
B	Standardized beta
b	Unstandardized beta
CI	Confidence Interval
DES-28	Diabetes Empowerment Scale-28
DMQ	Diabetes Management Questionnaire
DMS	Diabetes Management Self-Efficacy Scale
DMSES	Diabetes mellitus self-efficacy scale
DSCAQ	Diabetes Self-Care Ability Questionnaire
DSES	Diabetes Self-Efficacy Scale
DSMP-SR	Diabetes Self-Management Profile- Self Report
DSMQ	Diabetes Self-Management Questionnaire
DW	Durbin Watson coefficient
EMR	Eastern Mediterranean region
HAS-A	Health literacy assessment scale for adolescents
HAS-A-AR	Health literacy assessment scale for adolescents-Arabic
HbA1C	Hemoglobin A1c
HBSC	Health Behavior in School-aged Children
HELMA	Health Literacy Measure for Adolescents
HLAT-8	Health Literacy Assessment tool-8
HLSAC	Health Literacy for School-Aged Children
HLS-C-Q	Health Literacy Survey Questionnaire
IPAQ-A	International Physical Activity Questionnaire in Adolescents
IRB	Institutional Review Board
ISPAD	International Society of Pediatrics and Adolescents
MMAS	Morisky Medication Adherence Scale
N/n	Number
OR	Odd ratio

PMC	Palestine Medical Complex
p.b. r	Point-biserial correlation
r	Pearson correlation
SCBs	Self-care behaviors
SCI scale	Self-Care Inventory scale
SD	Standard deviation
SDSCA	Summary of diabetes self-care activities measure
SDSCA-Ar	Summary of diabetes self-care activities measure-Arabic
SED	Self-efficacy for Diabetes Scale
SED-D specific	Self-efficacy for Diabetes Scale- diabetes specific
SED-G	Self-efficacy for Diabetes Scale- general situations
SED-M	Self-efficacy for Diabetes Scale- medical situations
SEDM	Self-Efficacy for Diabetes Self-Management Measure
S-TOFHL	Short test of Functional Health Literacy
T1D	Type 1 Diabetes
T2D	Type 2 Diabetes
UNRWA	United Nations Relief and Works Agency for Palestinian Refugees
USA	United States of America
VIF	Variance Inflation Factor
WHO	World Health Organization

Chapter One: Introduction

1.1.Background

Type 1 diabetes (T1D) is the most common chronic endocrine disorder in children and adolescents (Asghari et al., 2023; Halasa, 2022). T1D refers to juvenile or insulin-dependent diabetes (Lucier & Weinstock, 2024). The hallmark of T1D is the autoimmune destruction of pancreatic B-cells in the presence of genetic or environmental factors, which results in hyperglycemia secondary to the state of deficient insulin production (Lee et al., 2024; Wass et al., 2022).

The prevalence of T1D worldwide is very high, one in every 300 people has the disease (Al-Shorman et al., 2023). The incidence is rapidly rising by 3% annually, reaching 1.106.500 patients with T1D aged under 20 years (Al-Shorman et al., 2023). According to World Health Organization (WHO) statistics, diabetes is directly responsible for 1.5 million deaths annually. An estimated 2 million people died in 2019 from diabetes and kidney damage caused by diabetes (WHO, 2023). Diabetes causes acute complications including diabetic ketoacidosis, which requires urgent management, in addition to long-term complications including microvascular and macrovascular diseases (Syed, 2022). Diabetes can be managed, and its consequences avoided or delayed with diet, physical activity, medication, regular screening, and treatment for complications (Al-Shorman et al., 2023; Asghari et al., 2023; WHO, 2023). Lack of self-care behaviors is the most important factor affecting mortality and morbidity among patients with diabetes (Karimy et al., 2018; Sharifirad et al., 2013).

Adolescence is a crucial stage of development that includes a variety of physical, cognitive, and psychosocial changes as well as an increase in independence (Harrington et al., 2021). During this time, adolescents also learn and acquire healthy habits that will maintain a healthy adulthood (Taba et al., 2022). Adolescence is a suitable time for adopting preventive interventions and applying self-care behaviors (Masoumi & Shahhosseini, 2017).

Self-care behaviors refer to the decisions and actions that individuals can take to deal with or improve their health (Dashiff et al., 2006). These behaviors include healthy eating, adequate physical activity, blood sugar monitoring, adherence to medicine, problem-solving,

healthy coping, and reduced complications (Oluchina, 2022). Management of T1D purposes to obtain blood glucose levels close to normal ranges (Mistry et al., 2022). According to the International Society of Pediatrics and Adolescents (ISPAD) guidelines for the management of T1D in adolescents, the target level of HbA1c should be < 7.5% (<58 mmol/mol) if reached without severe incidences of hypoglycemia (Rewers et al., 2009).

It has shown that a small number of patients with T1D perform self-care regularly, despite the complications of the disease (Shahbazi et al., 2018). Many factors affect self-care behaviors among patients with diabetes including knowledge information, physical and emotional skills, health perceptions and literacy, and self-efficacy (Ong-Artborirak et al., 2023) . Self-efficacy and health literacy have been implicated as factors influencing self-care behaviors (Gonzalez et al., 2016).

Self-efficacy refers to the faith in one's abilities to organize and execute the courses of action needed to manage situations (Bandura, 1995). To achieve good results, adolescents must have faith in and belief in their skills. People who believe they are capable of achieving a desired behavior are more likely to maintain their health-related behaviors (Taba et al., 2022). Self-efficacy describes why adolescents seek out information, how they behave, and how they perceive their ability to evaluate and apply skills (Taba et al., 2022).

Health literacy describes the social and cognitive abilities that enable a person to receive, process, and understand health information to make wise decisions about their lifestyle and medical treatment (Asharani et al., 2021). Therefore, it is critical to provide adolescents with reliable and precise health information so they may adopt healthy habits for the rest of their lives and take responsibility for their health (Ghanbari et al., 2016).

Previous literature has discussed the relationship between self-efficacy, health literacy, and self-care behaviors in patients with diabetes. Higher self-efficacy was associated with better self-care behaviors and higher diabetic control (Geneti, Wondwossen et al., 2022; Guo et al., 2019; Kristensen et al., 2018). In addition, good health literacy correlated with better self-care behaviors (Geneti, Desta et al., 2022; Khodabandeh et al., 2017; Sarpooshi et al., 2021). Furthermore, the literature discussed the correlation between self-care behaviors and age (Diab & Hussein, 2023; Geneti, Wondwossen et al., 2022), income, duration of diabetes (Diab & Hussein, 2023), place of residence, HbA1c (Mahdilouy & Ziaeirad, 2019), gender, and education (Sarpooshi et al., 2021; Zarifsaniey et al., 2022).

1.2.Problem Statement

TID is the most common endocrine disease among adolescents, and its prevalence is rising globally (Reinauer et al., 2023). T1D tends to be one of the most behaviorally and psychologically challenging diseases (van Duinkerken et al., 2020). To reduce complications and improve quality of life, diabetes requires good diabetic management (Zarifsaniey et al., 2022). Most diabetic management relies on self-care behaviors (Shahbazi et al., 2018).

Adolescents with T1D suffer from many stressors that are resulted from the continual requirements for diabetes care (Chao et al., 2016), which could influence their adaptation to T1D and cause psychological problems including stress, anxiety symptoms, and depression (Beran et al., 2022; Chao et al., 2016; Harazneh et al., 2024; Rapee et al., 2019). These psychological problems have a significant role in controlling and managing the disease, which may lead to inadequate involvement in self-care for diabetes (Kalra et al., 2018). Most studies agreed that self-care behavior was at moderate and unsatisfactory levels among adolescents with T1D (Diab & Hussein, 2023; Kerman et al., 2016; Mahdilouy & Ziaeirad, 2019). Therefore, maintaining appropriate self-care behavior can reduce the burden of the disease and its mortality (Karimy et al., 2018).

Self-efficacy is necessary for successful management of diabetes and it is a cornerstone of self-care of diabetes (Masadeh et al., 2024). Higher self-efficacy is associated with better compliance with self-care behaviors and glycemic control and leads to fewer complications (Abdelghaffar et al., 2020; Tharek et al., 2018). Also, people with diabetes with high self-efficacy have low levels of diabetes-associated distress (Abdelghaffar et al., 2020). Many previous studies have concluded that adolescents with diabetes have high levels of self-efficacy (Masadeh et al., 2024; Sahin et al., 2021; Rashid et al., 2018). Aseela et al. (2024) reported that 51.25% of people with diabetes had high self-efficacy (Aseela et al., 2024). Another study reported medium to high self-efficacy levels in diabetes management (Nass et al., 2019). Survonen et al. (2019) found that self-efficacy was appropriate among adolescents with T1D. A previous study revealed that more than half of Egyptian children have very poor self-efficacy regarding diabetes management (Mohammad et al., 2020).

Health literacy is another significant factor for self-care behaviors. Different levels of health literacy in adolescents were reported in the literature. A study in Taiwan revealed that 50% of adolescents with T1D had sufficient health literacy and 30% had problematic health literacy (Chu-Ko et al., 2021). According to a WHO survey in 2017/2018 in 10 countries in Europe, 13.3% of adolescents had low health literacy and 19.9% had high health literacy (WHO, 2021). Moreover, the adolescents in the Eastern Mediterranean region had low to moderate levels of health literacy (Sarhan et al., 2023). More specifically in diabetic adolescents, a study showed that 60% of participants had sufficient health literacy (Carels et al., 2021). In contrast, there was inadequate health literacy in Brazil, Pakistan, United Kingdom among adolescents with diabetes (Gomes et al., 2020).

In Palestine, the prevalence of diabetes among the population was 15.3% in comparison with a global prevalence of 6% (World Diabetes Foundation, 2023). It is estimated that 4.4% of people with diabetes experience T1D and 95.3% suffer from type 2 diabetes (T2D) (World Diabetes Foundation, 2023). Due to the Palestinian context, the political condition and war situations predispose patients with chronic illnesses such as diabetes to additional stress and challenges, for example, difficulty accessing health services (Elissa et al., 2017; Sarhan et al., 2019). In addition, the low economic status in an occupied area negatively affects follow-up visits, medication availability, and management (Fernandez-Lazaro et al., 2019). Previous studies conducted among adolescents with T1D, for example, Sarhan et al. (2019) revealed that most Palestinian adolescents had insufficient motivation to seek out health information by themselves. Harazneh et al. (2024) revealed that adolescents with T1D had difficulties in adaptation to disease. Another study found that 10.3% of obese adolescents had low health literacy, and 5.5% of participants had high health literacy (Sarhan et al., 2022). Also, Alkaiyat et al. (2020) demonstrated that 66%, 89%, 79%, and 21% respectively of patients with T1D declared non-adherence to glucose testing, diet recommendations, exercise, and administering the insulin on time.

Most of the existing research has been performed internationally and may not apply to Palestinian adolescents with T1D due to disparities in cultural, political, and social status. Despite the importance of addressing self-care behaviors among adolescents with T1D in Palestine, the research on this topic is scant and limited (Alkaiyat et al., 2020). There are no

studies have been conducted about the association between self-efficacy, health literacy, and self-care behaviors in adolescents with T1D.

1.3.Significance of the Study

The healthcare situation in Palestine faces challenges due to ongoing conflicts, occupation, and socioeconomic constraints, which result in considerable barriers, such as limited access to healthcare settings, and lack of medicines and supplies (United Nations, 2023). These difficulties add additional stress and challenges to patients especially adolescents with T1D. Therefore, it is crucial to evaluate self-efficacy, health literacy, and self-care behaviors among adolescents with T1D.

This study is one of the first studies that were conducted in Palestine. It can provide primary data about the situation of adolescents with T1D and the association between self-efficacy, health literacy, and self-care behaviors. It will guide policymakers, healthcare professionals, parents, and adolescents to develop strategies to enhance self-care behaviors. Also, targeted interventions and educational programs can be developed to promote health literacy and self-efficacy, which positively reflect on self-care behaviors and improve quality of life.

1.4.Aim of the study

This study aimed to assess the relationship between self-efficacy, health literacy, and self-care behaviors among adolescents with T1D in Palestine.

1.5.Objectives of the Study

The objectives guiding the present study included the following:

- To assess the levels of self-efficacy, health literacy, and self-care behaviors among adolescents with T1D in Palestine.

- To investigate the relationship between selected demographic characteristics (age, gender, parents' educational level, monthly family income, place of residence, duration of diabetes, and last HbA1c level), self-efficacy, health literacy, and self-care behaviors among participants.
- To identify the predictors of self-care behaviors among participants.

1.6.Research Questions

This study involved the following questions:

- What are the levels of self-efficacy, health literacy, and self-care behaviors among participants?
- What is the relationship between selected demographic characteristics (age, gender, parents' educational level, monthly family income, place of residence, duration of diabetes, and last HbA1c level), self-efficacy, health literacy, and self-care behaviors among participants?
- What are the predictors of self-care behaviors among participants?

1.7.Definition of the Study Variables

This study included the following variables: self-efficacy and health literacy as independent variables, and self-care behaviors as dependent variable. Each variable had conceptual and operational definitions.

1.8.Conceptual Definitions

The following conceptual definitions were used in this study:

Self-efficacy. It is defined as the individuals' belief and faith in their abilities to perform the required actions in a specific situation (Bandura, 1995). People with high self-efficacy

interpret stressful situations as challenges instead of threats and face them confidently (Bandura, 1995).

Health Literacy. It refers to the psychosocial traits and cognitive abilities that provide the ability of an individual to access, understand, appraise, and apply health information to promote and maintain good health (Dodson et al., 2015; Kayalkar & Dmello, 2024). It is considered a key factor influencing health outcomes as it enables individuals to make appropriate decisions about their health issues (Sarhan et al., 2019).

Self-care Behaviors. It is related to the actions that the individual undertakes to prevent diseases and maintain and promote health. In other words, it is the process of making decisions about practices that maintain physiological stability and how to respond to symptoms when they emerge (Masoumi & Shahhosseini, 2017).

1.9.Operational Definitions

The following operational definitions were employed in this study:

Self-efficacy. It was measured using the self-efficacy in adolescents with IDDM (SED) scale. It consists of 35 Items distributed on three subscales: SED, diabetes-specific (SED-D); SED, medical situations (SED-M); and SED, general situations (SED-G). This scale was rated on a 4-point scale ranging from "very sure I can't" to "very sure I can" on each item (Allen et al., 2018). The total score ranged from 35 to 140 and it classified as follows: 0-35 indicated very poor self-efficacy, >35 - 70 indicated poor self-efficacy, >70 - 105 indicated good self-efficacy, and >105 - 140 indicated very good self-efficacy (Whittemore et al., 2012) (Appendix A).

Health Literacy. A diabetic health literacy scale created by Liu et al. (2018) was used to assess health literacy. It consists of 15 items that responded on a 5-point Likert scale ranging from 1 (never) to 5 (often) (Liu et al., 2018) (Appendix A). This scale was scored according to the mean as follows: 1-2.33 (low health literacy), > 2.33-3.66 (moderate health literacy), and > 3.66-5 (high health literacy) (Tefera et al., 2022).

Self-care Behaviors. The Self-Care Inventory that was created by La Greca et al. (1992) was used to assess self-care practices for diabetes. It involved 14 items distributed on four

subscales including blood glucose regulation, insulin and food regulation, exercise, and emergency precautions. Only ten items were counted and responses to these items were on a 5-point Likert scale ranging from 1 (never do it) to 5 (always do this as recommended without fail) (Appendix A). The cutoff value of this scale was 34, where $\leq$ 34 indicated low self-care behaviors and > reflected high self-care behaviors (La Greca et al., 1992).

1.10. Summary

Adolescents with T1D must adhere to appropriate self-care behaviors to improve their quality of life and reduce complications. Self-care behaviors during adolescence need to be maintained into adulthood. Many factors are thought to have a direct effect on self-care behaviors. Self-efficacy and health literacy could correlate to self-care behaviors. There is a lack of studies in Palestine that investigated self-efficacy, health literacy, and self-care behaviors among adolescents with T1D. Therefore, this study aimed to explore the relationship between self-efficacy, health literacy, and self-care behaviors among adolescents with T1D in Palestine.

Chapter Two: Literature Review

T1D is considered the most prevalent chronic disorder in adolescents. T1D is a life-long and incurable disease that requires skills and appropriate self-care behaviors to prevent its short- and long-term complications. Therefore, self-care behaviors are essential to improve quality of life and decrease the burden of disease. Understanding the relationship between self-efficacy, health literacy, demographic characteristics, and self-care behaviors among adolescents with T1D in Palestine is an absolute priority to promote their well-being and ensure high-quality care.

Therefore, this literature review aims to thoroughly analyze what is known about self-efficacy, health literacy, and self-care behaviors among adolescents with T1D. This study attempts to give an in-depth overview of the factors that are associated with self-care behaviors in adolescents with T1D by synthesizing and incorporating current literature. This chapter is grouped into two parts: the search process and the previous literature.

2.1. Search Process

Many databases and engine were accessed during the search process. These databases and engines were PubMed, Science Direct, Frontiers, Research Gate, and Google Scholar. The main used keywords were self-efficacy, health literacy, self-care behaviors, self-care management, diabetes mellitus, type 1 diabetes, and adolescents. Studies from 2014 and later were included in the review, while older studies due to definitions of concepts and instruments were included. Only studies published in English were included. However, studies published in other languages were excluded. The total number of included studies was 60.

2.2. Previous Literature

This section addresses the literature about the research questions and includes two sections. The first section explores the related previous studies regarding the levels and importance of self-efficacy, health literacy, and self-care behaviors among adolescents with

T1D. The second investigates the literature associated with factors related to self-care behaviors.

2.3. Levels of Self-efficacy, Health Literacy, and Self-care Behaviors

2.3.1. Levels of Self-efficacy

Self-efficacy refers to the faith in one's abilities to plan and execute actions necessary to manage a situation (Bandura, 1995). Grossman et al. (1987) defined diabetes self-efficacy in adolescents as the self-perceptions or expectations held by persons with diabetes about their personal competence, power, and resourcefulness for successfully managing their diabetes. People with high self-efficacy have trust in their abilities to manage demands and problems, they interpret them as challenges rather than threats, which can predict a behavior change (Bandura, 1995; Tak et al., 2017). People are more likely to adopt healthy behaviors when they feel confident in their abilities to successfully execute those behaviors (Bandura, 1988). Moreover, Hassanabad et al. (2024) described high self-efficacy as an effective non-drug approach to controlling diabetes.

Masadeh et al. (2024) performed a cross-sectional, quantitative study to assess the level of self-efficacy and its correlates among 127 Jordanian participants aged 18-30 with T1D registered in outpatient clinics. The Arabic Version of the Diabetes Self-Efficacy Scale (DSES) was used for gathering data. The findings revealed a mean score of 215.46 (SD=34.98; range, 97–299) which reflects high self-efficacy. The participants showed the highest self-efficacy in problem-solving, while diet and exercise were the lowest.

depending on Orem’s Self-Care Theory, Fereidooni et al. (2024) designed a descriptive-analytical cross-sectional study to explore self-efficacy among 341 Iranian patients with T2D. The Self-Efficacy Scale which is composed of eight items was adopted for gathering data. The findings revealed that Iranian patients with T2D had average self-efficacy (M=2.4, SD±0.45 out of 4). Moreover, in Iran, Hassanabad et al. (2024) performed a descriptive study to explore health literacy among adolescents with T1D. Sixty adolescents completed the functional self-efficacy questionnaire. The mean score was 123.78 (SD±1.25), which reflected a moderate level of self-efficacy among participants.

Aseela et al. (2024) performed an analytical cross-sectional study aimed at determining diabetes self-efficacy level and its effect on glycemic control and well-being in patients with T2D in Kerala, India. Four hundred patients were interviewed to complete the Stanford Diabetes Self-Efficacy Scale (DSES), which consists of 8 items. The result showed that 51.25% of the participants had high self-efficacy (95% CI: 46.2-56.2).

Furthermore, a cross-sectional study was carried out on 17-year-old adolescents with T1D who were monitored at the Montreal Children's Hospital Diabetes Clinic for a year before transferring to adult treatment. After completing the Self-Efficacy for Diabetes Self-Management Measure [SEDM], the participants' mean SEDM score was 7.1 which indicated that those adolescents have a good level of self-efficacy in managing their diabetes (Alwadiy et al., 2021).

During the COVID-19 pandemic, Paulsamy et al. (2021) conducted descriptive cross-sectional research aimed at investigating the self-efficacy in T2D during the pandemic. Two hundred participants were recruited via convenient sampling and asked to complete the modified Diabetes Management Self-Efficacy Scale (DMS) which comprised 20 items. The result showed a mean of 5.74 for patients with HbA1c < 6.5, and a mean of 4.37 for patients with HbA1c ≥ 6.5, indicating that those with the lowest HbA1c had higher self-efficacy.

In Turkey, Şahin et al. (2021) examined the self-efficacy and medical adherence levels in 207 participants with T2D. They utilized the type 2 DM Self-Efficacy Scale comprised of 20 items rated on a 5-point Likert scale with scores ranging from 20-100. The result showed that participants had a medium level of self-efficacy (median score was 72). Moreover, Calli and Kartal (2021) assessed the self-efficacy level among 200 Turkish patients with T2D. The mean of self-efficacy was 60.61 (SD± 11.29) which reflected a moderate level among these patients.

Moreover, Oluma et al. (2020) assessed the influence of perceived self-efficacy and its correlates among patients with T2D in Ethiopia. Three hundred and ninety-eight participants were recruited via systematic random sampling method. To measure self-efficacy, the diabetes mellitus self-efficacy scale (DMSES) was used, which comprised eight questions. The results revealed that 52.2% of participants demonstrated high self-efficacy.

Conversely, Mohammad et al. (2020) performed a descriptive cross-sectional study to assess self-efficacy among Egyptian children with T1D and their caregivers. A hundred

children with T1D who attended a Diabetes Clinic participated and data were gathered using the Self-Efficacy for Diabetes Scale (SED) for children. Findings demonstrated that self-efficacy 51.9% of children had very poor self-efficacy regarding diabetes management while those who had good self-efficacy were only 12.3% of children.

Another study adopted a correlational descriptive design aimed to explore psychosocial self-efficacy in adolescents with T1D (N=68) in Finland utilizing the Diabetes Empowerment Scale (DES-28). This study revealed a quite good level of self-efficacy (Survonen, et al., 2019). Also, Nass et al. (2019) interviewed 35 Brazilian young people with T1D to assess their psychosocial self-efficacy and its correlates. They used the Diabetes Management Self-Efficacy Scale - Short Version which comprised 8 items. The findings showed that 85.7% of participants had high self-efficacy levels, and 14.3% had moderate self-efficacy.

Amer et al. (2018) performed a cross-sectional study to identify the effect of self-efficacy on self-care behaviors among 392 participants with T2D in Sudan. They collected data using the Diabetes Management Self-Efficacy Scale (DMSES) which comprised 20 items. The findings showed that 48.7% of participants had high self-efficacy. Additionally, Tharek et al. (2018) used the Diabetes Management Self-Efficacy Scale (DMSES)- Malay version in their study to achieve the aim of investigating the level of self-efficacy among 340 patients with T2D in Malaysia. Findings revealed a mean of 7.33 (SD±2.25) which indicates high self-efficacy in Malaysian patients with T2D. These findings were consistent with another study performed in Malaysia that adopted the same method and tool. The mean score of self-efficacies was 7.60 (SD= 3.40) (Rashid et al., 2018).

Furthermore, a cross-sectional study in the USA aimed to test the mediating role of self-efficacy between diabetes-specific family conflict and blood glucose monitoring and HbA1c. One hundred and twenty-nine adolescents with T1D participated in the study. The Self-Efficacy for Diabetes Scale comprising 35-item was used to gather data. Adolescents reported a mean of 167.46 (SD+19.63), reflecting a high self-efficacy (Noser et al., 2017).

In Iran, a correlational study included 100 adolescents with T1D to estimate the quality of life among them depending on their self-efficacy. They measured self-efficacy using the diabetes management self-efficacy scale consisting of 20 items. The results showed that the mean score of self-efficacies was 45.84 (SD±10.53), indicating a moderate level of self-

efficacy. The highest score was on diet control while the lowest was on medical care (Kerman et al., 2016).

In conclusion, the disagreement in self-efficacy levels in the studies had several causes. This could be due to the different study instruments. Also, self-efficacy is a dynamic construct, and can change; so that, age, personal, and family characteristics can significantly influence it.

2.3.2. Levels of Health Literacy

Health Literacy is defined as the capacity to engage with healthcare resources and information. In other words, it is the qualities and competencies (e.g., cognitive and social skills) required for individuals and communities to be able to access, understand, appraise, and use knowledge and resources to make decisions related to their health, disease prevention, and health promotion (Chu-Ko et al., 2021; Kayalkar & Dmello, 2024; Sarhan et al., 2023). Health literacy is considered a cornerstone tool for the management of chronic diseases including diabetes (Gomes et al., 2020). Health literacy skills are classified into three categories; functional health literacy: basic numeracy, reading, and writing; interactive health literacy: collecting, appraising, apply health information; and critical health literacy: skills to analyze and use information to improve individual health (Asharani et al., 2021).

Adolescents with good levels of health literacy can have healthier lives by setting specific health goals and practicing better preventive and healthy behaviors regarding physical activity and eating habits (Sarhan et al., 2022). The adolescents could have better food choices, be physically active, and be non-smokers (Sarhan et al., 2019). Individuals with inadequate health literacy have a restricted comprehension of health information and poor health self-management skills, which increases hospitalization, higher medical costs, and elevated mortality rates (Chu-Ko et al., 2021).

Health literacy is considered a determinant of health, as it can predict health outcomes (Sarhan et al., 2019). It reflects national health (Guo et al., 2021), and it is a public health goal that needs to be achieved (Sarhan et al., 2020). Several studies were performed to assess health literacy, for example, Kayalkar and Dmello (2024) conducted a cross-sectional study aimed to assess the health literacy among adolescents in rural areas of India (N=421). Health

Literacy Measure for Adolescents (HELMA) which consists of 44 items was utilized. It covers eight domains of health literacy; access, reading, comprehension, appraisal, apply, communication, self-efficacy, and numeracy. The findings indicated that 61% of adolescents had limited health literacy about diabetes. Also, 96.5% of participants showed limited health literacy in the appraisal domain.

In addition, Hassanabad et al. (2024) performed a descriptive study to investigate the correlation between functional self-efficacy, health literacy, and social anxiety among Iranian adolescents with T1D. Sixty participants were recruited by stratified random sampling and invited to complete the questionnaire on the health literacy of adolescents with T1D. The result showed that participants had an insufficient level of health literacy with a mean score of 48.99 (SD ± 6.69).

Moreover, a scoping review aimed to investigate the existing health literacy studies in the Eastern Mediterranean region (EMR) was conducted. The study stated that high health literacy can promote health and prevent disease significantly in areas suffering from unstable health situations related to political conflicts and wars. A total of 82 articles targeted adolescents performed in EMR countries and estimated the health literacy levels or predictors were enrolled. This study revealed that 50% of adolescents demonstrated low to moderate health literacy. Also, most studies explored health literacy among healthy adolescents rather than adolescents with chronic disorders (Sarhan et al., 2023).

Another cross-sectional study examined health literacy in 918 adolescents with T1D in Taiwan. Chinese Health Literacy Survey Questionnaire (HLS-C-Q) comprising 47 items was adopted. The findings showed that 2.07%, 28.11%, 50.76%, and 19.06% of the participants had insufficient, problematic, sufficient, and excellent health literacy, respectively. The study clarified that the highest score was for understanding health information, while appraising skills were the lowest (Chu-Ko et al., 2021).

In China, Guo et al. (2021) designed a cross-sectional study to examine health literacy as a mediating factor between a range of factors and health behaviors in 650 healthy adolescents in four secondary schools. The Chinese version 8-item Health Literacy Assessment Tool (HLAT-8) was adopted for gathering data. The mean score of health literacy was 26.37 (SD± 5.89), reflecting moderate levels. Additionally, Suksatan et al. (2021) performed a cross-sectional study to elaborate the relationship between health literacy, self-

care behavior, and blood sugar levels among patients with T2D in rural Thai (N= 415). Analyzing of data exposed the moderate level of health literacy among participants (M=2.68, SD±0.64).

Furthermore, to assess health literacy levels between countries in Europe, a comparative study derived its cross-sectional data from the Health Behavior in School-Aged Children (HBSC) study. This study included the 10 countries that utilized the Health Literacy for School-Aged Children (HLSAC) instrument which comprised 10 items. A total of 14.590 adolescents aged 15 years were included in the study from 10 countries (Austria, Belgium (Fl), Czechia, England, Estonia, Finland, Germany, Macedonia, Poland, and Slovakia). The findings reported that 20%, 67%, and 13% of participants had high, moderate, and low levels of health literacy, respectively. The highest score of high health literacy was in Macedonia (38%) and Finland (32.81%), whereas the lowest score was in Germany (12.8%) (Paakkari et al., 2020).

In Brazil, Gomes et al. (2020) carried out an observational, cross-sectional study that assessed the factors related to health literacy in patients with T1D and T2D. A total of 144 patients with T1D participated and data were gathered using the short test of Functional Health Literacy (S-TOFHLA) that consists of 40 items. The study revealed that most patients with T1D had adequate health literacy (82.6%).

Living in countries that are politically unstable and are in wars predispose patients with chronic illness to short- and long-term health complications (Sarhan et al., 2022). Health literacy helps adolescents overcome these complications. A Palestinian study performed by Sarhan et al. (2019) revealed that adolescents lack information important to their health and are prone to unhealthy lifestyles. Also, it emphasized the importance of being literate for adolescents.

In Palestine, a study aimed to assess health literacy in adolescents was executed by Sarhan et al. (2020). Cross-sectional research was performed to update the health literacy assessment scale for adolescents (HAS-A) to Arabic language (HAS-A-AR) and Palestinian background and to determine its validity among 1200 adolescents. The result indicated a high level of functional health literacy (read and understand health information) (80%), 55% of adolescents had a low level of interpersonal communication literacy.

To sum up, despite the large number of studies that explored health literacy, most of them targeted the adult population. Limited studies assessed health literacy in adolescents and yielded different levels of health literacy. Unfortunately, one study targeted adolescents with T1D. In Palestine, one study investigated health literacy among healthy adolescents.

2.3.3. Level of Self-care Behaviors

Orem's self-care deficit theory, developed in 1971, defined self-care as the execution of actions that individuals initiate and perform to preserve their life, health, and well-being (Chien et al., 2007). Martínez et al. (2021) defined self-care as the individual capacity to care for themselves through awareness, self-control, and self-reliance to achieve, preserve, or promote optimal health and well-being. Self-care in T1D refers to all activities aimed at supporting optimal health while living with T1D (Shiel et al., 2023). Many studies agree that these practices include blood glucose checks regularly, insulin treatment adherence, regular physical activity, and proper diet (Elissa et al., 2017; Lee et al., 2024; Vardanjani et al., 2020).

Self-care behaviors are the cornerstone management of T1D (Diab & Hussein, 2023; Montali et al., 2022). Suitable self-care has many benefits including improvement of health outcomes (such as lower rates of hypo/hyperglycemia), a better quality of life, and increased satisfaction which results in less use of health services and fewer visits to outpatient clinics. Overall, self-care behaviors reduce short- and long-term consequences of uncontrolled glucose levels (Masoumi & Shahhosseini, 2019; Montali et al., 2022; Vardanjani et al., 2020). Inversely, improper self-care increases mortality and morbidity (Alkaiyat et al., 2020).

Considering that self-care is performed by the patient (Asghari et al., 2023; Masoumi & Shahhosseini, 2017), diabetes self-care adds more demands and challenges to a sensitive developmental period (Montali et al., 2022). Adolescence is characterized by rapid physical, biological, and psychosocial changes which affect self-care. In addition, they tend to deal with their illness through judgment (Asghari et al., 2023). Therefore, the decline in self-care behaviors is obvious in adolescence (Lee et al., 2024; Oluchina, 2022).

A qualitative study that adopted the grounded theory approach was conducted in Palestine to explore adolescents' adaptation to T1D. Fourteen adolescents with T1D were interviewed and data was analyzed using a constant comparative method. The findings

showed poor adaptation among participants as they were suffering from difficult experiences. In addition, adolescents had many difficulties in managing their diabetes including dietary management and control of HbA1c levels (Harazneh et al., 2024).

Also, Fereidooni et al. (2024) designed a descriptive-analytical cross-sectional study depending on Orem's Self-Care Theory to explore self-efficacy, self-care, and health deviation self-care requisites among 341 Iranians with T2D. Participants were invited to complete the Summary of diabetes self-care activities measure (SDSCA) which consists of 13 questions regarding self-care activities such as diet and blood sugar control. The results showed that 47.1% of the participants had average levels of self-care behaviors.

In Jordan, the level of adherence to diabetes management in adolescents was assessed in a descriptive, correlational study conducted by Sabbah et al. (2024). A total of 109 children and adolescents were recruited using convenience sampling in a major diabetes hospital in Amman. The data were gathered using the Diabetes Management Questionnaire (DMQ), which comprised of 21-items. The findings showed a mean score of 61.45 (SD ± 15.75). Also, the study approved the decline of self-care management in adolescents compared to children as the DMQ score was lower in adolescents aged > 13 than children aged < 13 (58.92 vs. 63.66, respectively).

In a randomized control trial study in Italy, O'Donnell et al. (2023) recruited 109 adolescent-caregiver dyads to investigate the effect of behavioral interventions on improving health outcomes in adolescents with T1D. The study described HbA1C, self-care behaviors, and biological indicators of complications as primary and secondary outcomes. The Diabetes Self-Management Profile- Self Report (DSMP-SR) questionnaire was used to assess self-care behaviors as baseline data. The findings showed a mean of 49.8 (SD=10.6), which indicated poor self-care behaviors.

A Jordanian study was performed by Aljawarneh et al. (2023) among 74 adolescents with T1D to investigate various variables including regimen adherence and its effect on glycemic control. The Summary of Diabetes Self-Care Activities (SDSCA) scale which comprised eight items was used. The findings found that the mean of adherence was 38.09 (SD ± 8.86), which was slightly higher in males than females.

In Egypt, a cross-sectional study was carried out by Diab and Hussein (2023) to assess self-care behavior in children with T1D. One hundred and ninety-three participants aged

between 10-16 years were enrolled and the Diabetes Self-Care Ability Questionnaire (DSCAQ) which comprised 36 items was employed. The findings stated that 58.1% of participants had unsatisfactory levels related to insulin management. Also, participants showed unsatisfactory behaviors regarding follow-up (58.4%). Likewise, they had an unsatisfactory level regarding blood glucose monitoring (46.1%). Otherwise, 55.9% of them had a satisfactory level of personal hygiene and foot care. Another cross-sectional Egyptian study conducted by El-Radad et al. (2023) recruited 320 patients with T2D to assess diabetes self-care and glycemic control. The study adopted the SDSCA-Ar scale to explore the level of diabetes self-care. The result revealed an unsatisfactory level of self-care activities with a mean score of 27.65 (SD±5.96).

In developed countries, as obesity in children and adolescents and T1D are interrelated, Calella et al. (2023) designed a cross-sectional study to compare self-care behaviors (e.g., diet, lifestyle habits, and physical fitness) between several weight categories of Italian adolescents with T1D (N=74). The KIDMED Scale which consisted of 16 items distributed between positive food habits and negative food habits was used to assess adherence to the Mediterranean diet. In addition, Also, the short form of the International Physical Activity Questionnaire in Adolescents (IPAQ-A) to assess physical activity levels. Also, the Health Behavior in School-aged Children questionnaire was adopted. As a result, adolescents were classified into 3 groups: normal weight (n=22), overweight (n=37), and obese (n=15). For diet adherence, the medium score was 5.9 (SD± 3.1) indicating medium adherence. Regarding physical activity, 7.75 hours a week were spent on physical activity among the three groups. Additionally, no differences were noted in each measured variable between groups.

Moreover, Oluchina (2022) enrolled 96 adolescents with T1D in a quasi-experimental study in two hospitals in Kenya. The participants aged 10-19 years were recruited by a stratified random sampling method and divided into two groups: experimental and control. The Summary of Diabetes Self-Care Activities (SDSCA) questionnaire was adopted to assess self-management behaviors in baseline data and after seven months of an educational program. The findings showed inadequate self-care behaviors at the pre-test in the intervention group and control groups. The levels of physical activity were adequate in both

groups. However, the intervention group had adequate self-care behaviors after the educational program.

In Ethiopia, Geneti et al. (2022) conducted a cross-sectional study purposed to assess the level of adherence to diabetes self-management among adolescents with T1D in the outpatient clinics of public hospitals. Four hundred and fourteen adolescents completed the Diabetes Self-Management Profile Self-Report (DSMP-SR) questionnaire. The study revealed that diabetic self-management was poor in 52.7% of participants (CI:95% 0.47-0.57). Also, adherence to diet management was the lowest (56.8%).

During the pandemic of COVID-19, Paulsamy et al. (2021) performed cross-sectional research to explore self-care behaviors and self-efficacy in T2D during the pandemic in India. Two hundred participants were selected via convenient sampling and asked to complete the SDSCA scale to measure self-care behaviors during the last week (7 days) in many aspects of the diabetes routine. Results showed the lowest score was for exercise and 25.54% of participants were smokers, in addition, the mean of self-care behaviors was 4.56 (SD=2.61), reflecting moderate levels.

Furthermore, Harrington et al. (2021) conducted a study aimed to investigate diabetes self-management. Three hundred and one adolescents completed the Diabetes Management Questionnaire (DMQ) which consists of 20 items. The findings revealed a mean score of diabetes management adherence was 73 (SD±16), which higher scores indicated higher adherence. Also, Şahin et al. (2021) examined the medical adherence levels in 207 Turkish participants with T2D. Morisky Medication Adherence Scale (MMAS) was adopted to assess medication adherence. The findings revealed that 84.1 % had a medium level of medication adherence.

In Palestine, Alkaiyat et al. (2020) evaluated self-care behaviors among patients with T1D. One hundred and twenty-six participants completed the Self-Care Inventory scale (SCI) which comprised 14 items. The participants were categorized into three groups: children, adolescents, and adults, where self-care behavior scores were as follows: M=61.33 (SD±11.25), M= 52.06 (SD±16.83), and M= 46.64 (SD±13.81), respectively. This result suggested that self-care behaviors decline with age. Also, this study showed that medication adherence (79%) was higher than diet (11%) and exercise (21%). High scores were found in follow-up with clinical appointments and having sweets to manage sudden hypoglycemia.

Oluma et al. (2020) assessed the self-care behaviors among 398 patients with T2D in Ethiopia. A Diabetes Self-Management Questionnaire (DSMQ) was used for gathering data. The findings revealed that 20.4%, 51%, and 28.6% of the patients demonstrated good, fair, and poor self-care behavior, respectively. Furthermore, in Turkey, Yetim et al. (2018) conducted a study to explore health risk behaviors and their effects on glycemic control among adolescents with T1D. The data collection tool comprised 35 items derived from "Health Behavior in School-aged Children" (HBSC) study international questionnaire. A total of 210 adolescents were enrolled in the study. The results indicated that the prevalence of adolescents practicing exercises for 60 minutes daily was 16%, eating fruits, eating vegetables, smoking cigarettes, and consuming sugars was 51%, 35.7%, 9.1%, and 22.9%, respectively, which indicated an unhealthy lifestyle.

In Sudan, a cross-sectional study by Amer et al. (2018) aimed to explore the effect of management self-efficacy on self-care behaviors among patients with T2D. The Revised Summary of Diabetes Self-care Activities (SDSCA) was adopted. Participants were asked to highlight the number of days in the last week in which they performed self-care behavior. The results showed that participants were adherent to medication more than other self-care behaviors (69.4%), and the lowest adherence was for physical exercise (17.6%). Additionally, Tharek et al. (2018) adopted the Summary of Diabetes Self-Care Activities Scale (SDSCA) Malay version to measure self-care behavior levels among 340 Malaysian patients with T2D. The findings reflected a moderate level of self-care behavior with a mean of 3.76 (SD±1.87). In addition, blood glucose monitoring was the lowest practiced and diet restriction was the highest.

Elissa et al. (2017) conducted qualitative research to investigate the experience of children with T1D and their parents in the Palestinian West Bank. Face-to-face interviews with 10 adolescents and their parents showed negative thoughts and attitudes. Most adolescents feel stigmatized, and they tend to keep their diabetes a secret to be socially accepted, which results in avoiding self-care behaviors.

A prospective study in Taiwan explored the influence of some variables including self-care behaviors on HbA1C levels after six months of baseline measurement in adolescents with T1D. Two hundred and ten participants were categorized into three age groups: 10-12, 13-15, and 16-18 years. The results showed that the mean scores of self-care behaviors were

as follows: 26.15, 25.11, and 23.35 for age groups 10-12, 13-15, and 16-18, respectively. These findings are consistent with other research showing that self-care behaviors decline with aging (Lee et al., 2015).

Moreover, Mehta et al. (2015) enrolled 302 children using convenience sampling to test self-care management using the Diabetes Management Questionnaire. The mean score of self-care management was 70.6 (SD± 12.9), which indicated poor self-care management. Also, adolescents had poor self-care management more than children (M=68 vs. M=73.7, respectively).

2.4. Correlating Factors and Predictors of Self-Care Behaviors

Many studies evaluated the factors affecting self-care behaviors among adolescents with T1D including health literacy and self-efficacy. Bandura clarified that a strong positive relationship existed between self-efficacy and self-care behaviors. Self-efficacy may predict behavioral change, continuity of change, and facing challenges and barriers to achieving the desired change (Bandura, 1995).

Fereidooni et al. (2024) designed a descriptive-analytical cross-sectional study depending on Orem's Self-Care Theory. The study aimed to explore the relationship between self-efficacy, self-care, and health deviation self-care requisites among 341 Iranians with T2D. The results suggested that self-efficacy was a main predictor of self-care behaviors. In addition, the study proved that self-efficacy was responsible for 54% of the changes in self-care behaviors.

Another cross-sectional study was performed in Ethiopia by Geneti et al. (2022) to assess the level of adherence to diabetes self-management among adolescents with T1D and the associated factors. The results showed a significant relationship between self-efficacy and diabetic self-management (AOR=8.7, 95% CI:1.9–14.1, $p < 0.01$). Moreover, Alvarado-Martel et al. (2019) confirmed that self-efficacy was one of the main factors affecting adherence to self-care behaviors in patients with T1D.

A cross-sectional study carried out by Amer et al. (2018) aimed to explore the effect of management self-efficacy on self-care behaviors among patients with T2D in Sudan. The findings revealed the important role of self-efficacy on self-care behaviors across

lifestyle changes. Additionally, Tharek et al. (2018) proved the positive correlation between self-efficacy and self-care behaviors ($r= 0.538$, $p < 0.001$) in their cross-sectional study, which involved 340 patients with T2D recruited from primary care settings in Malaysia.

Also, Karimy et al. (2018) carried out a cross-sectional study to assess the correlation between self-efficacy, attitude, and social support with commitment to self-care behaviors. The study included 403 patients with diabetes from Iran. The study revealed that patients with higher self-efficacy scores had better self-care behaviors. In addition, self-efficacy was the most essential predictor of self-care behaviors.

Moreover, Noser et al. (2017) proposed that adolescents with high self-efficacy demonstrated better self-care behaviors despite high family conflict as they are more confident in their abilities in dealing with challenges. Another cross-sectional study was performed by Balesbaneh et al. (2014) to test the correlation between self-care behaviors and self-efficacy in Iranian adolescents with T1D. Fifty adolescents completed the data through interviews. The finding revealed an apparent link between self-care and self-efficacy ($p < 0.001$).

Regarding health literacy, studies had conflicting results on its effect on self-care behaviors. In a systematic review study by Riemann et al. (2021) aimed to investigate the relationship between health literacy and its outcome among pediatrics with chronic diseases, a positive correlation was found in only one study of three studies. Also, no study showed a positive relationship between health literacy and treatment adherence. In contrast, Guo et al. (2021) designed a cross-sectional study on 650 healthy adolescents. This study revealed that health literacy had a significant mediating role in predicting self-care behaviors. In addition, Suksatan et al. (2021) found that health literacy was correlated positively with self-care behavior in patients with T2D ($r= 0.90$, $p < 0.001$).

Other factors that may influence self-care behaviors among adolescents with T1D have been examined in the literature. In a recent study by Sabbah et al. (2024), family income was strongly associated with compliance with diabetes care. Also, Masoumi and Shahhosseini (2017) proposed a relationship between family income and diabetes self-care. On the contrary. Ogugua et al. (2021) suggested no relationship between family income and diabetes self-care.

It has been suggested that a longer duration of diabetes was associated with poor self-care behaviors (Ogugua et al., 2021; Sabbah et al., 2024). On the other hand, Diab and Hussein (2023) concluded that a positive correlation existed between the duration of diabetes and self-care behaviors. variables. Furthermore, Mohammad et al. (2020) highlighted the importance of a mother's educational level in diabetes management.

Increasing age was associated with less adherence to self-care management (Geneti et al., 2022). In contrast, Diab and Hussein (2023) showed a positive correlation between age and self-care behaviors. Literature exploring the effect of gender on self-care behaviors is scant. Some revealed that no role for gender in self-care behaviors (Ogugua et al., 2021), while others approved that females were more adherent to self-care behaviors (Alkaiyat et al., 2020; Yari et al., 2023).

A study by Mahdilouy and Ziaeirad (2019) showed a significant correlation between self-care behaviors and place of residence and HbA1c, while Alkaiyat et al. (2020) found no relationship existed between the two variables.

2.5. Gaps in the Previous Studies

Numerous research has been done to assess the levels of health literacy, self-efficacy, and self-care behaviors among patients with diabetes; however, the majority of these studies were performed internationally, with relatively few conducted in the Middle East, and the fewest were conducted in Palestine.

The previous studies adopted different methodologies to assess study variables; cross-sectional, narrative review, correlational descriptive studies, scoping review, comparative, qualitative, and systematic review designs, experimental, and quasi-experimental. Most of them showed a good level of self-efficacy among the target population. The majority of these studies revealed moderate levels of health literacy. It is important to mention that only one study assessed health literacy in adolescents with T1D. Some studies showed poor self-care behaviors, however, most of them revealed moderate to good levels.

Moreover, the existing evidence on the relationship between self-efficacy, health literacy, and self-care behaviors among adolescents with T1D is scarce. A few studies agreed on the positive influence of self-efficacy and health literacy on self-care behaviors. Also, few

studies examined the correlation between demographic variables and self-care behaviors, such as age, sex, monthly income, family educational level, duration of diabetes, and place of residence, in addition to HbA1c.

In Palestine, the war conditions add more challenges to patients with chronic illness, such as difficulty in reaching the clinics, and unavailability of HbA1c test most of the time. Palestinian adolescents with T1D are experiencing many difficulties regarding diabetes management and many of them had no adherence to diet therapy and difficulty in controlling HbA1c (Harazneh et al., 2024). In addition, Alkaiyat et al. (2020) illustrated the high prevalence of non-adherence to self-care behaviors especially in diet and exercise. Furthermore, many patients prefer to avoid essential self-care behaviors for not being stigmatized or judged (Elissa et al., 2017). Also, Sarhan conducted three studies regarding health literacy in Palestinian adolescents. Sarhan et al. (2019) explored the low levels of health literacy among Palestinian adolescents in their qualitative study. Also, Sarhan et al. (2020) conducted psychometric properties for translated health literacy assessment scale for adolescents into Arabic. Moreover, Sarhan et al. (2023) performed a scoping review which demonstrated that most adolescents had high level of functional health literacy and low level in other aspects.

To the best of our knowledge, no research has been performed yet in Palestine nor the most countries assessed the levels and the relationship between all interrelated variables (health literacy, self-efficacy, and self-care behaviors) among adolescents with T1D. This study is the first study that was conducted to fill out the gap in previous research.

Chapter Three: Methodology

This chapter discusses the study methodology involving the study design, setting, population, and sample. In addition to explanation of data collection methods, measures, and data analysis.

3.1. Study Design

The study adopted a cross-sectional, descriptive correlational design. This design has many positive aspects; it is an effective way to collect comprehensive data about common health conditions, so, it is suitable for national surveys, determining the associations between variables, it is cost-effective, and it can be performed quickly (Djannatian & Valim, 2018).

3.2. Study Population, Sampling Method, and Sample

The target population in this study included all adolescents aged 14-18 years who have T1D in Palestine. The accessible population was all adolescents with T1D who met the inclusion criteria. According to the Palestinian Ministry of Health, the total number of patients with T1D in Palestine was 980 and the number of adolescents was 404 in 2022 (Ministry of Health, 2023)

The convenience sampling method and snowball sampling were adopted in the process of data collection. Participants were initially supposed to be recruited from all primary health care settings in Palestine, Palestine Medical Complex outpatient's endocrine and medical clinics. With the continuation of the war, Gaza was excluded. Additionally, due to the difficulty in reaching to Jenin in the presence of recurrent heavy assault, Jenin was excluded. So, primary healthcare settings in Al-Quds, Ramallah, Nablus, Tulkarem, Hebron, Tubas, Jericho, Salfit, Beit-Lahm, and Qalqilya were included.

The sample size was calculated using the G*power (3.0.10) software program with an alpha of 0.05, effect size of 0.15, and power of 0.90 with 10 predictors (age, gender, parents' educational level, monthly family income, residence, duration of diabetes, HbA1c, self-efficacy, and health literacy). According to regression, a total sample of 147 adolescents was

required to complete the study. An additional 10% of participants were added to avoid incomplete questionnaires.

The participants were selected based on the following criteria: a) aged 14-18 years old, b) diagnosed with T1D for at least 6 months, and c) willing to participate in the study. The study excluded adolescents who have a cognitive impairment, can't read or write, and suffer from other diseases.

3.3. Study Setting

The study was performed in the West Bank and Jerusalem/Palestine. In addition to Gaza, the West Bank and Jerusalem are portions of Palestinian territories. Nevertheless, Palestine has been under military occupation since 1948 till now (Ministry of Foreign Affairs and Expatriates, 2024). According to the Palestinian Central Bureau of Statistics (2022), the Palestinian population is approximately 5.48 million with a third of its population under the age of 14. There are 493 primary health care clinics of the Palestinian Ministry of Health distributed in the cities and villages of Palestine. Follow-up visits of patients with T1D patients to primary health care clinics were 17.187 visits in 2022 (Ministry of Health, 2023).

The study was conducted in diabetic clinics in Palestine Medical Complex outpatient clinics, which is the public hospital in the central region of Palestine (Ramallah); In addition to primary health directorate in cities and some primary health care clinics in villages.

Palestine Medical Complex (PMC) is the largest governmental hospital in the West Bank located in Ramallah city. It was previously named Ramallah Hospital (established in 1963). In 2010, the hospital was expanded to include additional buildings and wards. It includes 312 beds distributed in 5 buildings (wings): Ramallah Wing, Emergency Wing, Bahrain Pediatric Wing, Kuwaiti Specialized Surgery Wing, and Dialysis Wing. It includes also the National Central of Blood Diseases- Hippocrates and Blood Bank. PMC provides its services not only for the local population but also receives referrals from other hospitals. It delivers a variety of services; adult and pediatric cardiovascular surgery, kidney transplantation, neonatal care, maternity care, dialysis, general surgery, emergency services, outpatient clinics, cardiac catheterization, physiotherapy, radiology, pharmaceutical and thalassemia services (Ministry of Health, 2024).

In addition to PMC, Ramallah has the largest number of primary healthcare settings due to the geographical and population distribution. It has nearly 53 primary healthcare clinics. In contrast, the Health Directorate of Jericho and Al-Aghwar has only 10 clinics, which is the lowest. In general, primary health care settings offer a variety of services which are provided for acute and chronic cases. Most health directorates include many sections, pharmacy, laboratory, radiology, in addition to specialized clinics. These directorates involve diabetes, orthopedic, diabetic foot, psychiatric, family medicine, immunization, and medical clinics.

3.4. Study Instruments

A self-structured questionnaire was utilized for data collection and consisted of the following parts:

3.4.1. Demographic data which includes *(*Appendix 1)**:**

- Age: refers to age in years, where ages from 14-15 considered as young adolescents, and 16 and above considered as older adolescents.
- Gender: refers to male or female.
- Father's educational level: refers to the highest level of formal education that has been completed by the participant's father.
- Mother's educational level: refers to the highest level of formal education that has been completed by the participant's mother.
- Monthly family income: refers to monthly salary expressed in Israeli Shekel.
- Place of residence: means where the participant lives. It could be a city, village, or camp.
- Duration of diabetes: refers to the length of time the participant has been suffering from diabetes.
- Last HbA1c level: refers to the most recent measurement of a participant's Hemoglobin A1c (HbA1c).

3.4.2. Self-efficacy for Diabetes Scale (SED). The SED scale was developed by Allen et al. (2018) to evaluate adolescents' capabilities related to diabetes situations. It comprised 35 items distributed on three subscales: SED-D which is diabetes-specific (24 items); SED-M which is related to medical situations (5 items); SED-G which is for general situations (6 items). This scale is rated on a 4-point scale ranging from "very sure I can't" to "very sure I can" on each item. The total score ranged from 35 to 140 and it classified as follows: 0-35 indicated very poor self-efficacy, >35 - 70 indicated poor self-efficacy, >70 - 105 indicated good self-efficacy, and >105 - 140 indicated very good self-efficacy (Allen et al., 2018) (Appendix 1). This original scale is valid and reliable, with a Cronbach α of 0.90 (Allen et al., 2018). The Arabic version that is valid and reliable with a Cronbach α of 0.84 was adopted (Mohammad et al., 2020) (Appendix 2). Furthermore, Cronbach α of SED in this study was 0.878.

3.4.3. Diabetic Health Literacy Scale. This scale was created by Liu et al. (2018) to assess health literacy in adolescents with diabetes. The tool measures different aspects of numerical, informational, and communicative health literacy. It consists of 15 items that responded on a 5-point Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree) (Tefera et al., 2020). The total score was calculated as average as follows: 1-2.33 (low health literacy), > 2.33-3.66 (moderate health literacy), and > 3.66-5 (high health literacy) (Tefera et al., 2020) (Appendix A). The original tool has validity and reliability with a Cronbach α of 0.91 (Lee et al., 2018).

Because Arabic is the native language of the participants, the health literacy scale was translated into Arabic and back translated to English. Then, the Arabic version was examined by an expert who has a Ph.D. in Arabic language. To ensure that the items matched with the study purposes, content validity was assessed using the content validity index (CVI) (Appendix 3). The Arabic scale was sent to a jury consisting of five experts in diabetes and endocrine; the experts revealed that CVI was 1. Additionally, a pilot study was conducted on adolescents (N=20) to ensure the clarity, understanding, and comprehensibility of the scale items. The results revealed that the scale is clear and understandable, in addition, the required time to fill out the questionnaire ranged from 15 to 20 minutes. The reliability was also evaluated using internal consistency, where Cronbach's alpha for health literacy in the current study was assessed twice, on the pilot group and the total participants. The Cronbach α of

Health Literacy Scale on the pilot sample was 0.841 and 0.832 on the total participants in this study (Appendix 2).

3.4.4. Self-care Inventory (SCI). This inventory was designed by La Greca, (1992) to assess self-care practices for T1D. It consists of 14 items corresponding to the key elements of the treatment regimen for T1D. The items of this scale were distributed as follows: item #3 (ketone testing), item #4 (administering the correct dose of insulin), item #11 (come in for appointments), items 1, 2, and 6 (blood glucose regulation), Items 5, 7, 8 and 9 (Insulin and Food Regulation), Items 13 and 14 (Exercise), and items 10 and 12 (emergency precautions). Only 10 items (1, 2, 5, 7, 8, 9, 10, 12, 13, and 14) were calculated. The other four items including item#3 (ketone testing), item#4 (administering the correct dose of insulin), item #6 (insulin adjustment) and # 11(adhere to clinic appointments) were excluded. Items rated on a 5-point Likert scale extended from 1(never do it) to 5 (always do this as recommended without fail). The cutoff value of this scale was 34, where $\leq$ 34 indicated low self-care behaviors and > 34 reflected high self-care behaviors (La Greca et al., 1992). This inventory is valid and reliable with a Cronbach's α of 0.80 in children and adolescents (La Greca et al., 1995). The Arabic version of this scale is valid and reliable with Cronbach α of 0.737 adopted (Alkaiyat et al., 2020) (Appendix 2). Also, the Cronbach α of SCI in this study was 0.921.

3.5. Ethical Considerations

Approval was obtained from the Institutional Review Board (IRB) of Arab American University (Appendix 5), and the ethical committees of the Palestinian Ministry of Health. Additional approvals from the selected primary health directorate and Palestine Medical Complex were obtained to facilitate data collection in the outpatient clinics. Informed consent was signed by the participants' guardians (Appendix 4). Participants were asked not to mention their names or any information about their identity to maintain confidentiality during the study. The participants and their guardians were informed that they had the right to withdraw at any time during the study without any harm and could return an incomplete survey. All data was stored safely in a coded file.

3.6. Data Collection Procedures

The data collection procedure started by obtaining the required approvals from the selected healthcare settings. Then, planned meetings with the executive managers and head nurses in the healthcare settings, and with doctors and nurses in the diabetic clinics were conducted. Then, meetings were held with the participants and their guardians during the follow-up visits to fill out the questionnaires. The questionnaires were distributed to eligible participants and interviews were performed with participants who need assistance. Moreover, the questionnaires were collected by the researcher on the same day after filling out. The data collection period was prolonged because of the political conditions; it began on the 20th of February to 1st of June, 2024.

3.7. Data Analysis

The data were entered into the SPSS 26.0 software program. Then, this data was checked for missing values and normality. As a result, no occurrences of missing data were detected for the items measured. To test the normality of constructs, descriptive statistics of skewness and kurtosis coefficient and Kolmogorov–Smirnov test. The skewness and kurtosis statistics were over standard error scores between -1.96 to 1.96 (Field, 2013), and Kolmogorov–Smirnov test demonstrated that all constructs showed normal distributions.

Descriptive statistics (frequencies, percentages, mean, and standard deviation) were used to describe study variables. Pearson**'**s and point biserial correlation tests were used to examine the relationship between variables. Multiple linear regression was adopted to assess the predictors of self-care behaviors. Also, a t-test was used to examine the differences in study variables according to gender. The p-value was set at ≤ 0.05 to be significant.

3.8. Summary

This research was executed using a cross-sectional study. The target population was adolescents with T1D. All adolescents with T1D who attended the primary health care settings and outpatient clinics of PMC and met the inclusion criteria were included in the

study. A self-reported questionnaire was adopted in the data collection process which includes the following tools: SED, Health Literacy Scale, The Self-Care Inventory scale (SCI), and demographic data. Inferential and descriptive analyses were used to analyze data and find the correlations between variables. The correlations were significant at p-value $\leq$ 0.05.

Chapter Four: Results

This chapter displays the results of the study about self-efficacy, health literacy, and their effect on self-care behaviors among adolescents with T1D in Palestine. Moreover, this chapter shows the findings of the current study based on research questions.

4.1. Demographic Characteristics of the Study Sample

A total of 162 questionnaires were distributed to the adolescents and 156 were returned with a response rate of 96.2%. Table 4.1 illustrates the demographic characteristics of the participants' with T1D, 61.5% were females and 38.5% were males. A total of 44.9% of the adolescents'' fathers had secondary education and 38.5% of their mothers completed university education. More than half of the participants (53.2%) live in villages. Almost 47% of the participants had HbA1c levels between 7.5-9.5%. The mean age of the participants was 15.66 (SD=1.53) with a range of 14-18 years and the mean family income was 4293.55 (SD=2469.257) Shekel with a range of 1000-12000. Also, the mean duration of the disease was 6.08 (SD=3.81) years with a range of 1-15 years.

4.2. Research Questions

4.2.1. Research Question One:

What are the levels of self-efficacy, health literacy, and self-care behaviors among participants?

Regarding self-efficacy, the results showed that 71.2% of participants had very good self-efficacy with a mean of 108.80 (SD=14.92) which indicated they had high self-efficacy levels. Concerning health literacy, 72.4% of the participants demonstrated low health literacy (M= 2.12, SD=0.78), which reflected the low level of health literacy among participants. Regarding self-care behaviors, 50% of participants showed low self-care with a mean of 33.82 (SD=7.76), which represents the low self-care behaviors concerning T1D.

Table 4.1. Demographic characteristics of the participants (N= 156)

Characteristic	Categories	n	%
Gender	Male	60	38.5
	Female	96	61.5
Fathers' educational level	Elementary	18	11.5
	Preparatory	29	18.6
	Secondary	70	44.9
	University	39	25.0
Mothers'educational level	Elementary	18	11.5
	Preparatory	29	18.6
	Secondary	49	31.4
	University	60	38.5
Residence	Village	83	53.2
	City	58	37.2
	Camp	15	9.6
Last HbA1c	5 < 7.5%	22	14.1
	7.5-9.5%	73	46.8
	> 9.5-11.5%	30	19.2
	> 11.5-13.0%	18	11.5
	> 13%	13	8.3
	Mean (SD)		
Age	15.66 (1.53)		
Family income/month (Shekel)	4293.55 (2469.257)		
Duration of disease (year)	6.08 (3.81)		

N/n: number; %: percentage; M: Mean; SD: Standard Deviation

Table 4.2. Levels of the study variables

Characteristic	Categories	n (%)	M(SD)
Self-efficacy	36 -70 (poor)	4 (2.6)	108.80 (14.92)
	71 – 105 (good)	41 (26.3)	
	106 – 140 (very good)	111 (71.2)	
Health literacy	M= 1 – 2.33 (Low)	113 (72.4)	2.12 (0.78)
	M= < 2.33- 3.66 (Moderate)	33 (21.3)	
	M= (< 3.66-5) (High)	10 (6.5)	
Self-care behaviors	≤ 34 (Low)	78 (50.0)	33.82 (7.79)
	> 34 (High)	78 (50.0)	

N/n: number; %: percentage; M: Mean; SD: Standard Deviation

4.2.2. Research Question Two:

What is the relationship between selected demographic characteristics (age, gender, parents' educational level, monthly family income, place of residence, duration of diabetes, and last HbA1c level), self-efficacy, health literacy, and self-care behaviors among participants?

Point-biserial correlation and Person's correlation tests were employed to determine the relationship between selected demographic characteristics, self-efficacy, health literacy, and self-care behaviors. Point-biserial correlation test was utilized to test the relationship

between categorical variables and continuous variables (gender, fathers' educational level, mothers' educational level, HbA1c, residence, and self-care behaviors). On the other hand, Pearson's correlation test was used to investigate the relationship between continuous variables (age, family monthly income, duration of diabetes, self-efficacy, health literacy, and self-care behaviors).

The statistical analyses showed that age negatively correlated with self-care behaviors ($r=-0.249$, $p< 0.01$). also, there was a negative correlation between last HbA1c and self-care behaviors (p.b. $r = -0.173$, $p<0.05$). Moreover, the findings confirmed the positive relationship between self-efficacy and self-care behaviors ($r = 0.396$, $p< 0.001$). Nevertheless, the results denied the relationship between health literacy and other study variables with self-care behaviors.

Table 4.3. Correlating factors of self-care behaviors

Variable	Self-care behaviors	
	p.b.r	p-value
Gender	0.055	0.489
Fathers' educational level	-0.025	0.753
Mothers' educational level	0.111	0.166
Residence	0.020	0.807
Last HbA1c	-0.173	0.031*
	r	p-value
Age	-0.249	0.002**
Family income/month	0.067	0.406
Duration of disease	-0.019	0.818
Self-efficacy	0.396	0.000**
Health literacy	0.010	0.904

p.b.r: point biserial correlation; r: Pearson correlation

* Significant at $p \leq 0.05$.; ** Significant at $p \leq 0.0$

4.2.3. Research Question Three:

What are the predictors of self-care behaviors among participants?

A multivariable regression analysis was used to explore the predictors of self-care behaviors. As illustrated in Table 4.4, the variables that correlated with self-care behaviors were entered into the model of predictors, including self-efficacy, age, and last HbA1c.The regression assumptions were verified, in which the variance inflation factor (VIF) and tolerance statistics were utilized to investigate the multi-collinearity. The collinearity is accepted if the VIF value is less than 10 and the tolerance value is more than 0.1. Also, the autocorrelation assumption was checked using the Durbin Watson (DW) coefficient, which in this study was 1.623. Regarding the regression model for independent variables (self-efficacy, age, and last HbA1c), the VIF and tolerance were in the normal range, which reflected a positive and acceptable autocorrelation.

As illustrated in Table 4.4, the variables that correlated with self-care behaviors were entered into the model of predictors, including self-efficacy, age, and last HbA1c.The complete model, which considered all influencing factors in self-care behaviors, was statistically significant ($p \leq 0.001$, $R = 0.478$, $R^2 = 0.229$, adjusted $R^2 = 0.213$). This stated that 22.9% of the variance in self-care behaviors was illustrated by the model.

The findings showed that self-efficacy was an influencing factor self-care behaviors ($\beta = 0.196$, $p < 0.001$). Also, the beta coefficient for self-efficacy was 0.091 representing that a one-point increase in self-efficacy was correlated with a 0.091 increase in self-care behaviors. Moreover, age was proved to be an influencing factor in self-care behaviors ($\beta = -1.256$, $p < 0.01$), and the beta coefficient for age was -0.714 representing that a one-point increase in age was correlated with a 0.714 decrease in self-care behaviors.

In contrast, the last HbA1c was not considered an influencing factor in self-care behaviors.

Table 4.4. Predictors of self-care behaviors

Predictor	b	B	t-test	p-value	95.0% CI	
					Lower	Upper
Self-efficacy	0.196	0.375	5.173	0.000	0.121	0.271
Age	-1.256	-0.248	-3.478	0.001	-1.969	-0.542
Last HbA1c	-0.743	-0.107	-1.482	0.140	-1.734	0.248
$R=0.478$, $R^2=0.229$, Adjusted $R^2=0.213$, $F=15.020$, $df=3$, $p=0.000$						

CI= Confidence Interval, b= Unstandardized beta, B= Standardized beta

* Significant at $p \leq 0.05$.; ** Significant at $p \leq 0.01$

4.3. Summary

A total of 156 adolescents with T1D completed a questionnaire. The findings revealed that the participants had very good levels of self-efficacy and low levels of health literacy and self-care behaviors. A significant positive correlation was found between self-efficacy and self-care behaviors. Furthermore, age and HbA1c negatively correlated with self-care behaviors. However, self-efficacy and age were the predictors of self-care behaviors.

Chapter Five: Discussion

This chapter discusses thoroughly the study findings according to the research questions, in addition to implications, limitations, recommendations, and conclusions.

5.1. Discussion of the Study Findings

The present study showed that participants had high self-efficacy. The result is consistent with literatures from Jordan (Masadeh et al., 2024), India (Aseela et al., 2024), Canada (Alwadiy et al., 2021), Ethiopia (Oluma et al., 2020), Brazil (Nass et al., 2019), Malaysia (Tharek et al., 2018), and U.S.A. (Noser et al., 2017). However, the finding contradicts with some studies that revealed moderate levels of self-efficacy conducted in Iran (Fereidooni et al., 2024; Hassanabad et al., 2024; Kerman et al., 2016), Turkey (Şahin et al., 2021), and Finland (Survonen et al., 2019), and one study conducted in Egypt that showed low level of self-efficacy (Mohammad et al., 2020).

Participants demonstrated high self-confidence during data collection phase which clearly appeared as high self-efficacy levels. Self-efficacy is affected by multiple factors such as social and behaviors factors (Schunk & DiBenedetto, 2021). Behavioral factors can be clarified in term of "mastery experiences", which refers previous successful accomplishment of a task. Mastery experiences is essential in developing self-efficacy (Kleppang et al., 2023). Considering the duration of diabetes for the participants of 6 years, they had enough experience in managing their diabetes, thereby expressing the high self-efficacy they had. Another factor that may contribute to this result is the social factor of the presence of peers (Kleppang et al., 2023). Peers could influence motivation and provide social support (Li et al., 2020). Another possible reason for this finding could be due to receiving high family support which plays a critical role in diabetes self-efficacy (Aseela et al., 2024).

Regarding health literacy, participants demonstrated low levels of health literacy as concluded in previous studies (Hassanabad et al., 2024; Kayalkar & Dmello, 2024). In contrast, other studies revealed moderate to good levels of health literacy (Chu-Ko et al., 2021; Gomes et al., 2020; Guo et al., 2021; Paakkari et al., 2020; Sarhan et al., 2023; Suksatan

et al., 2021). In Palestine, Sarhan et al. (2020) indicated that 80% of adolescents reported a high level of functional health literacy (read and understand health information) and 55% of adolescents had a low level of interpersonal communication literacy. The different levels of health literacy among studies could be related to the adoption of different measurement tools (Riemann et al., 2021). Also, many factors could influence health literacy such as gender, age, cognitive and social skills, family and peer groups, and educational level (Riemann et al., 2021). Considering that participants did not achieve a high educational level yet, their health literacy is suspected to be low. Kayalkar and Dmello, (2024) found that students with educational level below the 10^{th} grade had limited health literacy compared to older students. Chu-Ko et al. (2021) linked low health literacy in adolescents with low exercise levels. In addition, the economic status of countries affects levels of population health literacy, rural population have lower levels of health literacy than urban population (Asharani et al., 2021). Also, this result may be related to lack of awareness and health education training programs about T1D and lack of experienced staff to provide these programs to adolescents and their parents (Elissa et al., 2017).

The results showed that participants had poor self-care behaviors. This result is in line with other studies performed in Jordan (Sabbah et al., 2024), Italy (O'Donnell et al., 2023), Egypt (Diab & Hussein, 2023), Kenya (Oluchina, 2022), Ethiopia (Geneti et al., 2022), Palestine (Alkaiyat et al., 2020), Sudan (Amer et al., 2018), and Turkey (Yetim et al., 2018). In contrast, this finding is inconsistent with other studies conducted in Iran (Fereidooni et al., 2024), Italy (Calella et al., 2023), U.S.A (Harrington et al., 2021), Turkey (ŞAHİN et al., 2021), India (Paulsamy et al., 2021), Ethiopia (Oluma et al., 2020), Malaysia (Tharek et al., 2018), and Taiwan (Lee et al., 2015), which suggested moderate levels of self-care behaviors. There are a variety of factors contributing to low self-care behaviors among our participants. The developmental stage of adolescents is characterized by hormonal changes which could affect blood sugar levels (Alkaiyat et al., 2020). Additionally, behavioral changes involve increasing in independence, being headstrong, and making decision without judgmental logic (Harrington et al., 2021). Also, the stigmatization of our participants might lead them to hide their diabetes and avoid doing some self-care behaviors in front of others (Elissa et al., 2017; Harazneh et al., 2024). Chao et al. (2016) clarified variety of stressors that lead to low self-acre behaviors among adolescents such as painful injections, regulating diet as they are

observed by others, daily decision making, and remembering and getting reminded by others to check glucose that might affected our participants.

Additionally, the continuous conflicts and war conditions seem to be an important factor. Elissa et al. (2017) mentioned in their study that living with chronic illnesses like diabetes in an occupied area such as Palestine has a significant effect on self-care behaviors. The low economical condition in Palestine leads to limited essential supplies to health sector such as some diabetic medications and to the unavailability of essential laboratory tests most of the time such as HbA1c measures. Moreover, these conditions led to an increase in unemployment rates which affect the capacity of individuals to buy some supplies such as glucometers and glucosticks. Furthermore, military closures and barriers between villages and cities hinder the ease of access to health services such as diabetes clinics (Sarhan et al., 2019). Also, no educational programs have been designed to this target group due to lack of experienced healthcare professionals and resources (Elissa et al., 2017).

The current study examined select demographic variables in relation to diabetes self-care behaviors. The results showed that no differences in self-care behaviors existed between genders which is similar to the results of Ogugua et al. (2021) and Vardanjani et al. (2020). Conversely, Alkaiyat et al. (2020) and Yari et al. (2023) suggested that females were more commitment to self-care behaviors than males. While, Nejat et al. (2021) stated that males had more levels of adherence than females. In some cultures, females gain more social support than males which influence performing self-care behaviors. While, other cultures may provide more social support to males, which improves their self-care behaviors levels (Masoumi & Shahhosseini, 2019).

Age differences also play a significant role in self-care behaviors during adolescence. The findings of this study revealed that younger adolescents had higher self-care behaviors in comparison with older adolescents which confirmed the significant negative relationship between self-care behaviors and age. This finding is parallel with earlier studies conducted in Tanzania (Noorani et al., 2016), Ethiopia (Geneti, Wondwossen et al., 2022), Jordan (Sabbah et al., 2024), and Palestine (Alkaiyat et al., 2020). This finding could be interpreted as young adolescents receiving more social support and guidance from their parents that decreases with older age (Alkaiyat et al., 2020). Adolescents with older age become more independent and have more loyalty to their peers (Riemann et al., 2021).

In this study, the place of residence had no significant role in self-care behaviors as evidenced by Alkaiyat et al. (2020) and in contrast with Adhikari and Santosh (2021). In Palestine, there are no centralization for health services, as United Nations Relief and Works Agency for Palestine Refugees (UNRWA) provides its services in camps, health directorate in cities, and primary care settings in most villages (UNRWA, 2016).

Our findings revealed that there is no relationship between duration of diabetes and self-care behaviors. The result is similar to other studies (Alkaiyat et al., 2020; Ogugua et al., 2021) but incompatible with Sabbah et al.'s (2024) results which concluded that long duration of diabetes was associated with more adherence to self-care behaviors. Also, our result may be related to family involvement in the first period of the disease which decreases by time (Ogugua et al., 2021).

A significant negative relationship was found between HbA1c and self-care behaviors. Alkaiyat et al. (2020) reported that decreased HbA1c was associated with increased adherence to self-care behaviors. Dalal et al., (2020) concluded that satisfaction with care induces motivation to improve self-care behaviors, which suggests that HbA1c is a motivator to continue in good self-care behaviors. Also, one of the critical elements of self-care management among adolescents with diabetes is recognizing the proper self-care behaviors (Babazadeh et al., 2023).

Regarding family monthly income, this study is consistent with Ogugua et al. (2021) but it is opposite to Masoumi and Shahhosseini, (2017) and Sabbah et al. (2024). Sabbah et al. (2024) reported that the monthly average cost of diabetes is equal sometimes to monthly salary of some families in Jordan. Also, no association was found in the present study between parents' educational levels and self-care behaviors. In contrast, Alkaiyat et al. (2020) found that self-care behaviors are better in patients whose parents have higher degree of education. Our result could be due to participants' characteristics, where they had similar family income and educational levels.

Moreover, the findings showed the significant positive relationship between self-efficacy and self-care behaviors. This result is in line with studies conducted in Iran (Balesbaneh et al., 2014; Fereidooni et al., 2024; Karimy et al., 2018), U.S.A. (Noser et al., 2017), Malaysia (Tharek et al., 2018), Sudan (Amer et al., 2018), Ethiopia (Geneti et al., 2022), and Spain (Alvarado-Martel et al., 2019). Bandura, (1988) was a pioneer in

conceptualizing the concept of self-efficacy and clarified the importance of having certain psychological traits such as confidence and faith in capabilities to accomplish a task successfully in a specific situation. Self-efficacy enabled participants to set goals and achieve them (Bandura, 1995). Babazadeh et al. (2023) emphasized the importance of information about diabetes alongside self-efficacy in managing diabetes successfully. Self-efficacy plays a significant role in enhancing self-care and prevent complications (Babazadeh et al., 2023). High self-efficacy enables participants to overcome the challenges and cope with a long-term condition (Survonen et al., 2019).

Furthermore, no significant correlation was presented between health literacy and self-care behaviors, which is parallel with an earlier study (Riemann et al., 2021). In contrast, many studies suggested that health literacy had a positive correlation with self-care behaviors (Guo et al., 2021; Suksatan et al., 2021). Chu-Ko et al. (2021) stated that the inability of adolescents to analyze, evaluate, and judge health information might affect health behaviors. Considering the study participants had poor health literacy which could be reflected on self-care behaviors. Health literacy is considered as a barrier toward applying effective self-care behaviors (Diab & Hussein, 2023).

Self-efficacy was the main predictors of self-care behaviors addressed in the current study. Self- efficacy as a predictor was reported in previous studies (Alvarado-Martel et al., 2019; Amer et al., 2018; Fereidooni et al., 2024; Geneti et al., 2022; Karimy et al., 2018; Krishna & Boren, 2008; Vardanjani et al., 2020). Paulsamy et al. (2021) concluded that patients who have a strong faith in their capabilities in controlling their diabetes are competent at doing self-care behaviors. It is uniformed widely that self-efficacy is an essential psychological component that induces behavioral change and determines the maintenance and commitment to that change (Bandura, 1995). Over time, patients with diabetes gain knowledge and experiences, and their self-efficacy increases as they begin to believe that diabetes can be managed and controlled. However, low self-care behaviors in presence of high self-efficacy are related to lack of knowledge needed to practice the purposed self-care behaviors (Kong & Cho, 2020). In other words, adolescents who have the knowledge and required skills and have confidence in their abilities in managing diabetes in different situations are more likely to succeed than adolescents who have high self-efficacy and have no knowledge.

Age also was predictor of self-care behaviors; this result emphasizes the negative relationship as increasing in age is associated with decline in self-care behaviors. The result is in line with earlier studies carried out in Palestine and Jordan (Masadeh et al., 2024; Sabbah et al., 2024; Serhan et al., 2020). In contrast, the study of Diab and Hussein (2023) revealed that age was a positive predictor. In adolescents with T1D, increasing in psychological maturity led to an increase in self-care autonomy which results in poor self-care adherence (Wysocki et al., 1996). Leocadio et al (2023) suggested that interdependence (cooperation between family and other support systems is better than independence to avoid complications and deterioration in HbA1c.

5.2. Implications for Study

The current research provided primary information regarding level of health literacy, self-efficacy, and self-care behaviors among Palestinian adolescents with T1D, in addition to investigating self-care correlates among these participants. Moreover, this study is one of the first studies in Palestine and the Arab World which addresses all these concepts together. The result of the study showed the correlations between self-care behaviors and self-efficacy, age, and HbA1c. Relying on these correlations, and to enhance patients' outcomes, quality of life, and decrease burden of disease on individuals and communities, it is necessary to focus on the importance of adolescents with T1D to elevate their level in self-care behaviors. This requires the cooperation of all relevant agencies; health care providers, policymakers, families, educational institutions, and adolescents themselves. In addition, the findings may guide any future educational program or training sessions in order to increase self-efficacy and self-care behaviors among adolescents.

Administrators and managers, and those in positions of authority should design programs and interventions that target adolescents' adherence to diabetes management. Moreover, promoting strategies that enhance self-care behaviors commitment. Additionally, targeting families and peer groups in order to provide social support and motivation. It is essential to take into consideration the significance of highly competent adolescents in self-care behaviors, including the benefits for them, their families, health sector, and community.

A strategic intervention which could be applied are supporting presence of mobile clinics in remote areas, encourage health care providers to be specialized in chronic diseases especially diabetes, make efforts in supplying the necessary equipment and medications and make them available and affordable.

Future research and further investigation are recommended to address factors affecting self-efficacy among this population, investigating other correlates that could influence self-care behaviors in an occupied area.

5.3. Conclusion

The current study found that Palestinian adolescents with type 1 diabetes had high level of self-efficacy, low level of health literacy, and low level of self-care behaviors regarding their diabetes. A positive correlation was found between self-efficacy and self-care behaviors. In addition, there is a negative relationship between HbA1c, age, and self-care behaviors. Moreover, no correlation was found between health literacy and self-care behaviors. therefore, efforts must be made to maintain the high level of self-efficacy and improve level of self-care behaviors as this ensure better quality of life.

5.4. Recommendations

Depending on the findings of the current study, we suggest the following recommendation:

- Direct educational interventions to early adolescent stage as it is the suitable period for adopting healthy habits.
- Design periodic educational sessions in primary health care setting including practical practice to maintain high self-efficacy.
- Providing therapeutic education to increase level of motivation and discuss beliefs about diabetes.
- Increase health literacy levels of adolescents by incorporating health subjects into the curriculum of schools and universities.
- Planning a purposed physical education in school environment to make it a habit and of interest of adolescents.

5.5. Limitations

This study included these limitations:

- The data were gathered using self-reporting methods that could cause biases due to remembering and social desirability, consequently, may cause overestimation of the findings.
- The cross-sectional study made it impractical to reach the causal association between the independent variables and self-care behaviors.
- Some regions were difficult to reach because of the war conditions and barriers between districts.
- The study was conducted during 7th October war, which affect the psychological status of participants alongside the economic status, thereby affecting level of adherence to self-care behaviors.
- UNRWA clinics were not included in the settings of data collection, which impaired access to participants in camps who follows there.

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Appendices

Appendix (1)

English Version of the Questionnaire

Questionnaire: The Relationship Between Self-Efficacy, Health Literacy, and Self-Care Behaviors among Adolescents with Type-1 Diabetes in Palestine.

1. Personal, social, and demographic data:

- Age: ----------
- Gender: ----------
- Father's educational level: □ not-educated □ primary preparatory □ secondary □ university and post graduate
- Mother's educational level: □ not-educated □ primary preparatory □ secondary □ university and post graduate
- Monthly family income: ----------
- Place of residence: □ City □ Village □ Camp
- How long have you been suffering from diabetes? ----------
- Last HgA1C level: □ 7.5 □ 7.5-9.5 □ 9.5-11.5 □ 11.5-13 □ 13-14 □ >14

2. Self-efficacy for diabetes management Scale

Please read the following questions. After each question , please put acircle to show how much you think you can or can't do what is required of you now on the scale ranging from 1-6.

Items	Very sure I can't 1	Slightly Sure I can't 2	Slightly sure I can 3	Very sure I can 4
Self-efficacy specific to diabetes (SED-D)				
1. Be the one in charge of giving my insulin injection to myself				
2. Figure out my own meals and snacks at home				
3. Figure out what foods to eat when I am away from home				
4. Keep track of my own blood sugar levels				
5. Watch my own sugar levels in my urine				
6. Change the amount of time I get insulin when I get a lot of extra exercise				
7. Judge the amount of food I should eat before activities				
8. Figure out how much insulin to give myself when I am sick in bed				
9. Prevent having reactions				
10. Avoid or get rid of dents, swelling, or redness of my skin where I get my shot				

11. Suggest to my parents changes in my insulin dose				
12. Sleep away from home on a class trip or at a friend's house where no one knows about my diabetes				
13. Keep myself free of high blood sugar levels				
14. Know how to make my urine tests look better or worse than they are				
15. Avoid having acetones				
16. Feel able to stop a reaction when I am having one				
17. Tell a friend I have diabetes				
18. Prevent blindness and other complications from my diabetes				
19. Tell my boyfriend or girlfriend I am diabetic				
20. Get as much attention from others when my diabetes is under control as when it isn't				
21. Regularly wear a medical alert tag or bracelet which says I have diabetes				

22. Sneak food not on my diet without getting caught				
23. Believe that I have the ability to have control over my diabetes				
24. Run my life the same as I would if I didn't have diabetes				
Self-efficacy specific to medical situations (SED-M)				
25. Talk to my doctor myself and ask for the things I need				
26. Change my doctor if I don't like him/her				
27. Ask for help I need from other people when I feel sick				
28. Argue with my doctor if I felt he/she were not being fair				
29. Follow my doctor's orders for taking care of my diabetes				
Self-efficacy in general situations (SED-G)				
30. Play baseball or other sports that take a lot of energy				

31. Do things I have been told not to when I really want to do them				
32. Easily talk to a group of people at a party when I don't know them				
33. Make a teacher see my point of view				
34. Show my anger to a friend when he/she has done something to upset me				
35. Take responsibility for getting my homework and chores done				

3. Diabetic health literacy of the diabetic patients

Here is a list to measure health literacy. In the following table, please choose the answer by placing a check mark (√) next to the appropriate choice that represents your feeling towards how often you do the things mentioned below:

Diabetic Health Literacy Questions	**Strongly Disagree (%)**	**Disagree (%)**	**Neutral (%)**	**Agree (%)**	**Strongly agree (%)**
1.Read and understand educational materials and booklets					

Diabetic Health Literacy Questions	**Strongly Disagree (%)**	**Disagree (%)**	**Neutral (%)**	**Agree (%)**	**Strongly agree (%)**
2.Understand the written information provided at the appointment					
3.Comprehend the information I sought on diabetes					
4.Understand the information on diabetes management from the health-care provider					
5.Judge if diabetes-related information is reliable					
6.Alter the appointment date or time for a medical checkup					
7.Calculate the next time to take diabetes medication					

Diabetic Health Literacy Questions	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly agree (%)
8.Determine the carbohydrate content per serving from the nutrition label					
9.Interpret if my blood-glucose level is within the normal range					
10.Understand information on diabetes presented as probabilities, ratios, or on graphs					
11.Ask health professionals a question					
12.Explain my diabetes condition to a healthcare provider					
13.Convey the reason why I should have a diabetic diet					
14.Knowing and practicing the					

Diabetic Health Literacy Questions	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly agree (%)
appropriate storage conditions of diabetic medications					
15.Understand all diabetic-related medication information					

4. The Diabetes Self-Care Behavior Scale

Please rate each of the items according to HOW WELL YOU FOLLOWED YOUR

PRESCRIBED REGIMEN FOR DIABETES CARE in the past month. Use the following scale:

1 = Never do it

2 = Sometimes follow recommendations; mostly not

3 = Follow recommendations about 50% of the time

4 = Usually do this as recommended; occasional lapses

5 = Always do this as recommended without fail

NA = Cannot rate this item/ Not applicable

Items	1	2	3	4	5
1. Glucose testing					
2. Glucose recording					
3. Ketone testing					
4. Administering correct insulin dose					

5. Administering insulin at right time					
6. Adjusting insulin intake based on blood					
blood glucose values					
7. Eating the proper foods; sticking to meal plan					
8. Eating meals on time					
9. Eating regular snacks					
10. Carrying quick-acting sugar to treat reactions					
11. Coming in for appointments					
12. Wearing a medic alert ID					
13. Exercising regularly					
14. Exercising strenuously					

Appendix (2)

Arabic Version of the Questionnaire

دراسة حول: "العلاقة بين الكفاءة الذاتية، الثقافة الصحية، وسلوكيات الرعاية الذاتية لدى المراهقين المصابين بالنوع الأول من السكري في فلسطين."

1- البيانات الشخصية والاجتماعية والديموغرافية

- **العمر:** ----------
- **الجنس:** □ ذكر □ أنثى
- **المستوى التعليمي للأب:** □ أمي (غير متعلم) □ ابتدائي □ اعدادي □ ثانوي □ جامعة أو دراسات عليا
- **المستوى التعليمي للأم:** □ أمية (غير متعلمة) □ ابتدائي □ اعدادي □ ثانوي □ جامعة او دراسات عليا
- **دخل العائلة الشهري:** ----------
- **مكان السكن:** □ مدينة □ قرية □ مخيم
- **منذ متى تعاني من مرض السكري:** .....
- **مستوى آخر فحص تراكمي Hb1Ac:**

□ 7.5-5.0 □ 9.5-7.5 < □ 11.5 -9.5 <

□ 13.0 -11.5 < □ 14.0- 13.0 < □ 14.0 <

2- مقياس الكفاءة الذاتية لمرضى السكري

تعليمات: الرجاء قراءة الأسئلة التالية. بعد كل سؤال من فضلك قم بوضع دائرة لإظهار مقدار ما تعتقد أنه يمكنك أو لا يمكنك

فعل ما هو مطلوب منك الآن على المقياس الذي يتراوح من 1-6

الرقم	العبارة	متأكد جدا أنني لا أستطيع 1	متأكد قليلا أنني لا أستطيع 2	متأكد قليلا أنني أستطيع 3	متأكد جدا أنني أستطيع 4
	الكفاءة الذاتية للحالات الخاصة بمرض السكري				
1	أكن المسؤول عن إعطاء حقنة الأنسولين لنفسي				
2	أحدد وجباتي والوجبات الخفيفة في المنزل				
3	أحدد الأطعمة التي يجب تناولها عندما أكون بعيدًا عن المنزل				
4	أتتبع مستويات السكر في دمي				
5	أراقب مستويات السكر لدي في البول				
6	أقوم بتغيير مقدار الوقت الذي أحصل فيه على الأنسولين عندما أمارس الكثير من التمارين الإضافية				
7	احكم على كمية الطعام التي يجب أن أتناولها قبل القيام بالأنشطة				
8	اعرف كمية الأنسولين التي يجب أن أعطيها لنفسي عندما أمرض في الفراش				
9	أمنع حدوث ردود الفعل				
10	أتجنب أو أتخلص من الخدوش أو التورم أو الاحمرار في بشرتي مكان اعطاء الحقنة				
11	أقترح على والدي تغييرات في جرعتي للأنسولين				
12	النوم بعيدًا عن السكن في أي رحلة مدرسية أو في منزل صديق				

	حتى لا يعرف أحد بشأن مرضي السكري				
13	أحافظ على نفسي من ارتفاع مستويات السكر في الدم				
14	اعرف كيف أجعل اختبارات البول / الدم الخاصة بي تبدو أفضل أو أسوأ مما هي عليه				
15	اتجنب وجود الأسيتون				
16	أشعر بالقدرة على إيقاف رد الفعل عندما أواجهه				
17	أخبر صديقا أنني أعاني من مرض السكري				
18	منع العمى والمضاعفات الأخرى لمرض السكري				
19	أخبر صديقي المقرب /صديقتي المقربة بأنني مصاب بالسكري				
20	احصل على نفس القدر من الاهتمام من الآخرين عندما يكون مرض السكري تحت السيطرة كما هو الحال عندما لا يكون				
21	أرتدي بانتظام بطاقة تنبيه طبية أو سوارًا يشير إلى إصابتي بمرض السكري				
22	ألقي نظرة على الطعام الذي ليس على نظامي الغذائي دون الإمساك به				
23	أعتقد أن لدي القدرة على السيطرة على مرض السكري الخاص بي				

24	أدير حياتي بنفس الطريقة التي أديرها إذا لم يكن لدي مرض السكري				
	الكفاءة الذاتية للحالات الطبية				
25	اتحدث إلى طبيبي بنفسي واسأل عن الأشياء التي أحتاجها				
26	أغير طبيبي إذا كنت لا أحبه				
27	اطلب المساعدة التي أحتاجها من أشخاص آخرين عندما أشعر بالمرض				
28	أناقش طبيبي إذا شعرت أنه لم يكن عادلاً				
29	اتبع أوامر طبيبي للعناية بمرضي السكري				
	الكفاءة الذاتية للحالات العامة				
30	العب البيسبول أو الرياضات الأخرى التي تستهلك الكثير من الطاقة				
31	أفعل الأشياء التي قيل لي ألا أفعلها عندما أريد فعلها				
32	التحدث بسهولة إلى مجموعة لا أعرفها من الناس في حفلة او في أي مكان				
33	اجعل معلمي/ مدرسي يرى وجهة نظري				
34	أظهر غضبي لصديقي عندما يفعل شيئًا يزعجني				
35	أتحمل مسؤولية إنجاز واجباتي المنزلية وأعمالي المنزلية				

3- مقياس الثقافة الصحية لمرض السكري

وفيما يلي قائمة لقياس الثقافة الصحية . على الجدول التالي، يرجى منك اختيار الإجابة بوضع علامة (√) عند الاختيار الملائم التي تمثل شعورك تجاه مدى القيام بالأشياء المذكورة أدناه:

الرقم	العبارة	أوافق بشدة	أوافق	محايد	لا أوافق	لا أوافق بشدة
1	قراءة وفهم الكتيبات التعليمية					
2	فهم المعلومات المكتوبة المقدمة في الموعد					
3	فهم المعلومات التي بحثت عنها حول مرض السكري					
4	فهم المعلومات حول التعامل مع مرض السكري المقدمة من الطبيب					
5	القدرة على معرفة مدى موثوقية المعلومات المتعلقة بمرض السكري					
6	تغيير تاريخ او وقت الموعد لفحص طبي					
7	حساب الوقت القادم لتناول أدوية السكري					
8	تحديد محتوى الكربوهيدرات من الملصق الموجود على المنتجات الغذائية					

9	القدرة على معرفة ما اذا كان مستوى السكر في الدم ضمن النطاق الطبيعي					
10	فهم المعلومات المقدمة حول مرض السكري المعروضة على شكل احتمالات أو نسب أو على الرسوم البيانية					
11	طرح أسئلة للطبيب الخاص بي					
12	اشرح حالتي الخاصة بمرض السكري لمقدم الرعاية الصحية					
13	القدرة على شرح السبب الذي يجعلني اتبع نظاما غذائيا خاص لمرض السكري					
14	معرفة وممارسة شروط التخزين المناسبة لأدوية مرض السكري					
15	فهم جميع المعلومات المتعلقة بالأدوية الخاصة بمرض السكري					

مقياس الرعاية الذاتية لمرضى السكري

يرجى تقييم كل عنصر من العناصر وفقًا لمدى اتباعك النظام الموصى به لرعاية مرضى السكري في الشهر الماضي. استخدم المقياس التالي:

1 = لا أفعل ذلك أبدا

2 = في بعض الأحيان اتبع التوصيات ؛ في الغالب لا

3 = اتبع التوصيات حوالي 50٪ من الوقت

4 = افعل هذا عادة على النحو الموصى به ؛ هناك بعض الهفوات

5 = افعل هذا دائمًا على النحو الموصى به دون أن تفشل

= لا يمكن تقييم هذا العنصر / غير متوفر

في الشهر الماضي ، ما مدى جودة اتباعك للتوصيات من أجل:

الرقم	الأعراض	1	2	3	4	5
1	فحص الجلوكوز/ السكر					
2	تسجيل نتائج الجلوكوز/ السكر					
3	فحص الكيتون					
4	إعطاء جرعة الأنسولين الصحيحة					
5	إعطاء الأنسولين في الوقت المناسب					
6	تعديل جرعة الأنسولين على أساس قيم جلوكوز/سكر الدم					
7	تناول الأطعمة المناسبة ;الالتزام بخطة الوجبات					
8	تناول الوجبات في مواعيدها					
9	تناول وجبات خفيفة منتظمة					
10	حمل سكر سريع المفعول لمعالجة التفاعلات (مثل هبوط السكر)					
11	الإلتزام بالمواعيد					
12	ارتداء معرف طبي (مريض سكري)					
13	ممارسة الرياضة بانتظام					
14	ممارسة الرياضة بقوة					

Appendix (3)

Content Validity Index (CVI) for Health Literacy Scale

Letter Seeking Permission to Validate Health Literacy Scale

I am a master student in Critical Care Nursing at Arab American University IN Palestine. I would like to conduct a thesis entitled " The Relationship Between Self-Efficacy, Health Literacy, and Self-Care Behaviors among Adolescents with Type-1 Diabetes in Palestine" This study purposes to This study aimed to assess the relationship between self-efficacy, health literacy, and self-care behaviors among adolescents with type-1 diabetes in Palestine. This tool is available in English language and for language issue and cultural factors, it is translated into Arabic. English to Arabic translation and backward translation into English was done. I would like to assess the content validity index (CVI) for the Arabic version using a 4-point rating scale, whereas "1 = not relevant; 2= unable to assess relevance without item revision or item is in need of such revision that it would no longer be relevant; 3= relevant but needs minor alteration; 4= very relevant and succinct.

If this is possible, please indicate so by replying to me through e-mail:

Fidaayed1@gmail.com

Sincerely,

Fida Ayed Musa
Master's degree Candidate
Faculty of Postgraduate Studies
Arab American University

الرقم	العبارات	1	2	3	4
1	قراءة وفهم الكتيبات التعليمية				
2	فهم المعلومات المكتوبة المقدمة في الموعد				
3	فهم المعلومات التي بحثت عنها حول مرض السكري				
4	فهم المعلومات حول التعامل مع مرض السكري المقدمة من الطبيب				
5	القدرة على معرفة مدى موثوقية المعلومات المتعلقة بمرض السكري				
6	تغيير تاريخ او وقت الموعد لفحص طبي				
7	حساب الوقت القادم لتناول أدوية السكري				
8	تحديد محتوى الكربوهيدرات من الملصق الموجود على المنتجات الغذائية				
9	القدرة على معرفة ما اذا كان مستوى السكر في الدم ضمن النطاق الطبيعي				
10	فهم المعلومات المقدمة حول مرض السكري المعروضة على شكل احتمالات أو نسب أو على الرسوم البيانية				
11	طرح أسئلة للطبيب الخاص بي				
12	اشرح حالتي الخاصة بمرض السكري لمقدم الرعاية الصحية				
13	القدرة على شرح السبب الذي يجعلني اتبع نظاما غذائيا خاص لمرض السكري				
14	معرفة وممارسة شروط التخزين المناسبة لأدوية مرض السكري				
15	فهم جميع المعلومات المتعلقة بالأدوية الخاصة بمرض السكري				

Appendix (4)

Informed Consent

AAUP-IRB Code No.: …….

AAUP-IRB Date: …….

انا .....اعلن موافقتي على المشاركة في البحث الموضح ادناه.

عنوان الدراسة: العلاقة بين الكفاءة الذاتية ، الثقافة الصحية ، و سلوكيات الرعاية الذاتية لدى المراهقين المصابين بالنوع الأول من السكري في فلسطين.

وبهذا أؤكد انه تم شرح طبيعة واهداف الدراسة ومنهجيتها والعواقب المترتبة على المشاركة في الدراسة بشكل كامل من قبل السيدة فداء عايد سالم باللغة العربية.

وبعد التأكد من فهمي الكامل عن الاثار الإيجابية والغير إيجابية عن مشاركتي في الدراسة انا اوفق طواعية بمحض ارادتي المشاركة في البحث المحدد أعلاه واتفهم انه يمكنني الانسحاب من هذا البحث في أي وقت وبدون ابداء أي سبب على الاطلاق.

التوقيع: ……..…… التاريخ: ……...……..…..

أقر بانني شرحت للمشارك منهجية وطبيعة البحث وكل معلومات وعواقب الدراسة بشكل كامل

التوقيع: ……..…… التاريخ: …….

Appendix (5)

Institutional Review Board (IRB) at Arab American University

Arab American University
Institutional Review Board - Ramallah

الجامعة العربية الأمريكية
مجلس اخلاقيات البحث العلمي – رام الله

IRB Approval Letter

Study Title: "The Relationship Between Self-Efficacy, Health Literacy, and Self-Care Behaviors among Adolescents with Type-1 Diabetes in Palestine"

Submitted by: Fida Ayed Musa Salem

Date received: 9th December 2023

Date reviewed: 5th January 2024

Date approved: 5th January 2024

Your Study titled **"The Relationship Between Self-Efficacy, Health Literacy, and Self-Care Behaviors among Adolescents with Type-1 Diabetes in Palestine"** with archived number R-2024/A/10/N was reviewed by the Arab American University IRB committee and was approved on the 5th January 2024.

Sajed Ghawadra, PhD
IRB-R Chairman
Arab American University of Palestine

الجامعة العربية الأمريكية - فلسطين
مجلس أخلاقيات البحث العلمي - رام الله
IRB-R
ARAB AMERICAN UNIVERSITY-PALESTINE
INSTITUTIONAL REVIEW BOARD - RAMALLAH

General Conditions:
1. Valid for 6 months from the date of approval.
2. It is important to inform the IRB-R with any modification of the approved study protocol.
3. The Bord appreciates a copy of the research when accomplished.

رام الله – فلسطين
Tel: 02-294-1999 **E-Email:** IRB-R@aaup.edu **Website:** www.aaup.edu

العلاقة بين الكفاءة الذاتية، الثقافة الصحية، وسلوكيات الرعاية الذاتية لدى المراهقين المصابين بالنوع الأول من السكري في فلسطين

اسم الطالب: فداء عايد موسى

أسماء لجنة الإشراف:

أ.د. ملكة زهدي ملك

د. لبنى حرازنة

د. أنس شحادة

ملخص

الخلفية: يعتبر مرض السكري من النوع الأول من أكثر الأمراض المزمنة انتشارًا خلال فترة المراهقة. وتشكل سلوكيات الرعاية الذاتية عاملا أساسيا في السيطرة على مرض السكري. وهناك دراسات محدودة قامت بتقييم العوامل المرتبطة بسلوكيات الرعاية الذاتية بين المراهقين المصابين بمرض السكري من النوع الأول في العالم العربي بما في ذلك فلسطين. لذلك، هدفت هذه الدراسة إلى التحقيق في العلاقة بين الكفاءة الذاتية، والوعي الصحي، والمتغيرات الديموغرافية المختارة وسلوكيات الرعاية الذاتية بين المراهقين المصابين بمرض السكري من النوع الأول في فلسطين.

المنهجية: تم استخدام دراسة ارتباطية مقطعية، وتم اختيار 157 مراهقًا تتراوح أعمارهم بين 14 و18 عامًا بطريقة أخذ العينات الملائمة من مراكز الرعاية الصحية الأولية في فلسطين. وتم استخدام استبيان ذاتي البناء تضمن البيانات الاجتماعية والديموغرافية، ومقياس الثقافة الصحية لمرضى السكري، ومقياس الكفاءة الذاتية لمرض السكري، ومقياس مخزون الرعاية الذاتية لجمع البيانات. تم استخدام الإحصاء الوصفي واختبارات الارتباط التسلسلي بيرسون ونقطة الارتباط الثنائي واختبار الانحدار الخطي المتعدد لفحص العلاقة بين المتغيرات والتنبؤات لسلوكيات الرعاية الذاتية. تم جمع البيانات خلال الفترة من 20 شباط إلى 1 حزيران 2024.

النتائج: أفاد المشاركون بمستوى عالٍ من الكفاءة الذاتية (الوسط الحسابي = 108.80، الانحراف المعياري = 141.92)، ومستويات منخفضة من الثقافة الصحية (الوسط الحسابي = 2.12، الانحراف المعياري = 0.78) وسلوكيات الرعاية الذاتية منخفضة المستوى (الوسط الحسابي = 33.82، انحراف معياري = 7.76). ارتبطت الكفاءة الذاتية بشكل إيجابي بسلوكيات الرعاية الذاتية (معامل الارتباط= 0.396، القيمة الاحتمالية <0.01)، وكان للعمر والسكر التراكمي علاقة سلبية بسلوكيات الرعاية الذاتية (معامل الارتباط= -0.249 ، القيمة الاحتمالية< 0.01 ; معامل الارتباط= −0.173, القيمة الاحتمالية< 0.05)، على التوالي. كانت الكفاءة الذاتية والعمر من أهم المتنبئات بسلوكيات الرعاية الذاتية (بيتا القياسية= 0.196، القيمة الاحتمالية< 0.001; بيتا القياسية= 1.256− , القيمة الاحتمالية< 0.01) ، على التوالي.

الخلاصة: تساعد هذه الدراسة صناع السياسات ومهنيي الرعاية الصحية والوالدين على وضع استراتيجيات لتعزيز سلوكيات الرعاية الذاتية من خلال التدخلات والبرامج التعليمية المستهدفة. قد توجه النتائج أي برنامج تعليمي أو جلسات تدريبية مستقبلية من أجل زيادة الكفاءة الذاتية وسلوكيات الرعاية الذاتية بين المراهقين.

الكلمات المفتاحية: الثقافة الصحية; السكري من النوع الأول ;الكفاءة الذاتية; المراهقون؛ سلوكيات الرعاية الذاتية.