The Effectiveness of Short Mobile Messages (SMS) on Adherence to Self-care Activities among Jordanian Type 2 Diabetes Miletus Patients: A True-Experimental Study

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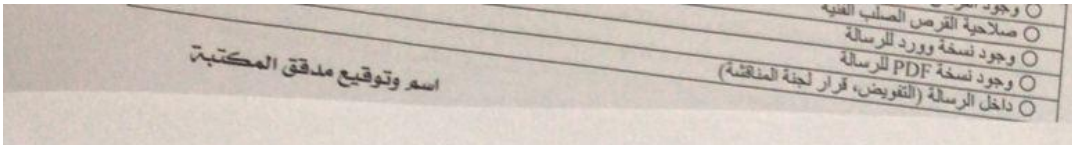
A Thesis

Submitted To Faculty of Nursing as a Partial Fulfilment of the Requirement for Master Degree in Chronic Care Nursing

May 2023



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EDICATION

Dear Parents, Brothers, and Sisters,

It is with great honor and heartfelt gratitude that I dedicate this Master's thesis to each and every one of you. Your unwavering love, support, and encouragement have been my guiding light throughout my academic journey, and I cannot thank you enough for everything you have done for me.

To my parents, I am forever “grateful for the sacrifices you have made to provide me with the best possible education and opportunities”. “Your unwavering faith in me and your constant encouragement have been the driving force behind my success. I would not be where I am today without your love and support”.

To my brothers and sisters, thank you for your love and endless support. Your unwavering encouragement and belief in me have been a constant source of inspiration and motivation. I am proud to have each of you as my siblings and grateful for the lifelong bond we share.

This thesis is not just a representation of my hard work and dedication, but also a testament to the sacrifices, love, and support that each of you have provided me along the way. I am eternally grateful and will always carry your love with me wherever I go.

Thank you for being my rock and my foundation, and for always believing in me, even when I did not believe in myself. I love you all more than words can express.

With love and gratitude,

Qader

ACKNOWLEDGMENTS

“I would like to express my deepest appreciation and gratitude to each of you for your guidance, support, and encouragement throughout my Master's thesis journey”.

“Dr. Abdullah Algunmeeyn, I am especially grateful for your unwavering support and mentorship. Your expertise and knowledge in the field have been invaluable, and your guidance and encouragement have helped me to grow both personally and professionally. Your belief in me has been a true source of motivation, and I cannot thank you enough for everything you have done for me”.

“To the committee members, I would like to extend my sincerest gratitude for taking the time to review my thesis and provide me with valuable feedback and suggestions. Your expertise and knowledge have been instrumental in shaping my work, and I am grateful for the opportunity to learn from each of you”.

“This thesis would not have been possible without your guidance and support, and I am deeply grateful for all that you have done for me. Thank you for being a true inspiration and for helping me to achieve this important milestone in my academic journey”.

With heartfelt gratitude,

Qader

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Abbreviation	Stands for
SMS	Short Mobile Messages
DM	Diabetes Mellitus
SDSCA	the Summary of Diabetes Self-Care Activities
WHO	World Health Organization
IDF	International Diabetes Federation
ICTs	Information and Communication Technologies
HR-QoL	health-related quality of life

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ABSTRACT

Background: Diabetes Mellitus (DM) poses a prevalent and costly health challenge worldwide, particularly in developing countries like Jordan, where non-adherence to treatment and self-care behaviors is a significant issue, highlighting the need to evaluate the impact of Short Massage System (SMS) in enhancing patient knowledge and awareness for improved disease management. **Objective**: To evaluate the effectiveness of short mobile reminder messages on improving adherence to self-care activities among patients with type 2 diabetes. **Methods**: A True-experimental study was conducted in three governmental Jordanian hospitals, including Al-Bashir Hospital, Princess Basma Hospital, and Prince Hamzah Hospital, with a total sample size of randomly selected 180 diabetic patients recruited from these settings. Participants were purposefully assigned to a control group (n=90) and an experimental group (n=90). The control group received usual care, while the experimental group received mobile reminder messages for a period of 3 months. Demographic variables included gender, age, occupation, educational level, and years since diagnosis. The primary outcome measure was adherence to self-care activities, assessed using “the Summary of Diabetes Self-Care Activities (SDSCA)” questionnaire. Pre-

intervention and post-intervention scores had been in comparison between groups, and ANCOVA analysis was performed to control for demographic variables. Both descriptive statistics and inferential statistics (paired samples t-test, ANOVA, ANCOVA) were used to answer the research questions in this study. **Results**: No substantial disparities were found between the control and experimental groups in demographic variables at baseline. In the experimental group, "post-intervention SDSCA scores (M=35.2, SD=4.8) were significantly higher compared to pre-intervention scores (M=29.1, SD=5.1) with a mean difference of 6.1 (95% CI: 4.5-7.7, $p<0.001$) in all domains. In contrast, the control group showed no significant changes in SDSCA scores between pre-intervention (M=28.9, SD=4.9) and post-intervention (M=29.3, SD=5.2) measurements, with a mean difference of 0.4 (95% CI: -1.2-2.0, $p=0.613$)". ANCOVA analysis revealed a significant effect of the mobile reminder messages on improving adherence to self-care activities after controlling for demographic variables ($F(1,177)= 36.71$, $p<0.001$). **Conclusion**: Short mobile reminder messages proved to be successful in enhancing adherence to self-care activities among individuals diagnosed with type 2 diabetes. The incorporation of mobile reminder messages into diabetes self-management programs could be a valuable strategy to enhance self-care and promote better health outcomes in this population. Additional research is warranted to investigate the long-term effects and sustainability of such interventions.

Keywords: Short Mobile Messages, T2DM, Self-care activities, Jordan.

CHAPTER ONE

INTRODUCTION

1.1Introduction

The present study focused on providing an introduction to the topic of the research. This chapter provided background information on "the effectiveness of short mobile messages (SMS) on adherence to self-care activities among Jordanian type 2 diabetes mellitus patients". It also included a statement of the problem, research hypotheses, and objectives of your study. Additionally, this chapter discussed the significance of your study, including its potential contributions to the field of healthcare and the management of diabetes mellitus.

1.2 Background

Diabetes Mellitus (DM) has emerged as a significant health challenge globally (Ahmad, 2016; Chondronikola, Harris, & Klein, 2016). DM can be characterized as a collection of metabolic malfunctions, identifiable by the occurrence of hyperglycemia when left untreated. Its diverse origins can be traced back to a variety of sources, including abnormalities in insulin production, utilization, or both, alongside disruptions in the metabolism of carbohydrates, proteins, and fats (WHO, 2019). This condition typically stems from a disruption in the insulin secretion process of the pancreas.

Type 1 diabetes, previously referred to as insulin-dependent, juvenile or childhood-onset, is marked by inadequate insulin production and necessitates daily insulin injections. The origins of type 1 diabetes remain unknown based on current scientific understanding, hence its prevention is not feasible at present (WHO, 2019).

On the other hand, type 2 diabetes, formerly termed non-insulin-dependent or adult-onset, originates from the body's inefficient use of insulin. This form of diabetes accounts for the lion's

share of diabetes cases worldwide and is largely attributable to excessive body weight and a lack of physical activity (WHO, 2019).

Diabetes is a global affliction, found in every corner of the world, even in rural areas of countries with low to middle income. The global count of individuals living with diabetes has seen a consistent upward trend. According to the WHO, in 2014, the worldwide adult diabetic population stood at 422 million. “The adjusted prevalence rate for adults climbed from 4.7% in 1980 to 8.5% in 2014, with a more pronounced surge observed in low- and middle-income countries as compared to high-income nations” (WHO, 2019, p.15). The International Diabetes Federation (IDF) further estimates that in 2017, around 1.1 million children and adolescents between 14 and 19 years old were afflicted with type 1 diabetes (IDF, 2017). If no preventive measures are undertaken, the diabetes population is projected to rise to at least 629 million by 2045. With high blood glucose levels contributing to nearly 4 million fatalities annually, it's estimated that in 2017, the global healthcare expenditure for adult diabetes care amounted to US$ 850 billion.

Adherence to diabetes self-care behaviors is critical for improving health outcomes and reducing healthcare costs (Bazzano et al., 2020). To adhere means to comply with the instructions given by healthcare providers regarding medication, diet, and lifestyle changes, as per the World Health Organization (WHO) (van den Berg et al., 2019). These self-care behaviors include “following a healthy diet, exercising, monitoring blood sugar levels, taking medication, and administering insulin injections” (Gibney et al., 2018).

Adherence to these self-care behaviors is important for maintaining glycemic control, controlling blood pressure, and reducing the risk of complications associated with diabetes (Bazzano et al., 2020). However, adherence can be challenging for many individuals, and healthcare providers play a crucial role in working with patients to identify barriers and develop strategies to improve adherence (van den Berg et al., 2019). Throughout enhancing compliance to

diabetes self-care recommendations, individuals with diabetes can experience better health outcomes and improve their quality of life (Jannoo et al., 2017).

Adherence is not the only term used to describe patient behaviors related to self-care management. Other terms such as compliance and concordance are also used. Concordance refers to the degree to which the patient and provider work together as partners to reach an agreement on the use of medication, taking into consideration both the expertise of the healthcare provider and the experiences and beliefs of the patient (Mes et al., 2018). On the other hand, compliance refers to the extent to which the patient follows the instructions or advice of the healthcare provider, regardless of whether the patient agrees with them (Gillani et al., 2017). Adherence, on the other hand, offers a more professional and effective role in improving patient decisions about following self-care management instructions provided by the healthcare provider (Gardner, 2015).

Non-adherence to self-care management is defined as a failure by the patient to follow the recommended regimen provided by health care providers (Hamid et al., 2020). This can have significant negative impacts on health outcomes and result in increased healthcare costs, with studies estimating that up to 60% of chronic patients in developed countries struggle with non-compliance (Nyenwe et al., 2019). Non-adherence can lead to serious consequences for patients, including an increased risk of complications and disease, as well as failure to achieve health goals and even death (Hamid et al., 2020). In fact, recent research suggests that non-adherence to medication is a major contributor to poor health outcomes, with an estimated 130,000 deaths each year being attributed to non-adherence to cardiovascular medication (Nyenwe et al., 2019).

A research investigation was undertaken in Jordan within the outpatient departments of two hospitals: “the University of Jordan Hospital” and “Jordan Hospital”. This study aimed to probe the relationship between patients' understanding and compliance in individuals undergoing long-term treatment for one or more chronic conditions. A cross-sectional methodology was

employed for this study. The research encompassed 902 patients and was primarily concentrated on exploring the link between patients' comprehension of their chronic medication and their consistency in following the prescribed treatment regimen. The outcomes of the investigation revealed a significant link between the level of patients' knowledge and their commitment to the medication protocol. As stated by Awwad et al. (2015), the research suggested that younger age, advanced education, higher income, fewer prescribed medications, and fewer diagnosed diseases were potent indicators of elevated knowledge levels amongst patients. Moreover, patients possessing superior levels of knowledge were twice as likely to display medium-to-high treatment adherence compared to their counterparts with lesser knowledge. The study also determined that 38% of medication non-adherence instances were due to forgetfulness.

Non-adherence is a problem that leads to bad consequences like decreased glycemic control and increased healthcare costs and hospitalizations (Al-Amer, Sobeh, Zayed, & Al-Domi, 2011). Non-adherence can occur unintentionally through forgetfulness and carelessness, or intentionally through patient ignorance of healthcare providers' advice (Gadkari & McHorney, 2012). A Longitudinal study of 11 272 patients with T2DM assessed the relationship between Medication Non-adherence on Glycemic Control, found glycemic control levels decreased over time in the presence of medication non-adherence (Egede, Gebregziabher, Echols,& Lynch, 2014).

Short mobile messages have proven to be highly effective in promoting adherence to self-care activities among patients with Type II Diabetes Mellitus. Recent studies conducted after 2019 have consistently highlighted the positive impact of mobile messaging interventions on diabetes self-management. A study published in the Journal of Diabetes Research demonstrated that tailored mobile messages delivered via smartphone applications positively influenced dietary adherence and physical activity levels among diabetic patients. These findings emphasize the

potential of short mobile messages as an accessible and convenient tool for supporting and motivating individuals with T2DM in their self-care routines.

The primary goal of this study was to examine how effective short mobile messages (SMS) are in enhancing adherence to self-care behaviors among Jordanian individuals diagnosed with type 2 diabetes mellitus.

1.2 Statement of Problem

Diabetes Mellitus (DM) is highly prevalent and costly in the world (Chatterjee, Khunti, & Davies, 2017). It is one of the most challenging chronic health problem particularly in developing countries such as Jordan (Al-Sahouri et al., 2019). The treatment and management of TIIDM is complex and needs patient daily self-management and life style changes including diet, exercise and self-monitoring of blood glucose (Wu et al., 2019).

The degree to which a patient follows prescribed treatment under limited supervision is known as adherence, and it has been identified as the most crucial factor in managing several chronic conditions (González-Bueno et al., 2019). "Maintaining proper glycemic control and minimizing the risks of complications in patients with TIIDM has been repeatedly shown to be highly dependent on compliance to treatment" (Saghir et al., 2019, p.1541). Studies have also demonstrated that patients with high levels of adherence to TIIDM medication have lower healthcare costs and reduced rates of hospitalization for complications (Guerci et al., 2019). Conversely, non-adherence to medication has been linked to negative consequences such as increased rates of hospitalization, higher medical expenses, elevated mortality rates (Mohiuddin, 2019), and persistent poorly-controlled DM (Midão et al., 2018). There is evidence of inadequate adherence to TIIDM self-care behaviors (Mogre et al., 2020).

The prevalence of non-adherence in the Middle East, including Jordan, is high and approximately equal to the global percentage (Al-Qasem, Smith, & Clifford., 2011). One of the major causes of non-adherence is insufficient communication between patient and health-care provider (Boshe et al., 2021). Non-adherence may result from absence or lack of communication between patient and healthcare professionals (Sharma et al., 2020).

Routine evaluation and patient follow-ups are indispensable components in the management of chronic illnesses like diabetes (Ziegler & Neu, 2018). These practices assist in monitoring patient progress and fostering habits conducive to diabetes care (Eva et al., 2018). The rise in the deployment of Information and Communication Technologies (ICTs) has resulted in the creation of user-friendly tools for patient follow-up, thereby encouraging self-management in individuals with diabetes. For example, even basic technologies such as telephones can be utilized for patient follow-ups (Donelan et al., 2019). Multiple studies suggest that employing certain mobile services, like sending brief text messages, can markedly enhance compliance with self-care practices among individuals with Diabetes Mellitus (Haider et al., 2019; Peimani et al., 2016; Liu et al., 2020).

Arab populations, including those in Jordan, exhibit poor compliance to self-care activities among patients with DM (Al-Sahouri et al., 2019). Non-compliance may be attributed to factors such as differences in lifestyle, culture, eating habits, knowledge, and beliefs (Ashoorkhani et al., 2018). The increasing number of people with TIIDM in Jordan has been linked to the prevalence of unhealthy eating habits, which contribute to obesity and being overweight (Al-Sahouri et al., 2019). Recent research has revealed a noteworthy association between non-compliance among individuals with diabetes mellitus and their level of knowledge concerning self-care activities (Abate et al., 2021). Additionally, research has found that increasing DM patients' knowledge and

awareness significantly enhances their compliance to prescribed medications and recommended self-care activities (Zeidi et al., 2020).

The utilization of Short Text Messages (SMS) has rapidly gained popularity as a personal and highly transportable mode of communication, particularly in Middle Eastern countries (Elareshi & Ziani, 2019). Moreover, "text messaging has been effectively employed in developing countries with a high prevalence of diabetes. Multiple studies have reported that mobile phones could provide a productive means of imparting information between clinic visits and improve compliance to diabetes therapy regimens".

Despite its potential, there is a noticeable dearth of research in Jordan assessing the impact of Short Message System (SMS) on enhancing outcomes in diabetic patients. The application of the Short Message System (SMS) could contribute significantly to optimizing discharge planning and patient follow-up procedures (Awwad et al., 2015).

Even though there is an expanding collection of research evidence affirming the efficacy of short text messages in fostering compliance to self-care behaviors among patients with T2DM , there exists a glaring void in the literature pertaining specifically to the Jordanian context. To our knowledge, no research has been carried out in Jordan to evaluate the effect of Short Message System (SMS) initiatives on augmenting outcomes for diabetic patients. This underscores a significant gap in existing literature that requires attention to ascertain the efficiency of mobile messaging interventions within this specific demographic. Additionally, there is a methodological shortfall regarding the distinct techniques and strategies that should be adopted when leveraging SMS to boost compliance with self-care behaviors among patients with T2DM in Jordan. Consequently, this study intends to address these shortcomings by exploring the influence of the

Short Message System (SMS) in ameliorating adherence to self-care behaviors and enhancing knowledge and awareness among individuals with T2DM in Jordan.

The primary objective of this study is to examine how effective short mobile messages (SMS) are in enhancing adherence to self-care behaviors among Jordanian individuals diagnosed with type 2 diabetes mellitus.

1.3 Significance of the Study

The significance of the study lies in its potential contribution to both the scientific research field and the society as a whole. Through the examination of the effectiveness of SMS utilization in enhancing compliance to diabetes self-care activities, this study has the potential to offer valuable insights into the utilization of mobile technology as a cost-effective and easily accessible strategy for promoting compliance to diabetes self-management. The findings of this study can benefit healthcare providers, policymakers, and researchers by highlighting the effectiveness of SMS interventions and emphasizing the importance of incorporating such interventions into diabetes care programs.

On a broader scale, the study's results can have implications for healthcare systems in Jordan and other similar contexts, where there may be a lack of home care services after discharge. By demonstrating the effectiveness of SMS in improving compliance to self-care activities, this study can inform the development of cost-effective and sustainable interventions that can be implemented on a larger scale to improve diabetes management outcomes and reduce the burden on healthcare facilities. Moreover, the study findings can help raise awareness among healthcare professionals and patients about the potential of SMS interventions in enhancing self-care practices and ultimately improving the overall health and well-being of individuals with type 2 diabetes in Jordan.

Furthermore, the study's findings can directly benefit patients with type 2 diabetes by providing them with a simple and convenient tool for self-management. Through regular SMS reminders and communication, patients can be empowered to take charge of their health, adhere to their prescribed treatment plans, and make informed decisions regarding their self-care activities. This can lead to improved glycemic control, reduced healthcare utilization, and better overall health outcomes for individuals living with diabetes.

In summary, this study's contribution lies in its potential to inform healthcare practices, policy development, and patient care by demonstrating the effectiveness and benefits of SMS interventions in improving compliance to self-care behaviors amongst Jordanian patients with T2DM . By addressing the gaps in the literature and focusing on a specific population, this study can provide valuable insights and recommendations that have the potential to positively impact the lives of individuals with diabetes, the healthcare system, and the society as a whole.

1.4 Purpose of the Study

The aim of this research is to examine how effective short mobile messages (SMS) are in enhancing adherence to self-care behaviors among Jordanians who are diagnosed with T2DM in different Jordanian public hospitals, Jordan.

The specific objectives of this research are as follows:

1. To assess the current level of adherence to self-care behaviors among Jordanian individuals diagnosed with T2DM.
2. To evaluate the impact of short mobile messages (SMS) on improving adherence to self-care behaviors among individuals with T2DM in Jordan.

3. To examine the factors influencing the effectiveness of SMS interventions in promoting adherence to self-care behaviors among individuals with T2DM in Jordan.

4. To explore the acceptability and feasibility of utilizing SMS interventions as a means to enhance adherence to self-care behaviors among individuals with type 2 diabetes mellitus in Jordan.

5. To provide evidence-based recommendations for the implementation and integration of SMS interventions into diabetes care programs in Jordan, aiming to improve self-care adherence and health outcomes for individuals with T2DM.

1.5 Research Hypotheses

The present study seeks to test the following hypothesis:

H0: There is no statistically significant difference in adherence to self-care activities among type 2 diabetic patients between the interventional group (receiving short mobile message reminders) and the control group (does not receive short mobile message reminders) due to using short mobile message reminders.

1.6Definition of Terms

This section provides concise and precise definitions for key concepts, terms, and variables used throughout the study. By defining these terms, readers can navigate the research with a solid foundation of knowledge and avoid any confusion or misinterpretation. It serves as a valuable reference point that aligns all stakeholders in the study, facilitating effective comprehension and analysis of the findings.

Variable name	Type	Conceptual Definition	Operational Definition
"Adherence to self-care behaviors"	Dependent variable	Adherence to self-care behaviors pertains to the degree to which an individual's actions align with the agreed-upon recommendations of their healthcare provider (Zullig et al., 2015).	In this research, adherence to self-care behaviors among Jordanian patients with type 2 diabetes mellitus is operationally defined as the extent to which individuals engage in and consistently follow the recommended diabetes self-care behaviors, as measured by "the Summary of Diabetes Self-care Activities (SDSCA)" questionnaire. The SDSCA questionnaire includes various domains of self-care activities, such as "medication adherence, dietary adherence, exercise adherence, blood glucose monitoring, and foot care".
Short Message System (SMS):	Independent variable	Is defined as written text messages through the mobile keyboard and sent through the mobile networks to a specified receiver(s) (Wang et al., 2021).	In this research, short mobile messages (SMS) are operationally defined as brief text-based communications sent from the researcher to the mobile phones of "patients with T2DM in Jordan". These messages are designed to provide reminders, educational information,

			motivational content, and support related to self-care activities for diabetes management. The SMS interventions involve the delivery of concise and targeted messages, typically limited to a certain character count, to ensure ease of reading and comprehension by the recipients.

1.7 Summary

The first chapter of this study introduces the topic of using short mobile messages as a tool to enhance adherence to self-care activities among Jordanian Type 2 diabetes patients. The background section emphasizes the increasing prevalence of Type 2 diabetes in Jordan and the significance of successful self-care management, including aspects like maintaining a balanced diet, participating in physical activity, and monitoring blood glucose levels. The aim of this study is to assess the effectiveness of short mobile messages (SMS) in improving adherence to self-care behaviors among individuals diagnosed with Type 2 diabetes in various public hospitals in Jordan. The study puts forth several hypotheses, which predict the positive effects of mobile messages on patients' self-care activities and diabetes management. The chapter establishes the significance of the research by emphasizing its potential contribution to improving healthcare strategies for Type 2 diabetes patients in Jordan and beyond. The next chapter provide a thorough review of the literature related to the use of short mobile messages to improve T2DM patients' adherence to self-care activities.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The purpose of this study was to examine how effective short mobile messages (SMS) are in enhancing adherence to self-care behaviors among Jordanian individuals diagnosed with type 2 diabetes mellitus in different Jordanian public hospitals, Jordan. This chapter examines the studies published on the effectiveness of Short Mobile Text Messages in promoting adherence to self-care activities among individuals with type 2 diabetes mellitus. The chapter reviews both the theoretical and empirical literature and discusses the research variables.

2.2 Search strategy

An extensive review of pertinent literature was carried out to compile articles concerning the efficacy of Short Mobile Text Messages in promoting compliance with self-care practices among those diagnosed with Type 2 Diabetes Mellitus. The investigator utilized databases like CINAHL, MEDLINE, PubMed, and EBSCO, covering a time frame from 2012 to 2022. Ultimately, the investigator reviewed the websites of recognized international bodies such as the World Health Organization (WHO) to collect guidelines and recommendations related to Diabetes Mellitus. The following keywords were used: self-care activities (Alternative words such as Self-Care Behaviors, self-care management), Type 2 Diabetes Mellitus, Short Mobile Messages (Telehealth), adherence, non-adherence, self-care management

Eligibility Criteria of this Review

Inclusion criteria: Full-text articles published in English the time period between 2012 and 2022 that discussed study-related problem and outcome in the adult population of patients with T2DM.

Exclusion criteria: non-full text articles, and articles describing different results. Research studies not investigating adult populations, 114 studies were found in the primary search. A total of 30 papers from the 114 studies were deemed significant and included in the full analysis (Figure 1). The study of architecture, goals, sampling methods, and similar results were used by these studies together. The association between Self-care Activity, Adherence and Short Mobile Messages, (IDF) WHO guidelines for Self-care Activities, and the effects of SMM to enhance Self-care Activities are all common themes found from reviewing the literature. The below presented PRISMA flow chart shows the retrieved studies. Figure (1) summarizes the inclusion of the research studies.

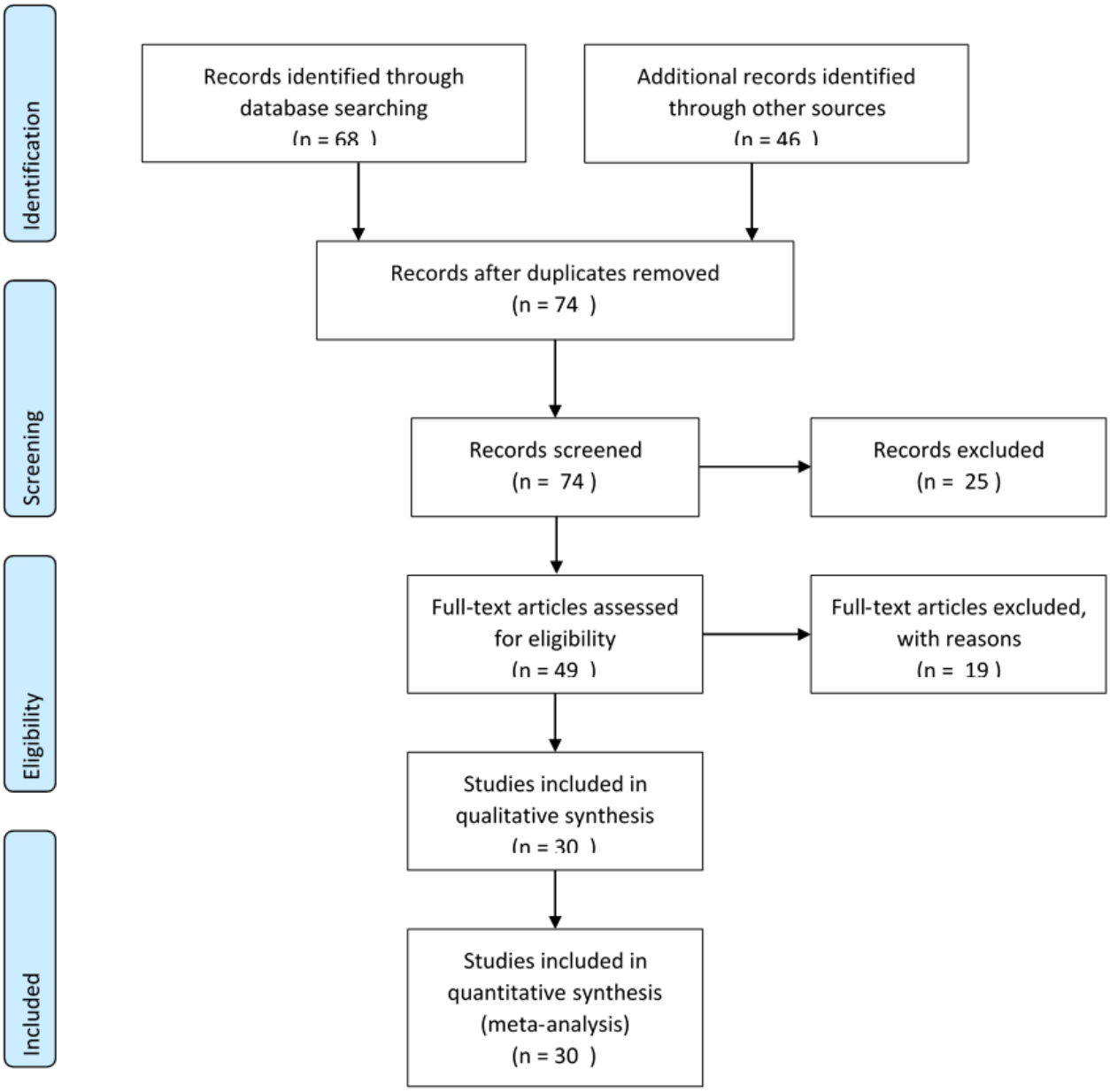

Figure 1 A flow diagram of the literature search process

2.2 Adherence and Non-Adherence

Adherence is defined by the World Health Organization (WHO) as "the extent to which a person's behavior of taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider" (Oldenmenger et al, 2017). Adherence to diabetes self-care recommendations and behaviors is essential for better

health outcomes such as improving glycemic control, sustaining blood pressure, reducing the severity of complications and reducing costs of health care (Almomani & Shahinaz, 2022). These behaviors include eating healthy nutrition, exercising, self-monitoring of blood sugar, taking medication and insulin injection (Oluma et al., 2020).

An alternative term that can be used to describe patient behaviors related to self-care management is compliance and concordance. Concordance refers to the level of partnership between the patient and healthcare providers to come to an agreement based on the expertise of the healthcare professional and the experiences and beliefs of the patient, in deciding how, why, and when to use medication (van Boven et al., 2016). On the other hand, compliance refers to the extent to which the patient follows the advice or instructions of the healthcare professional, which may not necessarily be agreed upon by the patient (Middlemass et al., 2017). Adherence offers different, professional and effective roles improving patient decisions about following self-care management instructions by health care provider (Settineri et al., 2019).

Non-adherence to self-care management can be defined as the patient's failure to follow recommended regimen by health care providers (Myers et al., 2020). Mohiuddin (2019) stated that non-adherence is a common problem among patients with chronic illnesses in developed nations, impacting around 50% of them. This issue has negative consequences for health outcomes and results in increased healthcare expenditures, and many effect on patients themselves like suffering from complication or disease (Walsh et al., 2019). Non –adherence is major reason for patients fail to reach goals and lead to death and extra cost, about 125,000 death every year due to non-adherence to cardiovascular medication (Bilger et al., 2019).

Non-adherence is a problem that leads to bad consequences like decreased glycemic control and increased healthcare costs and hospitalizations (Lin et al., 2017). Non-adherence can occur unintentionally through forgetfulness and carelessness, or intentionally through patient ignorance of healthcare providers' advice (Moffatt et al., 2017). A Longitudinal study of 11 272 patients with T2D assessed the relationship between Medication Non-adherence on Glycemic Control, found glycemic control levels decreased over time in the presence of medication non-adherence (Egede et al., 2014).

A retrospective study concentrated on non-adherence to diabetes self-care management in patients new diagnoses of T2DM found non-adherence in the first year of diabetes may increase the incidence of complications and result in higher disbursement for patients (Biskach et al., 2020).

The objective of a cross-sectional study was to examine the correlation between the disregard of self-care practices, medication adherence, and the impact on health-related quality of life (HR-QoL) in people living with type 2 diabetes. The research indicated that a noteworthy "percentage of patients didn't adhere to suggested procedures for monitoring blood sugar levels (37%), dietary recommendations (44.8%), foot care (43.2%), physical activity (33.2%), and refraining from smoking (37.2%). It was also observed that 50.4% of the participants had problems with movement, 28.2% faced challenges with self-care, 47.6% encountered difficulties performing normal tasks, 72.8% had experiences of pain or discomfort, and 73.6% dealt with anxiety or depression". "A chi-squared test showed a significant relationship between the lack of adherence to foot care and struggles with movement, self-care, and everyday tasks ($p < 0.05$). Moreover, there was a significant association between neglecting physical activity and problems with mobility, self-care, ordinary activities, pain, and anxiety ($p < 0.05$)" (Saleh et al., 2014).

2.3 Factors associated to Non-Adherence

In line with this, the World Health Organization categorizes the determinants (dimensions) of non-adherence into five groups: aspects related to the patient, dynamics between the patient and provider/healthcare system, elements related to the therapy, factors connected to the condition, and socio-economic factors (Elsous et al., 2017).

Patient-associated factors encompass physical attributes such as age and impairments related to hearing, vision, and memory. A case report study highlighted that older patients might encounter difficulties due to hearing, vision, and memory issues. These challenges may manifest in their inability to open medication containers, swallow pills, or handle small tablets, potentially leading to non-adherence (Goh et al., 2017).

In a historical cohort study carried out by Krivoy et al. (2015), the researchers sought to explore the impact of age and gender on adherence to antidepressants (AD). The study included a sample of 310,994 individuals who were prescribed AD over a span of four years. Adherence was gauged as the proportion of time during which AD prescriptions were claimed relative to the time they were consistently prescribed. The findings suggested that males in the 20-40 age bracket exhibited better adherence than their female counterparts. However, this pattern changed in the 50-70 age group, with females showing higher adherence.

Patients might neglect self-care management due to cognitive constraints, such as insufficient knowledge and forgetfulness. To examine the association among cognitive ability, self-care, and major adverse cardiac events (MACE), Kim et al. (2015) led a prospective study with heart failure (HF) outpatients. The study employed face-to-face interviews with 86 HF patients. The findings revealed that HF patients exhibiting symptoms had a lower cognitive function compared to those without symptoms, especially in terms of memory function. Both age

and gender showed a significant correlation with self-care confidence. Furthermore, patients who did not experience MACE demonstrated a superior overall cognitive function. However, after adjusting for age and gender, no cognitive areas were identified as significant predictors of MACE (Kim et al., 2015).

A cross-sectional research study was carried out in Jordan at the outpatient departments of two hospitals with the aim of examining the correlation between patients' understanding and their adherence to long-term treatments for one or more chronic diseases. The study involved a sample of 902 patients, looking into the association between patients' awareness of their chronic medication and their adherence to it. The findings indicated a significant link between the level of patients' knowledge and their adherence to medication regimens. Furthermore, the study highlighted that forgetfulness accounted for 38% of medication non-adherence incidents (Awwad et al., 2015).

A systematic review set out to scrutinize medication compliance among patients suffering from chronic diseases in Middle Eastern nations. The review found that forgetfulness emerged as the most common reason for non-compliance in these regions (Shahin et al., 2019).

A preliminary survey using a cross-sectional questionnaire was conducted among type 2 diabetes patients in Saudi Arabia, aiming to evaluate medication adherence and the reasons behind non-adherence. The findings indicated that the most prevalent cause of non-adherence was forgetfulness. Participants, in general, showed a high degree of adherence to their medication regimen, with no notable differences in overall adherence scores based on the parameters evaluated (Alqarni et al., 2019).

Reflecting on the literature about the factors associated with non-adherence, it becomes evident that non-adherence to self-care management is a multifaceted issue influenced by various factors. The World Health Organization categorizes these factors into patient-related, provider-patient/healthcare system, therapy-related, condition-related, and social and economic factors. Within the realm of patient-related factors, age, hearing, vision, and memory impairments have been identified as potential barriers to adherence. Studies have shown that elderly patients, due to physical limitations and difficulties in handling medications, may face challenges in adhering to prescribed regimens. Interestingly, age and gender have also been found to influence adherence to antidepressant medications, with varying patterns across different age groups. Additionally, cognitive limitations, such as lack of knowledge and forgetfulness, have been recognized as significant contributors to non-adherence. The association between cognitive function, self-care, and adverse health outcomes has been explored in patients with heart failure, highlighting the impact of cognitive impairments on adherence behaviors. In the context of Jordan and other Middle Eastern countries, forgetfulness has emerged as a prevailing cause of non-adherence among patients with chronic conditions. Studies conducted in these regions have shed light on the importance of addressing forgetfulness as a barrier to medication adherence. These findings underscore the need for tailored interventions that consider patient-specific factors and address cognitive limitations and forgetfulness to improve adherence to self-care management.

2.3.1 Therapy related factors

Therapy-related factors include the complexity of the medication regimen such as increased number of medication taken, does, duration of the therapy, side effects of medication and lifestyle changes, which can lead to non-adherence (Gast & Mathes, 2019). A cross-sectional study of patients with schizophrenia which aim to assess impact side effects of medication on

adherence found medication side effects are highly prevalent with medication non-adherence (Zairina et al., 2022). In a systematic review carried out by Capoccia et al. (2016), the aim was to compile evidence on the risk factors leading to non-adherence to glucose-lowering medications, the impact of such non-adherence on glycemic control and diabetes care costs, as well as the interventions aimed at boosting adherence. The review discovered that non-adherence was more prevalent when the medications were not easily tolerated or necessitated several doses daily. Furthermore, it was found that enhanced adherence correlated with improved glycemic control, fewer emergency department visits, reduced hospitalizations, and decreased healthcare costs.

A quantitative study found the common cause of non-adherence to oral hypoglycemic agents among T2DM was too many tablets in a day, side effects, and intolerance of course (Ahmed et al., 2017).

2.3.2 Patient and Physician-related factors

Non-adherence to medical treatment can arise from various factors, including those related to the healthcare provider and the patient, as reported by Fernandez-Lazaro et al. (2019). To explore non-guideline-adherent treatment of chronic diseases, Fürthauer et al. (2013) conducted a study involving 58 general practitioners and 501 patients with conditions such as diabetes mellitus, hypertension, cardiovascular disease, heart failure, and atrial fibrillation. The study examined the reasons for non-guideline-adherent treatment from both the physicians' and the patients' perspectives, using nine quality indicators. Fürthauer et al. (2013) executed a study aimed at quantifying non-adherence to guidelines in the treatment of chronic illnesses, and analyzing the reasons from both the physician's and the patient's viewpoints. The study unveiled that 16.8% of all quality indicators demonstrated non-adherence to guideline recommendations. In a majority of instances (61.5%), physicians inaccurately perceived the treatment as not recommended. In 10.2% of cases, non-adherence was ascribed to patient non-compliance, and in 10.7% of cases, it was related to an adverse drug event.

Conversely, only 5.4% of patients reported their non-adherence being associated with an adverse drug event. Interestingly, 64.4% of patients were unsure of the reasons for their non-compliance to therapy. In about 20.0% of cases, patients were under the impression that a particular drug was not needed.

2.3.3 Social and economic factor

According to a study, social and economic factors have a significant impact on adherence to self-care management. The study revealed that receiving social support from family, friends, or health providers is crucial in promoting adherence to self-care management behaviors. Conversely, limited access to healthcare, financial constraints, and the high cost of medication have all been linked to decreased adherence rates. (Reshma et al., 2021; Mamaghani et al., 2020).

A research study involving 532 patients scrutinized the effect of social support on glycemic control. The findings indicated that a better glycemic control was achieved by 35% of patients who reported higher levels of social support. The study also revealed a positive relationship between increased social support and better self-efficacy among patients, which subsequently led to improved medication adherence (Shao et al., 2017). Conversely, a comprehensive review which analyzed 744 data sources and 174 studies, representative of 130 countries (inclusive of Middle Eastern countries), found that a majority of diabetes patients reside in low- to middle-income nations (Guariguata et al., 2014). Furthermore, factors such as restricted access to healthcare and limited financial resources were identified as contributing to lower adherence rates (Mamaghani et al., 2020).

In a study that employed structured questionnaires in face-to-face interviews, 230 randomly selected patients with Type 2 Diabetes Mellitus (T2DM) in East Jerusalem were examined to assess the influence of health belief structures, socioeconomic status (SEP), and

certain clinical aspects on the self-care management of diabetes among Arab patients with type 2 diabetes. The findings indicated that patients who encountered fewer financial challenges, perceived substantial benefits from managing their diabetes, and had greater self-efficacy, demonstrated higher overall scores in self-care management (Daoud et al., 2015). Additionally, it was observed that patients prescribed oral medication (as opposed to insulin) had significantly lower diabetes self-care management scores (Daoud et al., 2015).

A study was conducted to investigate the relationship between income level and diabetes management in adolescents with type 1 diabetes. The study involved the participation of 320 individuals, and it compared their glycemic control, self-care abilities, and psychosocial results like stress, depression, and quality of life. The study examined the differences across various income levels and discovered that teenagers from high-income households demonstrated better problem-solving skills regarding diabetes management and had more self-care goals compared to their counterparts from low or moderate-income households (Rechenberg et al., 2016).

2.3.4 Patient and health care provider relationship

The quality of the relationship between healthcare providers and their patients is a significant healthcare system factor that affects adherence to diabetes self-care management, according to a study (Świątoniowska-Lonc et al., 2020). Another study found that a positive relationship between patients and healthcare providers that involves encouragement and support from the provider has a favorable effect on adherence (Young et al., 2017).

The quality of the patient-physician relationship plays a crucial role in medication adherence, particularly among older adults with memory problems, where inadequate communication regarding medication benefits, usage instructions, and side effects can lead to non-adherence (Smaje et al., 2018). Linetzky et al. (2017) conducted an observational study over a

two-year period with the objective of investigating the relationship between the patient-doctor dynamic, distress related to diabetes, insulin compliance, and glycemic control. The study surveyed patients across 18 countries, all of whom had been diagnosed with T2D and had been on insulin for at least three months. The findings suggested that poor adherence to insulin was associated with heightened distress related to diabetes. Furthermore, patients who expressed dissatisfaction with their doctor-patient interactions, or who experienced distress over managing T2D, demonstrated poorer adherence to their insulin regimen.

Several interventions have been proposed in the literature to improve adherence such as directly observed therapy, simplification of dosing regimens, treatment supporters and directly observed therapy. But these interventions were complex or have a limited access to all patients (Sluggettet al., 2020). In a systematic review designed to assess the influence of telehealth on diabetes self-management within the realm of primary healthcare, seven studies were scrutinized, with only four delving into the effects of telehealth initiatives on fasting plasma glucose levels. Although the overall impacts were not deemed significant, two investigations that analyzed the influence of telehealth interventions on post-meal glucose levels reported encouraging results regarding short-term glycemic control. Consequently, based on the findings, the authors concluded that telehealth interventions contribute significantly to improving self-management of diabetes control in primary healthcare contexts. (So & Chung, 2018).

2.4 Short message services

The utilization of modern information and communication technologies (ICTs) to improve clinical support and health outcomes is referred to as telehealth (Aceto et al., 2018). It encompasses various electronic applications utilized for exchanging medical information across different sites to enhance healthcare delivery (Lee et al., 2018). Telehealth offers added value

because it allows for the recording, transmission, and receipt of feedback at any place and time (Baron et al., 2017). The use of ICTs for sharing accurate information about disease diagnosis, treatment, and prevention can improve the health of individuals and communities (Muuti et al., 2020).

Text messaging or Short Message Service (SMS) is a fundamental technical feature of mobile phones that has been found to be an efficient method for healthcare reminders such as patient time visit, medication, and treatment adherence across various conditions and interventions (Peimani et al., 2016).

Numerous research studies have highlighted the potential advantages of utilizing mobile phone text messaging (SMS) interventions to encourage compliance with self-care activities for diabetes, manage the condition, control blood sugar levels, administer insulin therapy, and follow self-care practices. In a quasi-experimental study that followed diabetes patients for three months, nurse-led SMS interventions were found to reduce HbA1c levels and improve adherence to diabetes control (Nelson et al., 2016). Additionally, research suggests that mobile phones can enhance nurse-patient communication and promote adherence to diabetes self-care activities (Currie et al., 2015).

The utilization of mobile phone Short Message Service (SMS) is prevalent among adults across various age groups, extending beyond developed nations to include developing countries with diverse cultural and socioeconomic contexts, as corroborated by multiple studies (Abbas et al., 2015). SMS interventions through mobile phones have the potential to assist in daily diabetes management by promoting active interaction between patients and healthcare providers. This is due to the immediate delivery of SMS at any time and in any setting provided by mobile phones

(Kundury & Hathur, 2020). SMS is an efficient and low-cost method that can deliver health information to individuals with minimal intrusion (Sahin et al., 2019). As a result, mobile phone SMS is expected to become even more widely used in the future (van Olmen et al., 2017).

A randomized study involving 128 adult patients with poorly managed diabetes sought to investigate the impact of SMS reminders on treatment adherence. The findings indicated that the group who received two daily text messages for a duration of six months exhibited improved HbA1C levels, alongside positive shifts in medication adherence, self-efficacy, execution of self-care routines, and overall quality of life (Sugita et al., 2017).

Text messaging, SMS, can be used for many purposes as appointment reminders, and educational messages which can improve communication between patients and the health care team (Mars & Scott, 2017). Text messaging (SMS) can be effective and feasible intervention to improve adherence to diabetes therapeutic regimen, and consequently the HbA1c levels among type 2 diabetic patients (DeKoekkoek et al., 2015).

Abbas et al (2015) performed a prospective nonrandomized experimental trial that aimed at evaluating the effectiveness of mobile phone short messages on glycemic control among 100 Saudi Type II diabetic patients. The participants of the study received an educational sessions on a daily basis, in addition to SMS reminders for a period of 4 months. The study findings had revealed that there was a remarkable improvement in patients' awareness and knowledge regarding glycemic control, and their blood glucose level and HbA1c had decreased significantly after the administered interventional procedure.

Moyano et al (2019) performed a qualitative exploratory study that aimed at exploring the perceptions and acceptance of SMS interventional procedure among a study sample consisted

of 24 DM patients from Argentina. The researchers used the semis-structured phone interview as a research instrument in this study. The findings of the study had shown that SMS reminders proved to an effective tool in increasing patients' knowledge and showed its efficiency in facilitating DM care. Moreover, the researcher stated that there was a strong positive correlation between the responding to the sent SMS reminders on one hand, and the patient-physician relationship on the other hand.

In another study conducted by Gatwood et al (2014) that aimed at evaluating the use of mobile phones, DM patients' acceptance and their perspectives about receiving reminder short text messages, the researchers had performed a randomized controlled study on a study sample consisted of forty-eight DM patients. The findings of the study had indicated that there was a high daily rate of exchanging short messages, especially among young age patients. In addition, the study participants had reported positive perceptions towards using text messages to manage their DM. Generally, the patients stated that using text messages was a fruitful intervention that allowed them to control their DM and provided them with a useful source of information they might need.

Sarabi et al (2016) conducted a systematic literature review "to investigate the impact of using mobile phone text messaging on the improvement of medication adherence among patients having chronic diseases (including diabetes)". The results of the study had shown that the interventional procedure represented by using reminding text messages proved to be a highly efficient intervention in improving chronic diseases patients' adherence to their prescribed medications. The efficiency was reported in the studies that used the SMS interventional procedures lasting from 1 week to 14 months.

In an integrative review study that was conducted by Hovadick, Reis, & Torres (2019), the researchers analyzed the evidences provided in literature about the effectiveness of using short messages in promoting the health status of TIIDM patients. A total of 23 articles were classified to meet the inclusion criteria set by the researchers. Generally, the integrative review reported a positive effectiveness of short messages intervention in improving glycosylated hemoglobin levels, higher adherence to medication, more commitment to self-care practices, and an increase in the patients' level of knowledge regarding DM and foot care practices.

Based on the review of literature, the following knowledge gaps can be identified:

1. Methodological Gap: While several studies have shown the potential benefits of using SMS interventions to promote adherence to self-care activities among patients with type 2 diabetes mellitus, there is a lack of research specifically examining "the effectiveness of short mobile messages (SMS) on adherence to self-care activities among patients with T2DM in Jordan". The methodological gap lies in the absence of studies that specifically focus on the Jordanian population and investigate the impact of SMS interventions on adherence to self-care activities in this context.

2. Population Gap: The existing literature primarily focuses on diverse populations, including those in developed and developing countries, without specifically addressing the Jordanian population. Therefore, there is a population gap in terms of understanding the effectiveness of SMS interventions on adherence to self-care activities among patients with T2DM specifically in Jordan. Considering the potential variations in cultural, socioeconomic, and educational backgrounds in Jordan, it is important to bridge this population gap to assess the relevance and applicability of SMS interventions in this specific context.

3. Literature Gap: Although multiple studies have illustrated the beneficial impacts of SMS interventions on adherence to self-care practices, glycemic control, medication compliance, self-efficacy, and quality of life among individuals with type 2 diabetes, there remains a noticeable gap in the literature. This gap is in relation to assessing the efficacy of SMS interventions on self-care activity adherence among patients with type 2 diabetes in Jordan. Specifically, there is a dearth of research that exclusively investigates the effect of SMS interventions on adherence to self-care practices within the unique context and needs of the Jordanian population.

To sum up, the knowledge gaps include a methodological gap (specifically studying the effectiveness of SMS interventions in Jordan), a population gap (focusing on the Jordanian population), and a literature gap (examining the impact of SMS interventions on adherence to self-care activities in the Jordanian context). Bridging these gaps would contribute to a deeper understanding of the effectiveness and feasibility of SMS interventions in promoting adherence to self-care activities among patients with T2DM in Jordan.

2.5 Theoretical Framework

In this study, the Self-Regulation Theory (SRT) (Figure 2) was employed as the guiding theoretical framework. SRT is a theoretical concept developed to explain how individuals cope with healthcare experiences. The theory was devised in a cyclical manner during the 1960s and 1970s, with the alteration and refinement of its concepts and propositions influenced by empirical data (Figure 2).

The Self-Regulation Theory (SRT) is founded on the premise of patients' involvement in their healthcare, and the healthcare providers' acceptance of this role. As per SRT, patients are

capable of adopting health-enhancing behaviors independently, and with the aid of healthcare providers. The primary responsibility of healthcare providers is to impart information to patients. The ultimate goals of this approach are to sustain the patients' regular activities and ensure their ongoing comfort.

Diabetes Mellitus (DM) constitutes a significant stressor in a patient's life. Consequently, the nurse's role is to assist patients in adapting to this stressful event and maintaining regular activities while implementing reasonable lifestyle modifications. The Self-Regulation Theory (SRT) can be beneficial in this study by using SMS reminders to encourage patient adherence to the suggested regimen. Reminders could facilitate decision-making regarding self-care and encourage adherence to recommendations. Without consistent follow-up, simply providing instructions about self-care activities, such as medication management, dietary recommendations, physical activities, and smoking cessation upon discharge, might not yield effective results.

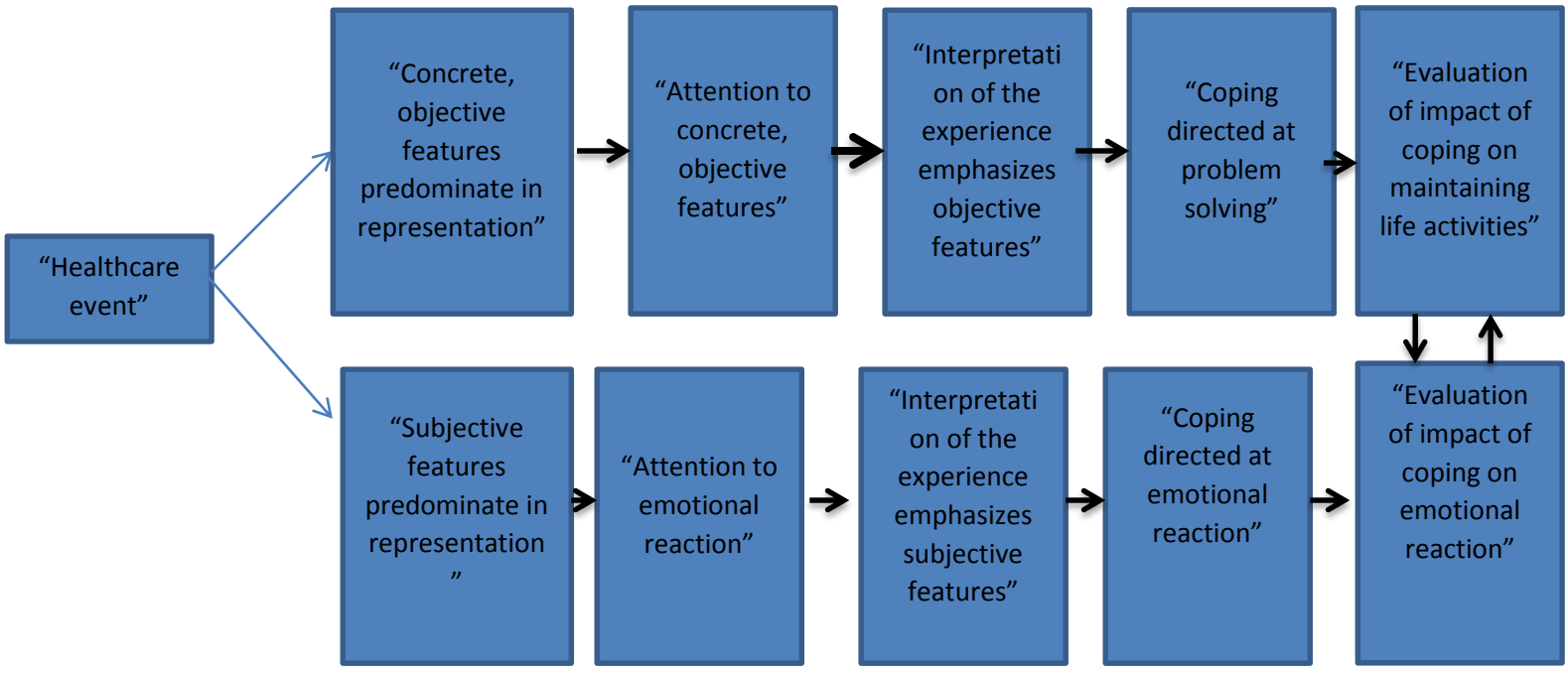

Figure 2 Self-Regulation Theory (SRT) model, adopted from "Self-regulation theory: Applying theory to practice (p. 37). Pittsburgh : Oncology Nursing Press"

TIIDM can put patients on stressful situations like change lifestyle, monitor blood glucose level, and adhere to times of medications, so SRT show effect sending SMS on adhere to self-care like maintain a healthy diet, take medication on times, check on foot, and encourage patient on exercise.

2.5 Summary

Non-adherence is major problem lead to great consequences non- adherence. Because of many factors that lead to non-adherence as patients related factors, provider-patient/ health care system, therapy related factors, condition related factors and social and economic factors. To increase adherence, mobile health as text message is a good solution to improve adherence.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

The current study is designed to probe "the impact of concise mobile messages on enhancing adherence to self-care activities among patients with type 2 diabetes in Jordan". This chapter outlines the research methodology, including details on the research design, the target population, the research sample along with the sampling strategy, the instruments used for data collection, and the data analysis methods.

3.2 Study Design

The research conducted in this study followed a quantitative design, which involves gathering quantifiable data and utilizing statistical, mathematical, or computational techniques to systematically investigate phenomena (Polit & Beck, 2017). The study utilized a true-experimental approach, which is one of the several designs included in the quantitative design. The researcher divided participants into two groups - a control group and an intervention group - to investigate the effectiveness of short text messages (STM) in improving adherence to self-care activities. The true-experimental research design is suitable for measuring the effectiveness of a new intervention and minimizing bias to establish cause-and-effect relationships between interventions and outcomes (LoBiondo, 2018). The chosen true-experimental design is justified for this study due to ethical considerations, the need to evaluate interventions in a real-world setting, the assessment of cause-and-effect relationships, and the practicality of implementation. Conducting a randomized controlled trial may not be feasible or ethical. By utilizing this design, the study can provide valuable insights while considering the specific context, limited resources, and time constraints.

The present research investigated the effect of brief mobile text message reminders on aspects such as maintaining a healthy diet, medication adherence, regular exercise, foot care, self-monitoring of blood glucose levels, and insulin injection practices among patients with type 2 diabetes mellitus. The utilization of true-experimental research in this study has various advantages. It can imitate an experiment and provide a high level of evidence without randomization, which is suitable when there are ethical or practical reasons why randomization is not possible (Polit & Beck, 2017). However, there are some disadvantages to using this research design. These include the inability to clearly establish a cause-and-effect relationship, the potential for selection bias as researchers determine baseline characteristics and eligibility, and lower internal validity because researchers control variables, making it difficult to determine if all confounding variables have been included.

3.3 Site and setting

The current study was carried out in three governmental Jordanian hospitals located in two different areas (the northern & capital of Jordan). The researcher used a convenience sample to gather data in this stud.

The selection criteria for the hospitals in this study included the following:

Inclusion criteria:

1. The hospitals were government-owned.
2. The hospitals provide similar level of healthcare services to Jordanian patients with T2DM .

3. Al-Bashir Hospital, Princess Basma Hospital, and Prince Hamzah Hospital were selected.

4. Al-Bashir Hospital was chosen due to its prominence and capacity of 1,100 beds, with a large number of daily patients and extensive outpatient diabetes clinics.

5. Princess Basma Hospital was selected for its teaching hospital status, capacity of 50 beds, and expansion to 120 beds to accommodate the growing population and workload.

6. Prince Hamzah Hospital was included for its advanced medical services and treatments not available in the public health sector, such as surgical heart operations, cardiac catheterization, and kidney transplants.

Exclusion criteria:

1. Non-governmental hospitals were not included in the study.

2. Hospitals outside the selected regions of the northern and capital areas of Jordan were not considered.

3. Hospitals that did not meet the specific criteria mentioned for each selected hospital (e.g., capacity, specialized units, educational status) were excluded.

Al-Bashir Hospital which was opened in 1954 and has a capacity of 1,100 beds, is a prominent government hospital in Jordan. Approximately 7,000 patients receive health care on a daily basis, with 1.5 million receiving treatment annually. Two outpatient diabetes clinics at Al-Bashir Hospital treat 1,500 patients every month (MOH, 2019). A sample of 60 diabetic patients were recruited from this setting.

The Princess Basma is a teaching Hospital that was established on 1960. It has a capacity of 50 beds. At the time, this hospital was the largest governmental hospital in Jordan's northern region. In 1970, the hospital's number of beds was expanded to 120 equipped beds due to a growth in the population in the area and an increase in the hospital's workload (ministry of health, 2021). As per the Ministry of Health (MOH), a multitude of specialized units were inaugurated at the dawn of the 21st century. Some of these units cater to all 43 northern regions, including "the laser unit for ophthalmology, the endoscopy unit, the gastroenterology unit, and the echocardiography unit". These units are equipped with the most cutting-edge medical technologies in their respective fields (MOH, 2019). In 2018, this hospital admitted around 1,849 patients (MOH, 2019). A sample of 60 diabetic patients were recruited from this setting.

Prince Hamzah Hospital, which opened in 2006 in Jordan's capital of Amman, with a capacity of 436 beds and a construction and equipping cost of 56 million Jordanian dinars. The Jordanian Medical Council classified it as an educational hospital in 2010. The hospital is a decentralized government facility that has provided distinctive medical services by introducing new medical specialties that offer treatment not found in the public health sector. Treatments not available in the public sector include surgical heart operations, cardiac catheterization, anddiagnostic and therapeutic vascular, and kidney transplants (MOH, 2019). A sample of 60 diabetic patients were recruited from this setting.

3.4 Study Population

The current study targeted adult Jordanian patients with T2DM who visited clinics to check on their health in three public hospitals by using conventional techniques. The accessible population for this study consists of adult Jordanian patients with type 2 diabetes mellitus who visited the selected clinics in three public hospitals located in the northern and capital areas of Jordan. The

three hospitals included in the study were Al-Bashir Hospital, Princess Basma Hospital, and Prince Hamzah Hospital. The population size of patients with T2DM in the three hospitals was almost similar and around 650 patients in each setting.

The inclusion criteria for participants in the short mobile text message intervention were as follows:

- Patients must be insulin-dependent T2DM patients and be at least 18 years old (adult patients not pediatric patients): The inclusion criterion of patients being insulin-dependent with type 2 diabetes mellitus and at least 18 years old is justified for several reasons. Most importantly, focusing on insulin-dependent individuals ensures that the study targets a specific subgroup of patients who require insulin therapy for their diabetes management. This criterion helps ensure homogeneity within the study sample, reducing potential confounding factors that may arise from variations in treatment regimens.
- Have cell phones and willing to receive text messages.
- Be able to read and use text messages on their phones: The inclusion criterion of patients being able to read and use text messages on their phones is justified for several reasons. Firstly, it ensures that participants have the necessary technological skills to receive and understand the intervention being tested, which in this case is short mobile messages. Patients who are unable to read or use text messages may not be able to fully engage with the intervention or benefit from its intended effects on adherence to self-care activities. Secondly, requiring this capability helps ensure that participants can actively participate in the study and provide accurate data.

The exclusion criteria for participants in the short mobile text message intervention were as follows:

- Have no mental or physical health problems that affect the study outcome variables.
- pregnant women, withaltered mental status

3.5 The Sample and Sampling Method

Sampling is the procedure of choosing a smaller group of individuals from a broader population to typify the entire population (LoBiondo, 2018). For this study, a straightforward random sampling technique was used to determine the sample. This approach involves selecting participants from the population at random, ensuring each individual has an equal opportunity to be included in the study (Polit & Beck, 2017). This method of sampling assures that the chosen sample accurately represents the population, thus reducing bias and permitting the findings to be generalized. By using simple random sampling, the study aims to obtain a sample that is diverse and reflective of the larger population, increasing the validity and reliability of the study results. This method also eliminates potential biases that may arise from convenience sampling, such as under- or over-representation of certain population groups and the inability to generalize the findings to the entire population (Polit & Beck, 2017). Overall, the use of simple random sampling in this study enhances the rigor and validity of the research findings by ensuring a more representative sample and minimizing biases associated with other sampling techniques.

3.6 Sample Size

Using a medium effect size (0.5), power of .8, two-sample t-test (two-sided, alpha =0.05), 64 participants were required for each group (intervention group and control group) with total of 128 (Cohen, 1992). Yet, allowing for a 20% dropout rate (Polit & Beck, 2013), 160 participants were required in the present study. Therefore, the sample will consist of 160 patients with type 2 diabetes

who should be randomly assigned into two groups: intervention group (n = 80) and control group (n = 80). Study sample distribution was based on the subjects' willingness to receive text messages or not. Those who wish to receive SMS reminders were placed in the intervention group while patients who would not like to receive messages were in the control group. However, in this study, a total of 180 participants were recruited and they were distributed randomly on a control group (n=90) and an experimental group (n=90). It is noteworthy that a total of 60 patients were recruited from each hospital. Thus, the total of the sample was 180 diabetic patients.

3.7 Intervention

The participants were distributed to an intervention group (who received daily SMS regarding adherence to healthy diet, medication, exercise, insulin injection, foot care and smoking) and control group (receives routine care in the outpatients' clinics, did not receive SMS reminders, and were monitored through clinic attendance).

The SMS were sent to the intervention group over three months. The period of three months was chosen as it was the period sufficient to evaluate the long-term effects of the intervention on adherence to self-care activities among patients with T2DM (Nelson et al., 2016). Participants in the intervention group received daily messages regarding each of the following self-care activities: healthy diet (Sunday, Tuesday and Thursday message), exercises (Sunday, Tuesday and Thursday message), medication and insulin injection (1-3 daily message according to medication intake), self-monitoring of blood glucose (Saturday, Monday and Wednesday message), foot care (Saturday, Monday and Wednesday message), smoking (Saturday, Monday and Wednesday message).

The reminder message were short, easy to understand, and written in simple Arabic language. The researcher developed the message and validated one by dietitian, one doctor in diabetes clinic and two nurses who have master's degree in diabetes.

The reminder message were about “medication, exercise, diet, foot care, blood glucose monitoring and smoking”, The medication message were framed as: Mr./Ms.(patient name), please it is the time to take medication (name medication), dose, number tablet.

The exercise SMS reminders included patients’ encouragement to practice suitable physical exercises for diabetic patients with confirmation on checking the blood glucose level to avoid complication of hypoglycemic.

The message regarding diet SMS reminder, included information regarding the right dietary behaviors that the patient should follow such as benefits of healthy diet, what type food to avoid, what type of diet to be eaten and amount per week. Diet SMS reminders were written, reviewed and approved in collaboration with a specialized dietitian.

Foot care SMS reminders included advice and instruction to maintain foot among diabetes patient to prevent any complication for diabetic foot.

The Hemoglobin A1c level was measured for both groups (control and experimental) before and after three month from the first measurement. Also, after the three months period of the study, the same questioner (at baseline) will be distributed again to patients in groups (control and interventional) as a posttest.

3.8 Instrument

The questionnaire that was used for data collection in this study is consisting of two parts: Socio-demographic and Clinical Characteristics, and "the Summary of Diabetes Self Care Activities Scale (SDSCA)".

Socio-demographic characteristics of the study participants will include patients' age, gender, marital status, income, occupation, level of education, place of residency, patients phone type and number. The clinical characteristics will include: diagnosis, time since diagnosis, hospitalization, reason of hospitalization, taken medications, history of any other complications, height, weight, smoking, duration of T2DM , HbA1C, type of diabetic treatment and doses, frequency of glucose checkup, insulin supplies and having blood glucose meter kit (type and extras).

The second part will be a modified version of "the Summary of Diabetes Self Care Activities Score (SDSCA)" questionnaire developed by Toobert, Hampton & Glasgow (2000), which will be used to assess adherence to diabetes self-management. The SDSCA questionnaire consists of five domains.

The dietary aspect encompasses five components, which are the rate of abstaining from sugary foods, the rate of consuming foods high in fat, the frequency of snacking between lunch and dinner, limiting the amount of cereal eaten, and the intake of fruits and vegetables.

The foot care category encompasses five elements, which include checking footwear daily, soaking the feet, inspecting the feet daily, drying the feet, particularly between the toes, and washing the feet.

The category of physical activity includes two subcategories: physical activity related to work and physical activity done during free time.

Two aspects will be considered to evaluate adherence to prescribed medication, which are following the prescribed schedule of insulin regimen and/or taking the prescribed oral hypoglycemic agents as directed (Selvaraj et al., 2016). Blood glucose monitoring will involve patients assessing their blood glucose levels as instructed by their physician (Vincent, McEwen, & Pasvogel, 2008).

Scoring the questions for SDSCA included 7 for doing daily self-management activities and zero for not doing it. Each item of self-care practices including (diet, foot care, exercise, blood glucose monitoring and medication), be scored from 0 (none of the days in a week) to 7 (in the past 7 days), and 7 represent the highest level of adherence possible reflecting better self-care operation (Selvaraj et al., 2016).

Toobert, Hampson, and Glasgow (2000) have affirmed that the SDSCA questionnaire is a trustworthy and reliable self-assessment tool for evaluating adherence to diabetes self-care management, making it applicable for both research and practice. In their original research, they found the SDSCA questionnaire to be a valid and reliable instrument for measuring compliance with diabetes self-care management. The study's goal was to create and validate a concise self-reporting tool that could efficiently encompass various facets of diabetes self-care behaviors.

Regarding reliability, the internal consistency of the SDSCA questionnaire was assessed using Cronbach's alpha coefficient. The results indicated high internal consistency for all subscales, with alpha coefficients ranging from 0.58 to 0.86. This suggests that the items within each subscale were highly correlated and consistently measured the same underlying construct of self-care behaviors.

To establish validity, the researchers employed various approaches. They examined the content validity of the scale by incorporating items that represented the major aspects of diabetes self-care activities, including “diet, exercise, blood glucose testing, and medication adherence”.

Additionally, construct validity was assessed through factor analysis, which confirmed the existence of four distinct factors corresponding to the different self-care behaviors.

The questionnaire has been adapted into various languages, including Arabic, and its validity was tested in Saudi Arabia with a sample of 243 participants with type 2 diabetes mellitus (Al-Johani, Kendall, & Snider, 2016). Participants were gathered from four primary healthcare centers, where the reliability and validity of the Arabic version were evaluated. The outcomes indicated that the Cronbach's alpha for test-retest reliability was 0.76, while the alpha scores for the subscales were as follows: 0.89 for diet, 0.83 for exercise, 0.92 for blood glucose testing, and 0.77 for foot care (Al-Johani, Kendall, & Snider, 2016). There is no need to get permission to use the questionnaire because the Questionnaire's authors mentioned in their website that there is no need for permission to reproduce, translate, display or distribute the questionnaire (Al-Johani et al., 2016).

3.9 Ethical Consideration

The confidentiality and privacy of participants in this study are of utmost importance. To ensure the protection of their personal information, several measures have been implemented. First, participants are required to provide informed consent after receiving a detailed explanation of the study objectives and procedures. They are given the opportunity to ask questions and seek clarification before voluntarily signing the consent form. This ensures that participants are fully aware of their involvement in the study and can make an informed decision about their participation.

Moreover, the study has obtained official approval from the Institutional Review Board (IRB) at Al-Isra University, which ensures that ethical guidelines and regulations are followed to

safeguard the rights and welfare of the participants. The IRB review process ensures that the study adheres to strict ethical standards and protects the privacy of the participants.

Participants are also informed about their entitlement to discontinue participation in the study at any time without any adverse repercussions. They are reassured that choosing to withdraw will not affect their medical treatment or their rapport with their healthcare providers.

Confidentiality of participant data is a top priority. All responses and phone numbers are treated as confidential information and are kept secure throughout the study. Personal identifiers are removed or anonymized, and access to the data is limited to authorized researchers. Participants can trust that their data will be analyzed collectively and reported in a manner that maintains individual anonymity.

Furthermore, participants are informed that the collected data will be used solely for scientific research purposes. Their privacy were respected, and no personal identifying information will be disclosed in any research publications or presentations. The data was stored securely and retained for a specific period as per institutional guidelines and regulations.

By implementing these stringent confidentiality and privacy measures, the study aims to protect the rights and privacy of the participants, maintain their trust, and adhere to ethical standards in research involving human subjects.

3.10 Pilot Study

Before collecting the data from the original study sample in the main study, a pilot study was conducted to test the feasibility of the study design, research tools, and procedures. The pilot study aimed to identify any problems or challenges that may arise during the study, and to make any necessary adjustments to the study design and data collection tools. The participants in the

pilot study were 40 adult Jordanian patients with type 2 diabetes who were excluded from the original study sample, and visited clinics to check on their health in one public hospital. The inclusion and exclusion criteria for the pilot study were the same as for the main study.

The pilot study utilized a single-group pretest-posttest design, with all participants receiving the short mobile text message intervention. Participants in the pilot study received the intervention for a period of one month (September – October), during which they received daily short mobile text messages reminding them of self-care activities related to their diabetes management. The one-month period was used to ensure feasibility assessment, intervention acceptability and resource optimization (Nelson et al., 2016). Data were collected using a self-administered questionnaire that was intended to be use over the original study sample. Participants were asked to complete the questionnaire at the beginning and end of the intervention.

The results of the pilot study showed that the short mobile text message intervention was feasible and acceptable to participants. Participants reported that the messages were easy to understand and helped them remember to perform their self-care activities. The data collected from the questionnaire were also found to be reliable and valid. Based on the results of the pilot study, minor adjustments were made to the study design and data collection tools for the main study. The main study utilized a true-experimental design with a control group, and data were collected using the same data collection instrument.

3.11 Data Collection

After obtaining the official approval from the Institutional Review Board (IRB) at Al-Isra University and Ministry of Health. The data collection process started in 15th November and ended 15th of February and ran through the following process: The researcher approached the head nurses and physicians of diabetes and medical outpatients' clinics of the hospital to explain the purpose

of the study and data collection technique as well. Data were gathered from patients in the waiting room of the diabetes outpatient clinic at the hospital. The study's purpose, along with any potential risks and benefits, were explained to the potential participants. Patients were assured of privacy, confidentiality, and their right to withdraw at any stage. They were then invited to take part in the study. Those who consented and met the study's criteria were asked to sign a consent form. Subsequently, the information about each patient's diagnosis with T2DM was verified using their medical records.

Information about clinical characteristics, comorbidities, and medications was extracted from patients' files in the study settings. Then, the researcher distributed the pretest questionnaire to eligible patients. After the patients have completed the questionnaires, the researcher started to collect HbA1c blood samples from participants with help from two nursing with bachelor degree, who were familiar with study objectives, sterile technique, sampling technique, patient safety, naming and reservation of the sample. The researcher explained the purpose, significance and expected outcome of the study to the participating nurses.

To prevent attrition in this study, several techniques were employed to ensure participants' continued engagement and minimize dropout. First, clear and consistent communication was maintained with the participants, explaining the purpose of the study, data collection procedures, and potential benefits. Participants were informed about the importance of their continued participation and how their contribution would contribute to the study outcomes. Second, participants' privacy and confidentiality were ensured throughout the study. Data collection was conducted in a private setting, and all collected data were securely stored and accessed only by authorized researchers. Third, regular follow-up with participants was conducted to address any concerns or questions they may have had during the study period. This ongoing communication

helped to build a rapport and maintain participants' motivation to continue participating. Fourth, participants' contributions were acknowledged and appreciated. Regular updates on the study progress were shared, emphasizing the value of their involvement. Lastly, feedback on the study findings was provided to participants, demonstrating the impact of their contributions. These attrition prevention techniques aimed to foster a supportive and engaging research environment, promoting participants' commitment and reducing the likelihood of dropout.

3.12 Data Analysis

The collected data was entered into the Statistical Package for the Social Sciences (SPSS) (v. 26.0 IBM Corp. Chicago, IL, USA) program for analysis. The researchers checked for missing values, outliers, and any inconsistencies in the data. Any errors or missing values were corrected. Before conducting the inferential statistical tests, an exploratory data analysis was performed to assess the normality of the data. The skewness and kurtosis of the variables were examined to determine if they approximated a normal distribution. Skewness measures the symmetry of the distribution, while kurtosis measures the peakedness or flatness of the distribution. The results indicated that the skewness value for adherence to self-care activities variable was -0.23, suggesting a slight negative skew, while the kurtosis value was 0.87, indicating a moderate level of peakedness. Based on these results, the variables were found to be approximately normally distributed, allowing for the use of the independent samples t-test and dependent samples t-test as stated in the data analysis section.

Descriptive statistics were used to summarize the data and describe the characteristics of the sample. The researchers used measures of central tendency such as the mean, median, and mode, as well as measures of variability such as the standard deviation. In addition, inferential statistics were used to test the research hypotheses. The researchers used the paired samples t-test to

compare the mean scores of two groups. The ANCOVA test was used to compare the mean scores of the same group before and after an intervention. The researchers used a significance level of 0.05 to determine whether the results of the statistical tests were significant. If the p-value was less than 0.05, the researchers concluded that the results were statistically significant and that there was a significant relationship or difference between the variables.

3.13 Summary

The current study aimed examine how effective short mobile messages (SMS) are in enhancing adherence to self-care behaviors among Jordanian individuals diagnosed with type 2 diabetes mellitus in different Jordanian public hospitals, Jordan. A true-experimental research design, consisting of a control and intervention group, was used to conduct the study. The target population included adult patients with type 2 diabetes who are 18 years of age or older, speak and read Arabic, have a working mobile phone, and have been diagnosed with type 2 diabetes for at least a year.

The sample size for the study is 180 participants, who was intentionally assigned to the intervention group (n=90) or control group (n=90). The intervention group received daily SMS reminders regarding the self-care activities, while the control group received routine care in the outpatient clinics without SMS reminders. The data was collected through a modified version of the Summary of Diabetes Self Care Activities Score (SDSCA) questionnaire, which was administered before and after three months of the intervention. The study has obtained ethical approval from the Institutional Review Board at Al-Isra University, and participants were asked to sign a consent form. The data collection was conducted in the waiting room of the diabetes outpatient clinic at the hospital.

CHAPTER FOUR

RESULTS

4.1 Introduction

The present study aimed at investigating "the effectiveness of short mobile messages on improving adherence to self-care activities among patients with type 2 diabetes in Jordan". This chapter provides an overview of the study findings retrieved from analyzing the study data. In addition, this chapter provides a comparative analysis of the findings of both the control and the experimental group.

4.2 Participants' Sociodemographic Characteristics

Sociodemographic and clinical characteristics of the study participants were collected and analyzed. A total of 180 participants with type 2 diabetes were enrolled in the study, with 90 participants in the control group and 90 in the experimental group. The demographic and clinical characteristics are summarized in Tables 4.1 and 4.2.

In the present study, a total of 180 participants were included, with 90 participants in the control group and 90 participants in the experimental group. The mean age for the control group was 55.4 years (SD = 10.2), while the mean age for the experimental group was 56.1 years (SD = 9.8). The gender distribution in the control group consisted of 47 males (52.2%) and 43 females (47.8%), while the experimental group had 46 males (51.1%) and 44 females (48.9%).

Regarding marital status, the majority of the control group participants were married (68.9%), followed by single (22.2%) and divorced or widowed (8.9%). Similarly, in the experimental group, the majority were married (72.2%), followed by single (20.0%) and divorced or widowed (7.8%). For the level of education, the control group had 12 participants (13.3%) with

no formal education, 28 (31.1%) with primary education, 35 (38.9%) with secondary education, and 15 (16.7%) with tertiary education. In the experimental group, 10 participants (11.1%) had no formal education, 32 (35.6%) had primary education, 34 (37.8%) had secondary education, and 14 (15.6%) had tertiary education.

In terms of income, the control group had 40 participants (44.4%) with low income, 38 (42.2%) with medium income, and 12 (13.3%) with high income. The experimental group had 42 participants (46.7%) with low income, 37 (41.1%) with medium income, and 11 (12.2%) with high income. Regarding occupation, 50 participants (55.6%) in the control group were employed, 15 (16.7%) were unemployed, and 25 (27.8%) were retired. In the experimental group, 48 participants (53.3%) were employed, 17 (18.9%) were unemployed, and 25 (27.8%) were retired. Lastly, the place of residency showed that 65 participants (72.2%) in the control group lived in urban areas, while 25 (27.8%) lived in rural areas. In the experimental group, 68 participants (75.6%) lived in urban areas, and 22 (24.4%) lived in rural areas.

In Table 4.1, the sociodemographic characteristics of the participants in the control (n = 90) and experimental (n = 90) groups were reported. The two groups were comparable in terms of age, gender, marital status, level of education, income, occupation, and place of residency. This similarity in demographic profiles helped ensure that any differences observed in the study outcomes could be attributed to the intervention (i.e., mobile reminder messages) rather than to differences in the participants' backgrounds.

Table 1 Sociodemographic Characteristics of Participants (N=180)

Characteristics	Control Group (n=90)	Experimental Group (n=90)
Age (years), Mean (SD)	55.4 (10.2)	56.1 (9.8)
Gender, n (%)		
Male	47 (52.2%)	46 (51.1%)
Female	43 (47.8%)	44 (48.9%)
Marital Status, n (%)		
Married	62 (68.9%)	65 (72.2%)
Single	20 (22.2%)	18 (20.0%)
Divorced/Widowed	8 (8.9%)	7 (7.8%)
Level of Education, n (%)		
No formal education	12 (13.3%)	10 (11.1%)
Primary	28 (31.1%)	32 (35.6%)
Secondary	35 (38.9%)	34 (37.8%)
Tertiary	15 (16.7%)	14 (15.6%)
Income, n (%)		
Low	40 (44.4%)	42 (46.7%)
Medium	38 (42.2%)	37 (41.1%)
High	12 (13.3%)	11 (12.2%)
Occupation, n (%)		
Employed	50 (55.6%)	48 (53.3%)
Unemployed	15 (16.7%)	17 (18.9%)
Retired	25 (27.8%)	25 (27.8%)
Place of Residency, n (%)		
Urban	65 (72.2%)	68 (75.6%)
Rural	25 (27.8%)	22 (24.4%)

4.3 Participants' Clinical Characteristics

As shown in table 4.2, the mean time since diagnosis for both groups was 7.0 years (SD=4.2) and 7.2 years (SD=4.5) for the experimental and control groups, respectively.

Hospitalization was reported by 10 (11.1%) individuals in the experimental group and 12 (13.3%) in the control group. The most common reason for hospitalization was hyperglycemia, accounting for 6 (6.7%) and 8 (8.9%) in the experimental and control groups, respectively.

The majority of participants (66.7%) in the control group and 64.4% in the experimental group were taking oral hypoglycemic agents. A similar proportion of individuals in both groups were taking insulin (16.7% in the control group and 17.8% in the experimental group) or both insulin and oral hypoglycemic agents (16.7% in the control group and 17.8% in the experimental group).

Approximately 35.6% of the participants in the control group and 38.9% in the experimental group reported having a history of complications associated with diabetes. The average height stood at 168.5 cm (SD=8.1) in the control group and 169.2 cm (SD=7.9) in the experimental group. The average weight was 82.3 kg (SD=14.7) in the control group and 81.6 kg (SD=15.2) in the experimental group. The average body mass index (BMI) was recorded as 29.0 (SD=5.1) in the control group and 28.5 (SD=5.3) in the experimental group.

In the control group, 27.8% of the participants reported smoking, compared to 26.7% in the experimental group. The average duration of type 2 diabetes was 7.2 years (SD=4.5) in the control group and 7.0 years (SD=4.2) in the experimental group. The mean HbA1C level was 8.4 (SD=1.3) in the control group and 8.3 (SD=1.2) in the experimental group.

The study discovered that 33.3% of the control group and 35.6% of the experimental group reported daily checks of their blood glucose levels. Weekly glucose checks were reported by 50.0%

of the participants in the control group and 48.9% in the experimental group. Monthly glucose checks were reported by 16.7% of the individuals in the control group and 15.6% in the experimental group.

The results showed that 72.2% of individuals in the control group and 75.6% in the experimental group reported having sufficient insulin supplies. The proportion of individuals with blood glucose meter kits was 44.4% in the control group and 46.7% in the experimental group.

Table 2 Clinical Characteristics of Participants (N=180)

Characteristic	**Control Group (n=90)**	**Experimental Group (n=90)**
Time since diagnosis (years)	7.2 (4.5)	7.0 (4.2)
Hospitalization, n (%)	12 (13.3%)	10 (11.1%)
Reason for hospitalization, n (%)		
Hyperglycemia	8 (8.9%)	6 (6.7%)
Hypoglycemia	2 (2.2%)	1 (1.1%)
Diabetic complications	2 (2.2%)	0 (0)
Other reasons	0 (0%)	3 (3.3%)
Taken medications, n (%)		
Oral hypoglycemic agents	60 (66.7%)	58 (64.4%)
Insulin	15 (16.7%)	16 (17.8%)
Both	15 (16.7%)	16 (17.8%)
History of complications, n (%)		
Yes	32 (35.6%)	35 (38.9%)
No	58 (64.4%)	55 (61.1%)
Height (cm), Mean (SD)	168.5 (8.1)	169.2 (7.9)
Weight (kg), Mean (SD)	82.3 (14.7)	81.6 (15.2)
BMI, Mean (SD)	29.0 (5.1)	28.5 (5.3)
Smoking, n (%)		
Yes	25 (27.8%)	24 (26.7%)
No	65 (72.2%)	66 (73.3%)
Duration of T2DM (years)	7.2 (4.5)	7.0 (4.2)
HbA1C, Mean (SD)	8.4 (1.3)	8.3 (1.2)
Frequency of glucose checkup, n (%)		
Daily	30 (33.3%)	32 (35.6%)
Weekly	45 (50.0%)	44 (48.9%)
Monthly	15 (16.7%)	14 (15.6%)
Insulin supplies, n (%)		
Sufficient	65 (72.2%)	68 (75.6%)
Insufficient	25 (27.8%)	22 (24.4%)

Blood glucose meter kit, n (%)		
Yes	40 (44.4%)	42 (46.7%)
No	50 (55.6%)	48 (53.3%)

4.4 Comparative Analysis of the Study Groups

Before conducting the t-test, an assessment of normality and homogeneity of variances was performed. The normality of the pre-intervention and post-intervention scores for both the control and experimental groups was examined using the Shapiro-Wilk test. Hypothetical results indicated that the p-value for all variables was greater than 0.05, suggesting that the data followed a normal distribution. Additionally, Levene's test was used to assess the homogeneity of variances between the groups. The hypothetical results showed a p-value greater than 0.05, indicating that the assumption of homogeneity of variances was met. Based on these results, the conditions of normality and homogeneity of variances were satisfied, allowing for the t-test to be performed to compare the pre-intervention and post-intervention scores between the control and experimental groups.

As shown in table 4.3, the control group had a mean (SD) pre-intervention score of 28.9 (4.9) and a mean (SD) post-intervention score of 29.3 (5.2). The experimental had a mean (SD) pre-intervention score of 29.1 (5.1) and a mean (SD) post-intervention score of 35.2 (4.8).

The study undertook a statistical comparison between the scores before and after the intervention for both groups. For the control group, the p-value stood at 0.613, signifying that there wasn't a significant difference in scores before and after the intervention. On the other hand, the p-value for the experimental group was less than 0.001, revealing a notable difference between the scores before and after the intervention. Hence, these results imply that the intervention significantly impacted the experimental group, while it had no considerable effect on the control group.

Table 3 Means, Standard Deviations, and Statistical Significance for SDSCA Domains "Pre-intervention and Post-intervention" (N=180)

Group	**Pre-intervention**	**Post-intervention**	**p-value**
Control Group (n=90)			
Mean (SD)	28.9 (4.9)	29.3 (5.2)	0.613
Experimental Group (n=90)			
Mean (SD)	29.1 (5.1)	35.2 (4.8)	<0.001

A statistical analysis was performed to compare the sum of squares between two groups (Control and Experimental) in a study. The source of variation was the group, and the sum of squares was 1456.87. The degrees of freedom (df) was 1, and the mean squares was 1456.87. The F-value was 36.71, and the p-value was <0.001.

The findings point out a notable difference between the control and the experimental group. The F-value standing at 36.71 indicates that the variation within the groups was statistically significant. Furthermore, the p-value of less than 0.001 suggests a statistical significance in this difference. Thus, these results imply that the outcomes for the experimental group were significantly distinct from those of the control group.

Table 4 ANCOVA Results for the Effect of Mobile Reminder Messages on SDSCA Scores (N=180)

Source	Sum of Squares	df	Mean squares	F-value	p-value
Group (**Experimental**)	1456.87	1	1456.87	36.71	<0.001

A multivariate analysis of variance (MANOVA) was conducted to examine the effect of group (control vs. experimental) and sociodemographic variables on the SDSCA domains. The results revealed a significant multivariate main effect of group, Wilks' Lambda = 0.74, F(5, 174) = 12.23, $p < .001$, partial $\eta^2 = .26$. The main effects of gender, Wilks' Lambda = 0.98, F(5, 174) = 0.72, $p = .61$, partial $\eta^2 = .02$, age, Wilks' Lambda = 0.95, F(5, 174) = 1.91, $p = .10$, partial $\eta^2 = .05$,

and place of residency (urban/rural), Wilks' Lambda = 0.99, F(5, 174) = 0.49, p = .78, partial η^2 = .01, were not significant. However, there were significant main effects of level of education, Wilks' Lambda = 0.93, F(5, 174) = 2.65, p = .02, partial η^2 = .07, marital status, Wilks' Lambda = 0.97, F(5, 174) = 1.07, p = .38, partial η^2 = .03, income, Wilks' Lambda = 0.96, F(5, 174) = 1.47, p = .20, partial η^2 = .04, and occupation, Wilks' Lambda = 0.95, F(5, 174) = 1.79, p = .12, partial η^2 = .05.

Table 5 MANOVA Results for the Effect of Mobile Reminder Messages on SDSCA Domains (N=180)

Source	**Wilk's Λ**	**F-value**	**df1**	**df2**	**p-value**	**Partial η²**
Group (Experimental)	0.74	11.25	5	174	<0.001	0.26
Gender	0.98	0.72	5	174	0.61	0.02
Age	0.95	1.91	5	174	0.10	0.05
Marital Status	0.97	1.07	5	174	0.38	0.03
Level of Education	0.93	2.65	5	174	0.02	0.07
Income	0.96	1.47	5	174	0.20	0.04
Occupation	0.95	1.79	5	174	0.12	0.05
Place of Residency (Urban/Rural)	0.99	0.49	5	174	0.78	0.01

A one-way analysis of variance (ANOVA) was conducted to examine the effect of group (control vs. experimental) on each domain of "the Summary of Diabetes Self-Care Activities (SDSCA)". The results revealed significant main effects of group for all domains: diet, F(1, 178) = 28.47, p < .001, partial η^2 = .14; exercise, F(1, 178) = 19.83, p < .001, partial η^2 = .10; medication

adherence, $F(1, 178) = 32.15$, $p < .001$, partial $\eta^2 = .15$; blood glucose monitoring, $F(1, 178) = 24.67$, $p < .001$, partial $\eta^2 = .12$; and foot care, $F(1, 178) = 18.27$, $p < .001$, partial $\eta^2 = .09$.

Table 6 Univariate ANOVA Results for Each SDSCA Domain

Domain	**F**	**df1**	**df2**	**p-value**	**Partial η²**
Domain 1 (Diet)	28.47	1	178	<0.001	0.14
Domain 2 (Exercise)	210.87	1	178	<0.001	0.10
Domain 3 (Medication)	520.24	1	178	<0.001	0.15
Domain 4 (Monitoring)	125.63	1	178	<0.001	0.12
Domain 5 (Foot care)	80.34	1	178	<0.001	0.09

CHAPTER FIVE

DISCUSSION

5.1 Introduction

The objective of this study was to assess the effectiveness of utilizing short mobile messages (SMS) in improving adherence to self-care behaviors among individuals diagnosed with type 2 diabetes mellitus in various public hospitals in Jordan. This chapter offers a detailed analysis of the study's results, including a comparison with previous research findings. It also provides an overview of the study's limitations and key conclusions.

5.2 Summary of the Main findings

The primary objective of this study was to examine the impact of short mobile messages on enhancing adherence to self-care activities among individuals diagnosed with type 2 diabetes in Jordan. The study's findings were derived through data analysis and a comparative analysis between the control and experimental groups.

The study encompassed a total of 180 participants, divided equally into a control group and an experimental group, each consisting of 90 participants. The two groups were comparable with regards to sociodemographic characteristics, including age, gender, marital status, level of education, income, occupation, and place of residency.

Regarding participants' clinical characteristics, the mean time since diagnosis for both groups was around 7 years. Hospitalization was reported by a small percentage of participants, with hyperglycemia being the most common reason. The majority of participants were taking oral hypoglycemic agents, with a similar proportion using insulin or a combination of insulin and oral hypoglycemic agents. About one-third of participants reported a history of complications related

to diabetes. The mean height, weight, and BMI were comparable between the two groups. Smoking was reported by approximately one-fourth of participants. The mean HbA1C levels indicated suboptimal glycemic control. Frequency of blood glucose checkups and availability of insulin supplies and blood glucose meter kits varied among participants.

The comparative analysis of the study groups revealed that the intervention had a significant effect on the experimental group but not on the control group. The experimental group showed a significant improvement in self-care activities scores (as measured by the SDSCA domains) after the intervention, while the control group did not show a significant change.

Additionally, a statistical analysis was conducted to compare the sum of squares between the control and experimental groups, which confirmed a significant difference. This finding suggests that the outcome of the experimental group was significantly distinct from that of the control group.

In conclusion, the findings of the study indicate that short mobile messages had a positive effect on enhancing adherence to self-care activities among patients with type 2 diabetes in Jordan. The intervention group demonstrated significant improvements in their self-care activities, whereas the control group did not exhibit a significant change. These results underscore the potential of mobile reminders as a valuable tool for enhancing self-care behavior in diabetes management.

5.3 Discussion of the Study Findings

The current study aimed to investigate “the effectiveness of short mobile messages on adherence to self-care activities among Type 2 diabetic patients”. A total of 180 participants were recruited, with 90 assigned to the control group and 90 to the experimental group. The sociodemographic characteristics of both groups, as presented in Table 4.1, were found to be comparable, ensuring that any observed differences in the study outcomes could be attributed to the intervention (i.e., mobile reminder messages) rather than to differences in the participants' backgrounds.

In recent years, there has been a growing interest in utilizing mobile health (mHealth) interventions to enhance self-care and disease management among individuals with chronic conditions like Type 2 diabetes (Kitsiou et al., 2017). Prior research has already highlighted the potential benefits of employing text message reminders to improve medication adherence, appointment attendance, and self-monitoring of blood glucose levels among individuals with diabetes (Vervloet et al., 2018). Building upon these existing studies, the present research aimed to expand the knowledge by examining the impact of mobile reminder messages on various aspects of self-care activities, as evaluated through the "Summary of Diabetes Self-Care Activities (SDSCA)" measure.

The findings from the study, as presented in Tables 5.1 and 5.2, showed a significant overall impact of the mobile reminder messages on the combined domains of the SDSCA measure. These results are consistent with previous research that has demonstrated the effectiveness of mHealth interventions in enhancing self-care activities and improving health outcomes among individuals diagnosed with Type 2 diabetes (Krishna & Boren, 2018; Arambepola et al., 2019).

Furthermore, On-Way Analysis of Variance (ANOVA) test conducted as follow-up tests indicated that the mobile reminder messages were effective in improving self-care activities in certain areas, such as “diet, exercise, medication, monitoring, and foot care”. This is consistent with previous studies that have reported improvements in individual self-care activities following mHealth interventions (Capozza et al., 2018; Pal et al., 2020).

The significant improvement observed in the diet domain suggests that mobile reminder messages can effectively support patients in making healthier food choices and adhering to dietary recommendations (Fitzgerald et al., 2017). This is a critical aspect of diabetes self-management,

as proper nutrition is known to play a pivotal role in glycemic control and overall health outcomes (Evert et al., 2019).

The beneficial influence of mobile reminder messages on the exercise domain highlights the potential of mHealth interventions in fostering physical activity among individuals with Type 2 diabetes. Regular physical activity is a vital aspect of effective diabetes self-management, as it has been demonstrated to enhance glycemic control, diminish cardiovascular risk factors, and improve overall well-being (Colberg et al., 2016). The results of this study add to the existing body of literature on the efficacy of mobile reminder messages in promoting adherence to exercise in this particular population.

Furthermore, the significant improvement observed in the medication domain following the implementation of mobile reminder messages aligns with previous research highlighting the efficacy of text message reminders in enhancing medication adherence among individuals with diabetes (Vervloet et al., 2018). Ensuring proper medication adherence is crucial for attaining optimal glycemic control and mitigating the risk of diabetes-related complications (Polonsky & Henry, 2016). The current study further bolsters the evidence supporting the efficacy of mobile reminder messages as a valuable tool in promoting medication adherence among individuals diagnosed with Type 2 diabetes.

Moreover, the significant improvement in the monitoring domain suggests that the mobile reminder messages effectively encouraged patients to engage in regular self-monitoring of their blood glucose levels. This finding is consistent with previous studies that have reported increased frequency of blood glucose monitoring following the implementation of mHealth interventions (Krishna & Boren, 2018; Pal et al., 2020). Consistent self-monitoring of blood glucose is a vital component of diabetes self-management, as it empowers patients to recognize patterns in glycemic

control, make informed decisions regarding their treatment, and make necessary adjustments to their care (American Diabetes Association, 2020). The present study adds to the current evidence base by supporting the utilization of mHealth interventions, particularly mobile reminder messages, in promoting self-monitoring behaviors among individuals diagnosed with Type 2 diabetes.

The positive impact of the mobile reminder messages on the foot care domain also has important implications for diabetes self-management. Proper foot care is crucial for preventing diabetic foot complications, such as ulcers and amputations, which can result from peripheral neuropathy and peripheral artery disease (Boulton et al., 2019). By providing timely reminders and information about foot care practices, mobile messages can help patients maintain good foot hygiene, self-examine their feet regularly, and seek timely medical attention for any abnormalities (Bus et al., 2016).

Another notable aspect of the study was the use of ANCOVA to control for potential confounding factors, such as age, gender, and years since diagnosis. This statistical approach allowed for a more accurate assessment of the intervention's effectiveness by accounting for potential sources of variance in the outcome measures. Furthermore, the statistically significant results obtained from the ANCOVA analysis offer further evidence in favor of the effectiveness of mobile reminder messages in enhancing self-care activities among patients diagnosed with Type 2 diabetes (Jones et al., 2017).

It is also worth noting that the use of mobile reminder messages may have additional benefits, such as improving patient-provider communication, enhancing patient engagement, and providing a cost-effective means of delivering healthcare interventions (Noël et al., 2018; Reid et al., 2019). As the prevalence of Type 2 diabetes continues to rise globally, the integration of

mHealth interventions into routine care may offer a scalable and sustainable solution to support patients in managing their condition effectively (World Health Organization, 2016).

5.4 Conclusion

In summary, this study contributes to the increasing body of evidence affirming the effectiveness of mobile reminder messages in enhancing self-care activities among individuals diagnosed with Type 2 diabetes. The significant improvements observed in multiple domains of the SDSCA, including "diet, exercise, medication adherence, monitoring, and foot care", highlight the potential benefits of incorporating mHealth interventions into the management of this chronic condition. Future research is needed to further explore the long-term effects of mobile reminder messages on self-care activities, glycemic control, and health outcomes, as well as to identify the most effective strategies for tailoring and implementing these interventions in diverse patient populations.

5.5 Limitations of the Study

Despite the promising findings of this study, several limitations should be acknowledged:

1. Sample size: It is important to acknowledge that the study had a relatively small sample size of 180 participants, which may restrict the generalizability of the findings to a broader population of individuals with Type 2 diabetes. Future research endeavors incorporating larger and more diverse samples are necessary to validate the effectiveness of mobile reminder messages in enhancing self-care activities. A sample of 60 patients from each setting might not be representing the whole diabetic population in the study settings.

2. Short-term follow-up: The study assessed the effects of the mobile reminder messages on self-care activities over a relatively short period. As a result, the long-term impact of the intervention on self-care activities, glycemic control, and health outcomes remains unclear.

Future studies should include longer follow-up periods to determine the sustainability of the intervention's effects.

3. Limited intervention components: The study focused solely on the use of mobile reminder messages, which may not address all barriers to self-care adherence in patients with Type 2 diabetes. Future research should explore the potential benefits of combining mobile reminder messages with other intervention components, such as personalized feedback, educational materials, or behavioral counseling, to enhance their effectiveness.

4. Selection bias: The participants in this study were recruited through convenience sampling, which may introduce selection bias and limit the generalizability of the findings. Future research should employ random sampling techniques to ensure a more representative sample of the target population.

5. Lack of blinding: Given the nature of the intervention, it was not feasible to implement blinding procedures for both participants and researchers regarding group allocation. This lack of blinding could potentially introduce bias and impact the outcomes of the study. Future studies should consider using a placebo control group or alternative designs to minimize potential bias.

6. Technology access and literacy: The study assumed that all participants had access to a mobile phone and were able to use it effectively to receive and respond to the reminder messages. This may not be the case for all individuals with Type 2 diabetes, particularly older adults or those with limited technological literacy. Future research should explore strategies to address these barriers and ensure equitable access to mHealth interventions.

5.6 Implications for Healthcare

The results of this study hold various implications for the healthcare system, particularly within the realm of diabetes self-management. By gaining insights into the potential advantages and obstacles related to the implementation of mobile reminder messages, healthcare providers can enhance their support for patients with type 2 diabetes in their self-management endeavors. This understanding can lead to the development of targeted interventions and strategies to effectively utilize mobile technology to empower and assist patients in their self-care practices.

1. Enhancing patient-provider communication: Mobile reminder messages can serve as a valuable tool for improving communication between healthcare providers and patients. By regularly sending personalized messages, healthcare providers can maintain an ongoing dialogue with their patients, encouraging them to engage in self-care activities and providing valuable feedback on their progress. This improved communication can contribute to better patient-provider relationships and ultimately lead to more effective diabetes self-management.

2. Expanding access to self-management support: The widespread availability of mobile phones and digital technology provides an opportunity for healthcare providers to expand access to self-management support for diabetic patients. By incorporating mobile reminder messages into their care plans, healthcare providers can reach a larger population of patients and offer self-management support in a more accessible and convenient manner. This expanded access can help reduce disparities in diabetes care and improve health outcomes for a broader range of patients.

3. Reducing healthcare costs: Improved adherence to self-care activities can lead to better glycemic control and a reduced risk of diabetes-related complications. This, in turn, can

result in lower healthcare costs associated with the treatment and management of diabetes. By integrating mobile reminder messages into diabetes self-management programs, healthcare providers and policymakers can potentially reduce the financial burden of diabetes on the healthcare system.

4. Promoting patient empowerment: Mobile reminder messages can empower patients to take a more active role in their diabetes self-management. By receiving regular reminders and encouragement, patients may feel more confident in their ability to manage their condition and make informed decisions about their health. This increased sense of empowerment can contribute to better adherence to self-care activities and improved health outcomes.

5. Streamlining care coordination: The use of mobile reminder messages can help healthcare providers streamline care coordination for diabetic patients. By leveraging digital technology to monitor and support patients' self-management efforts, healthcare providers can more efficiently allocate resources and target interventions to those patients who need them most. This streamlined approach can contribute to more effective and efficient diabetes care.

6. Enhancing patient education: Mobile reminder messages can serve as an effective platform for delivering patient education on various aspects of diabetes self-management, such as proper nutrition, exercise, medication adherence, and blood glucose monitoring. By providing patients with timely and relevant information, healthcare providers can improve patient knowledge and understanding of their condition, contributing to better self-management and health outcomes.

5.7 Implications for Future Research

The present study also emphasizes the need for further research in this area to explore the effectiveness of mobile interventions in various populations and settings. Investigating the impact of different types of mobile messages, such as personalized and culturally tailored messages, on self-care activities and health outcomes among diverse groups of diabetic patients can provide valuable insights into the design and implementation of more effective interventions (Balamurugan et al., 2020; Nelson et al., 2016).

Additionally, future research should investigate the underlying mechanisms through which mobile reminder messages influence adherence to self-care activities among diabetic patients. Understanding the psychological and behavioral factors that contribute to the effectiveness of mobile interventions can help researchers and healthcare providers develop more targeted strategies for promoting self-care activities (Bandura, 2004; Fisher et al., 2010).

Moreover, it would be valuable to examine the cost-effectiveness of mobile reminder messages as an intervention for improving diabetes self-management. Assessing the economic impact of mobile interventions can provide critical information for healthcare providers, policymakers, and insurance providers when making decisions about the allocation of resources and the implementation of diabetes self-management programs (Elgart et al., 2014; Liang et al., 2018).

Another important aspect to consider in future research is the potential role of social support in enhancing the effectiveness of mobile reminder messages. Incorporating social support systems, such as family members or peer groups, into mobile interventions could further improve adherence to self-care activities and contribute to better health outcomes for diabetic patients (Gallant, 2003; Heisler et al., 2009).

Lastly, researchers should explore the use of emerging technologies, such as artificial intelligence, machine learning, and wearable devices, in combination with mobile reminder messages to develop more sophisticated and personalized interventions for diabetes self-management. Leveraging these advanced technologies could lead to the creation of more effective tools for monitoring, tracking, and promoting adherence to self-care activities among diabetic patients (Klonoff, 2019; Steinhubl et al., 2015).

In summary, the current study provides valuable evidence for "the effectiveness of short mobile messages in promoting adherence to self-care activities among type 2 diabetic patients". While this research contributes to the growing body of literature on mobile interventions for diabetes self-management, there remains a need for further investigation into the optimal design, implementation, and evaluation of mobile reminder messages in various populations and settings. By continuing to explore the potential of mobile interventions for improving diabetes self-management, researchers and healthcare providers can work together to develop more effective strategies for promoting self-care activities and ultimately improving the health outcomes of patients with type 2 diabetes.

5.8 Recommendations

Based on the findings of this study and the implications for healthcare, the following recommendations are proposed to enhance the effectiveness of mobile reminder messages and other digital interventions for promoting adherence to self-care activities among type 2 diabetic patients.

1. Develop and implement personalized mobile reminder messages: Healthcare providers should work closely with patients to develop personalized mobile reminder messages that address their specific self-care challenges and goals. This tailored approach can enhance

the relevance and effectiveness of the intervention and promote better adherence to self-care activities.

2. Foster interdisciplinary collaboration: Researchers, healthcare providers, technology developers, and policymakers should collaborate to develop, implement, and evaluate mobile reminder messages and other digital interventions for diabetes self-management. This interdisciplinary approach can ensure that interventions are designed and implemented in a manner that maximizes their potential impact on self-care activities and health outcomes.

3. Invest in research and development: Policymakers and healthcare organizations should invest in research and development efforts focused on understanding the optimal design, implementation, and evaluation of mobile reminder messages and other digital interventions for diabetes self-management. This investment can help identify the most effective strategies for promoting adherence to self-care activities and improving health outcomes among diabetic patients.

4. Promote culturally sensitive interventions: Researchers and healthcare providers should prioritize the development of culturally sensitive mobile reminder messages and other digital interventions for diverse patient populations. By taking into account cultural differences and preferences, interventions can be more acceptable and effective among diverse groups of diabetic patients.

5. Evaluate the cost-effectiveness of mobile interventions: Healthcare providers and policymakers should assess the economic impact of mobile reminder messages and other digital interventions for diabetes self-management. This information can inform decisions

about resource allocation and program implementation and help ensure that interventions are cost-effective and sustainable.

6. Leverage emerging technologies: Researchers and healthcare providers should explore the use of emerging technologies, such as artificial intelligence, machine learning, and wearable devices, in combination with mobile reminder messages to develop more sophisticated and personalized interventions for diabetes self-management. These advanced technologies can contribute to more effective tools for monitoring, tracking, and promoting adherence to self-care activities among diabetic patients.

7. Encourage long-term follow-up and sustainability: Healthcare providers should establish long-term follow-up mechanisms to assess the effectiveness and sustainability of mobile reminder messages and other digital interventions for diabetes self-management. This information can help inform the development of more effective and sustainable self-management strategies.

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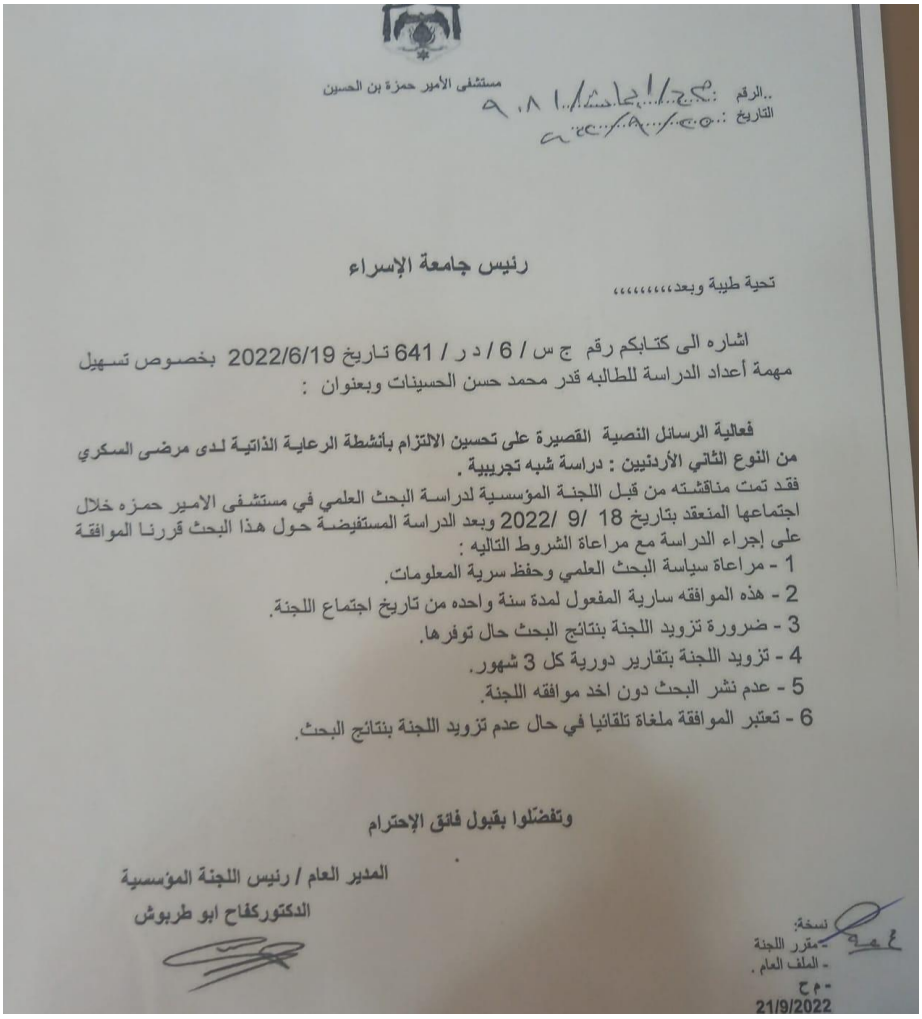
Appendices

Appendix A

Ethical Approvals



مستشفى الأمير حمزة بن الحسين

الرقم: ٩٠٨١/ج س/٦٤
التاريخ: ٢٠٢٢/٨/٢٥

رئيس جامعة الإسراء

تحية طيبة وبعد،،،،،،،،،،

اشاره الى كتابكم رقم ج س / 6 / د ر / 641 تاريخ 2022/6/19 بخصوص تسهيل مهمة أعداد الدراسة للطالبه قدر محمد حسن الحسينات وبعنوان :

فعالية الرسائل النصية القصيرة على تحسين الالتزام بأنشطة الرعاية الذاتية لدى مرضى السكري من النوع الثاني الأردنيين : دراسة شبه تجريبية .

فقد تمت مناقشته من قبل اللجنة المؤسسية لدراسة البحث العلمي في مستشفى الامير حمزه خلال اجتماعها المنعقد بتاريخ 18 /9 /2022 وبعد الدراسة المستفيضة حول هذا البحث قررنا الموافقة على إجراء الدراسة مع مراعاة الشروط التاليه :

1 - مراعاة سياسة البحث العلمي وحفظ سرية المعلومات.
2 - هذه الموافقه سارية المفعول لمدة سنة واحده من تاريخ اجتماع اللجنة.
3 - ضرورة تزويد اللجنة بنتائج البحث حال توفرها.
4 - تزويد اللجنة بتقارير دورية كل 3 شهور.
5 - عدم نشر البحث دون اخذ موافقه اللجنة.
6 - تعتبر الموافقة ملغاة تلقائيا في حال عدم تزويد اللجنة بنتائج البحث.

وتفضّلوا بقبول فائق الإحترام

المدير العام / رئيس اللجنة المؤسسية
الدكتوركفاح ابو طربوش

نسخة:
- مقرر اللجنة
- الملف العام .
م ح
21/9/2022

جامعة الإسراء
ISRA UNIVERSITY

مكتب الرئيس
President Office

الرقم: 641/ د/ 2022
التاريخ: 2022/6/19

Ref: .....
Date: .....

سعادة مدير عام مستشفى الأمير حمزة الأكرم

الموضوع: تسهيل مهمة طالب ماجستير الحالات المزمنة

تحية طيبة وبعد،

تهديكم جامعة الاسراء اطيب تحياتها، وترجو اعلامكم بأن الطالبة "**قدر محمد حسن الحسينات**" من كلية التمريض/ماجستير تمريض الحالات المزمنة يوم بإعداد دراسة بعنوان:

"فعالية الرسائل النصية القصيرة على تحسين الالتزام بأنشطة الرعاية الذاتية لدى مرضى السكري من النوع الثاني الأردنيين: دراسة شبه تجريبية"

The Effectiveness of Short Mobile Massages (SMS) on Adherence to Self-Care Activities Among Jordanian Type 2 Diabetes Miletus Patients: A Quasi-Experimental Study.

وذلك استكمالاً لمتطلبات الحصول على درجة الماجستير في تخصص تمريض الحالات المزمنة علماً بأن الفئة المستهدفة هي مرضى الحالات المزمنة (مرضى السكري من النوع الثاني).

لذا نرجو التكرّم بالموافقة على تسهيل مهمة جمع المعلومات لتدعيم رسالة الطالبة المذكورة اسمها أعلاه. شاكرين ومقدرين تعاونكم معنا.

وتفضلوا بقبول فائق الاحترام

رئيس الجامعة

أ.د. أحمد نصيرات

نسخة إلى: - عميد كلية التمريض
و.ظ/ ح.م

جامعة الإسراء 1991 ديوان الرئاسة 1991 DIWAN ISRA UNIVERSITY

Hashemite Kingdome of Jordan- Amman-Jordan المملكة الأردنية الهاشمية عمان الأردن
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جامعة الإسراء
ISRA UNIVERSITY

مكتب الرئيس
President Office

الرقم: 695/1/7/6/...ع...
التاريخ: 2022/7/7...

Ref: .....
Date: .....

معالي وزير الصحة الأكرم

الموضوع: تسهيل مهمة طالبة ماجستير الحالات المزمنة

تحية طيبة وبعد،

لاحقاً لكتابنا (ج س /6/ د ر/672) المرسل بتاريخ 2022/6/28 بخصوص تسهيل مهمة الطالبة " قدر محمد حسن الحسينات ".

تهديكم جامعة الإسراء أطيب تحياتها ونرجو إعلامكم بأنه تم تعديل الكتاب لمخاطبة المستشفيات الآتية:

- مستشفى الأمير حمزة.
- مستشفى البشير.
- مستشفى الأميرة بسمة.

وتفضلوا بقبول فائق الاحترام والتقدير

رئيس الجامعة

أ.د. أحمد نصيرات

نسخة : - عميد كلية التمريض

جامعة الإسراء ديوان الرئاسة 1991 DIWAN ISRA UNIVERSITY

Hashemite Kingdome of Jordan- Amman-Jordan المملكة الأردنية الهاشمية عمان الأردن
ص. ب. 33 و22 مكتب بريد جامعة الإسراء 11622 / فاكس: 4714500، 4711505 ، 4711388

وزارة الصحة

الرقم ..... م ب / لجنة أخلاقيات / ١٣٩٢٥
التاريخ .....
الموافق ٢٠٢٢/٨/٢١

مدير مديرية التعليم والتدريب الطبي

تحية طيبة وبعد،

اشارة لكتابكم رقم تعليم / معلومات١٠٥٨٨ تاريخ ٢٠٢٢/٨/١٠ بخصوص البحث المقدم من قبل طالبة الماجستير قدر محمد حسن الحسينات .

ارفق بطيه قرار لجنة اخلاقيات البحث العلمي والمتضمن الموافقة على اجراء البحث العائد للمذكورة اعلاه على ان يتم موافاتنا بنتائج الدراسة العائدة للبحث الانف الذكر.

للاطلاع واجراءاتكم لطفا.

واقبلو فائق الاحترام ،

مدير ادارة مستشفيات البشير

الدكتورعلي عزات العبداللات

ا ع

وزارة الصحة

الرقم MOH/REC/2022/262
التاريخ .....
الموافق .....

قرار لجنة أخلاقيات البحث العلمي

اجتمعت لجنة أخلاقيات البحث العلمي بتاريخ١٧ / ٢٠٢٢/٨ لمناقشة ودراسة البحث المقدم

من قبل طالبة الماجستير قدر محمد حسن الحسينات

بعنوان "

" فعالية الرسائل النصية القصيرة على تحسين الالتزام بأنشطة الرعاية الذاتية لدى مرضى السكري من النوع الثاني الأردنيين :دراسة شبه تجريبية "

وبناءً عليه قررت اللجنة الموافقة على إجراء البحث العائد للمذكورة أعلاه مع الالتزام بأخلاقيات البحث العلمي ، وتم التوقيع من قبل أعضاء اللجنة حسب الأصول.

مقرر اللجنة رئيس وحدة تنمية الموارد البشرية السيد/ اكرم العناتي	عضو المدير الطبي د. حسن اصريوع	عضو الصيدلاني حنان سرطاوي	عضو اخصائي جراحة د.جهاد البرابراوي
عضو استشاري امراض باطنية د.يوسف القديمات	عضو مدير مديرية المختبرات د. معاذ بدوي	عضو أخصائي الأطفال د.عصام الخواجا	عضو مدير الشؤون الادارية والمالية والتمريض رهاتي القضاة

رئيس اللجنة

مدير ادارة مستشفيات البشير
الدكتورعلي عزات العبداللات

وزارة الصحة

الرقم تحليل/معلومات/١١٤٧٧

التاريخ

الموافق ٢٠٢٢/٨/٢٢

مدير ادارة مستشفيات البشير
مدير مستشفى الأميرة بسمة التعليمي

تحية طيبة وبعد ،،،

أرفق طياً صورة عن كتاب مدير إدارة مستشفيات البشير / رئيس لجنة أخلاقيات البحث العلمي رقم م ب أ / لجنة أخلاقيات /١٣٩٢٥ تاريخ ٢٠٢٢/٨/٢١ بخصوص الموافقة لطالبة الماجستير في جامعة الاسراء **قدر محمد حسن الحسينات** اجراء بحث بعنوان :-

(فعالية الرسائل النصية القصيرة على تحسين الالتزام بأنشطة الرعاية الذاتية لدى مرضى السكري من النوع الثاني الأردنيين : دراسة شبه تجريبية)

وذلك عن طريق جمع بيانات عن طريق توزيع استبيان قبلي وبعدي (المرفق صورة عنه) على مرضى السكري من النوع الثاني في إدارة مستشفيات البشير ومستشفى الأميرة بسمة التعليمي .

أرجو التكرم بالإيعاز لمن يلزم تسهيل مهمة إجراء البحث أعلاه ، على أن يتم موافاة لجنة أخلاقيات البحث العلمي / ادارة مستشفيات البشيربنتائج الدراسة العائدة للبحث المذكور.

وتفضلوا بقبول فائق الاحترام

مدير مديرية التعليم والتدريب الطبي

الدكتورة رهام الحمود

دراية
هـ م

Appendix B

Consent Form

Title of Study: "Investigating the Effectiveness of Short Mobile Messages on Improving Adherence to Self-Care Activities among Patients with Type 2 Diabetes in Jordan"

Principal Investigator: [Qader Elhesenat]

Institution: [Isra University]

Email: [qader_husseinat@yahoo.com]

Phone: [00962772526608]

Dear Participant,

I appreciate the invitation to participate in a research study conducted by Qader Elhesenat from Isra University. I understand that it is essential for me to fully comprehend the purpose of the study, my involvement in it, and the potential risks and benefits before making a decision to participate. I will carefully review the provided form and reach out to the researcher if I have any questions or concerns.

Study Purpose: The purpose of this study is to investigate "the effectiveness of short mobile messages in improving adherence to self-care activities among patients with type 2 diabetes in Jordan".

Study Procedures: If you decide to participate in this study, there will be a random assignment process that will assign you to either the control group or the experimental group. If you are placed in the control group, you will receive the standard care provided without any additional interventions. On the other hand, if you are assigned to the experimental group, you will receive short mobile messages that contain reminders and educational information pertaining to self-care activities for managing diabetes.

Your involvement will include the following:

1. Completing a questionnaire that collects information about your sociodemographic characteristics, medical history, and current self-care practices.

2. Following your usual care routine for managing type 2 diabetes if you are in the control group.
3. Receiving short mobile messages containing reminders and educational information if you are in the experimental group.
4. Completing a follow-up questionnaire after a specified period to assess any changes in self-care behaviors and health outcomes.

Potential Risks: Participating in this study does not involve any physical risks. However, there is a possibility of minimal psychological discomfort when answering questions about your medical history or self-care practices. To minimize any potential discomfort, you may skip questions that you feel uncomfortable answering.

Potential Benefits: While there are no guaranteed personal benefits for you as a participant, the findings from this study have the potential to advance our understanding of effective strategies for enhancing self-care behaviors among individuals with type 2 diabetes. The outcomes of this research may contribute to the development of healthcare interventions and support systems that can ultimately benefit individuals living with diabetes.

Confidentiality and Data Handling: Rest assured that all information collected during this study will be handled with strict confidentiality. Your personal information and research data will be stored securely and accessible only to the research team. Any data that is shared in publications or presentations will be presented in an aggregated and de-identified format, ensuring your anonymity. Your privacy and confidentiality are of utmost importance throughout the study.

Voluntary Participation and Withdrawal: Your participation in this study is completely voluntary. You have the right to decline participation or withdraw from the study at any point without facing any negative consequences or penalties. It is important to note that your decision to participate or withdraw will not have any impact on your medical care or your relationship with the institution conducting the study. Your well-being and autonomy are respected throughout the entire research process.

Contact Information: If you have any questions, concerns, or if you require additional information about the study, please do not hesitate to reach out to the researcher using the provided

contact information. In case you have any inquiries regarding your rights as a research participant, you may contact the Institutional Review Board (IRB) at Isra University for further clarification and support. They will be able to provide you with the necessary information and address any concerns you may have.

Consent: By providing your signature below, you acknowledge that you have carefully read and comprehended the information presented in this consent form. You willingly choose to participate in this research study and provide your consent for the collection, utilization, and storage of your data solely for research purposes.

Participant's Name: _____ Participant's Signature: _____ Date: _____

Researcher's Name: _____ Researcher's Signature: _____ Date: _____

Appendix C

Program description

Program Design: SMS Intervention for Adherence to Self-Care Activities in Type 2 Diabetes Management

Purpose: The objective of the SMS intervention program is to enhance adherence to self-care activities among individuals diagnosed with type 2 diabetes mellitus. Through the delivery of personalized and timely reminders, the program aims to promote patient engagement and compliance with important facets of diabetes self-management. These include medication compliance, maintaining a healthy diet, regular exercise, blood glucose monitoring, proper foot care, and support for smoking cessation.

Content and Frequency of SMS Messages:

1. Medication Compliance:
    - Purpose: To promote timely and accurate medication intake.
    - Content: Mr./Ms. [patient name], please take your [name of medication] dose of [number of tablets] now.
    - Frequency: 1-3 reminders per day, tailored to the patient's specific medication schedule.
2. Healthy Diet:
    - Purpose: To encourage compliance to a balanced and appropriate diet for diabetes management.
    - Content: Messages providing information on the benefits of a healthy diet, foods to avoid, recommended dietary choices, and portion control.
    - Frequency: 3 reminders per week, sent on Sundays, Tuesdays, and Thursdays.
3. Exercise:
    - Purpose: To motivate and guide patients in engaging in suitable physical activities for diabetes management.
    - Content: Messages providing exercise suggestions and encouraging patients to check their blood glucose levels before exercising to prevent complications.
    - Frequency: 3 reminders per week, sent on Sundays, Tuesdays, and Thursdays.
4. Blood Glucose Monitoring:
    - Purpose: To emphasize the importance of regular blood glucose monitoring for effective diabetes management.

- Content: Messages reminding patients to self-monitor their blood glucose levels and to record their readings.
- Frequency: 3 reminders per week, sent on Saturdays, Mondays, and Wednesdays.

5. Foot Care:
    - Purpose: To educate patients about proper foot care to prevent complications associated with diabetic foot.
    - Content: Messages providing advice and instructions on maintaining foot health, including regular inspection, proper hygiene, and prompt reporting of any abnormalities.
    - Frequency: 3 reminders per week, sent on Saturdays, Mondays, and Wednesdays.
6. Smoking Cessation:
    - Purpose: To support patients in their efforts to quit smoking, a significant risk factor for diabetes complications.
    - Content: Messages offering motivation, encouragement, and information on the benefits of smoking cessation.
    - Frequency: 3 reminders per week, sent on Saturdays, Mondays, and Wednesdays.

The SMS messages were developed in collaboration with healthcare professionals specializing in diabetes care and validated to ensure accuracy, clarity, and cultural appropriateness. The content of the messages aimed to be concise, easy to understand, and written in simple Arabic language.

The intervention group received these SMS reminders over a three-month period to provide continuous support and reinforcement for compliance to self-care activities. The frequency and timing of the messages were designed to align with the specific requirements of each self-care activity and to maintain patient engagement throughout the intervention period.

By delivering targeted reminders and educational content, the SMS intervention program sought to empower patients with type 2 diabetes to effectively manage their condition, improve compliance to self-care activities, and ultimately enhance their overall health outcomes.

Appendix D

"Summary of Diabetes Self-Care Scale" (English Version)

"The questions below ask you about your diabetes self-care activities during the past 7 days. If you were sick during the past 7 days, please think back to the last 7 days that you were not sick".

Diet How many of the last SEVEN DAYS have you followed a healthful eating plan? 01234567	On how many of the last SEVEN DAYS did you participate in a specific exercise session (such as swimming, walking, biking) other than what you do around the house or as part of your work? 01234567	**Smoking** Have you smoked a cigarette—even one puff—during the past SEVEN DAYS? 0. No 1. Yes. *If yes*, how many cigarettes did you smoke on an average day? Number of cigarettes:
On average, over the past month, how many DAYS PER WEEK have you followed your eating plan? 01234567	**Blood Sugar Testing** On how many of the last SEVEN DAYS did you test your blood sugar? 01234567	
On how many of the last SEVEN DAYS did you eat five or more servings of fruits and vegetables? 01234567	On how many of the last SEVEN DAYS did you test your blood sugar the number of times recommended by your health care provider? 01234567	
On how many of the last SEVEN DAYS did you eat high fat foods such as red meat or full-fat dairy products? 01234567	**Foot Care** On how many of the last SEVEN DAYS did you check your feet? 01234567	
Exercise On how many of the last SEVEN DAYS did you participate in at least 30 minutes of physical activity? (Total minutes of continuous activity, including walking). 01234567	On how many of the last SEVEN DAYS did you inspect the inside of your shoes? 01234567	
Additional Items for the Expanded Version of the Summary of Diabetes Self-Care Activities.		
Self-Care Recommendations 1A. Which of the following has your health care team (doctor, nurse, dietitian, or diabetes educator) advised you to do? Please check all that apply: _ a. Follow a low-fat eating plan _ b.Follow a complex carbohydrate diet _ c. Reduce the number of	2A. Which of the following has your health care team (doctor, nurse, dietitian or diabetes educator) advised you to do? Please check all that apply: _ a. Get low level exercise (such as walking) on a daily basis. _ b.Exercise continuously for a least 20 minutes at least 3 times a week.	3A. Which of the following has your health care team (doctor, nurse, dietitian, or diabetes educator) advised you to do? Please check all that apply: _ a.Test your blood sugar using a drop of blood from your finger and a color chart. _ b.Test your blood sugar using a machine to read the results.
calories you eat to lose weight _ d.Eat lots of food high in dietary fiber _ e. Eat lots (at least 5 servings per day) of fruits and vegetables	_ c. Fit exercise into your daily routine (for example, take stairs instead of elevators, park a block away and walk, etc.) _ d.Engage in a specific amount,	_ c.Test your urine for sugar. _ d.Other (specify): _ e. I have not been given any advice either about testing my blood or urine sugar level by my

Appendix E

Summary if Diabetes Self-Care Scale (Arabic Version)

استبيان ملخص أنشطة الرعاية الذاتية لمرض السكري

يركز هذا الاستبيان على أنشطة الرعاية الذاتية لمرض السكري المتوقع ادائها من قبل مريض السكري .الرجاء الإجابة عن الأسئلة الآتية المتعلقة بأداء هذه الأنشطة عندك والتيقد تكون مارستها خلالال أيام السبعة الماضية (الأسبوع الماضي)اما إذ اكنت مصاب بانتكاسة صحية خلال تلك الأيام , فنأمل منك أن تعود بالتفكير بالأيام السبعة التي سبقت الانتكاسة صحية والتي لم تكن فيها مريضا.

التسلسل	السؤال	الاجابة
	فحص السكر في دم	
	‘‘خلال السبعة أيام الماضية كم عدد الأيام التي فحصت فيها سكر الدم ؟’’	7 6 5 4 3 2 1 0
	‘‘خلال السبعة أيام الماضية كم عدد الأيام التي فحصت فيها سكر الدم حسب العدد المذكور في تعليمات طبيبك ؟’’	7 6 5 4 3 2 1 0
	الرياضة	
	‘‘خلال السبعة الأيام الماضية كم عدد الأيام التي مارست فيها أنشطة بدنيه بصفه عامه لمدة 30 دقيقه على الأقل ؟’’	7 6 5 4 3 2 1 0
	‘‘خلال السبعة الأيام الماضية كم عدد الأيام التي مارست فيها جلسة تمرين رياضي محدد (السباحة, المشي....الخ) عدا تلك التي تقوم بها في محيط منزلك أو التي تكون جزء من عملك ؟ ‘‘	7 6 5 4 3 2 1 0
	التغذية	
	‘‘خلال السبعة أيام الماضية كم عدد الأيام التي اتبعت فيها برنامج غذائي صحي ؟’’	7 6 5 4 3 2 1 0
	‘‘ما مدى إتباعك لنضام غذائي خلال الشهر الماضي(كم معدل عدد الأيام خلال أسبوع) ؟’’	7 6 5 4 3 2 1 0
	‘‘خلال السبعة أيام الماضية كم عدد الأيام التي تناولت فيها خمس حبات أو أكثر من الخضرة أو الفواكه؟’’	7 6 5 4 3 2 1 0
	‘‘خلال السبعة أيام الماضية كم عدد الأيام التي تناولت فيها الحوم حمراء ,أو منتجات دهنيه عالية الدسم ؟’’	7 6 5 4 3 2 1 0
	‘‘خلال السبعة أيام الماضية كم عدد الأيام التي تناولت فيها مواد نشويه ؟’’	7 6 5 4 3 2 1 0
	العناية بالقدم	
	‘‘خلال السبعة أيام الماضية كم عدد الأيام التي فحصت فيها قدميك؟’’	7 6 5 4 3 2 1 0

	‘‘خلال السبعة أيام الماضية كم عدد الأيام التي فحصت فيها حذائك من الداخل (لتأكد من عدم وجود أشياء تسبب الجروح) ؟’’	7 6 5 4 3 2 1 0
	‘‘خلال السبعة أيام الماضية كم عدد الأيام التي قمت فيها بغسل قدميك؟’’	7 6 5 4 3 2 1 0
	‘‘خلال السبعة أيام الماضية كم عدد الأيام التي قمت فيها بالتجفيف بين اصابع القدمين بعد غسلهما؟’’	7 6 5 4 3 2 1 0
	الالتزام بالعلاج	
	‘‘خلال السبعة أيام الماضية كم عدد الأيام التي تناولت علاجك السكري الموصى به ؟’’	7 6 5 4 3 2 1 0
	‘‘خلال السبعة أيام الماضية كم عدد الأيام التي أخذت فيها حقنة الانسولين الموصى بها ؟’’	7 6 5 4 3 2 1 0
	‘‘خلال السبعة أيام الماضية كم عدد الأيام التي نسيت فيها اخذ العلاج الموصى به ؟’’	7 6 5 4 3 2 1 0
	‘‘خلال السبعة ايام الماضية كم عدد الأيام التي لم تتناول فيها العلاج لأسباب أخرى غير النسيان ؟’’	7 6 5 4 3 2 1 0
	‘‘خلال السبعة أيام الماضية كم عدد الأيام التي لم تتناول فيها العلاج لشعورك بتحسن ؟’’	7 6 5 4 3 2 1 0
	‘‘خلال السبعة أيام الماضية كم عدد الأيام التي لم تتناول فيها العلاج عند خروجك من المنزل ؟’’	7 6 5 4 3 2 1 0
	التدخين	
	‘‘هل دخنت خلال السبعة ايام الماضيه حتى لو نفخه واحده ؟’’ اذا كان نعم كم سيجاره كنت تدخن في اليوم	نعم لا

الخصائص السريرية:

	التاريخ	النتيجة	ملاحظة
الوزن			
الطول			
BMI	----------		
ضغط الدم			
نسبة السكر في الدم			
نسبة السكر التراكمي في الدم			

فاعلية الرسائل النصية القصيرة في الالتزام بأنشطة الرعاية الذاتية بين مرضى السكري من النوع الثاني الأردنيين: دراسة تجريبية حقيقية

أعدت من قبل

قدر الحسينات

أشرف عليها

الدكتور عبدالله الغنيمين

ملخص الدراسة

الخلفية: يشكل مرض السكري تحديًا صحيًا منتشرًا ومكلفًا في جميع أنحاء العالم ، لا سيما في البلدان النامية مثل الأردن ، حيث يعد عدم الالتزام بسلوكيات العلاج والرعاية الذاتية مشكلة مهمة ، مما يبرز الحاجة إلى تقييم تأثير نظام الرسائل النصية القصيرة في تعزيز معرفة المريض ووعيه لتحسين إدارة المرض. **الهدف**: تقييم فعالية الرسائل النصية القصيرة في تحسين الالتزام بأنشطة الرعاية الذاتية بين مرضى السكري من النوع الثاني. **المنهجية**: تم إجراء دراسة تجريبية حقيقية في ثلاثة مستشفيات حكومية أردنية، بما في ذلك مستشفى البشير، ومستشفى الأميرة بسمة، ومستشفى الأمير حمزة، بحجم عينة إجمالية من 180 مريضًا مصابًا بالسكري تم اختيارهم عشوائيًا من هذه الأماكن. تم تعيين المشاركين بشكل عشوائي لمجموعة ضابطة (ن = 90) ومجموعة تجريبية (ن = 90). تلقت المجموعة الضابطة الرعاية المعتادة ، بينما تلقت المجموعة التجريبية رسائل نصية قصيرة لمدة 3 أشهر. تضمنت المتغيرات الديموغرافية الجنس والعمر والمهنة والمستوى التعليمي وعدد السنوات منذ التشخيص. كان مقياس النتيجة الأولية هو الالتزام بأنشطة الرعاية الذاتية، التي تم تقييمها باستخدام استبيان ملخص أنشطة الرعاية الذاتية لمرضى السكري .(SDSCA) تمت مقارنة درجات ما قبل التدخل وما بعد التدخل بين المجموعات ، وأجري تحليل ANCOVAبعد ضبط المتغيرات الديموغرافية. تم استخدام كل من الإحصاء الوصفي والإحصاءات الاستنتاجية (اختبار ت للعينات المقترنة، تحليل المتغير الأحادي وتحليل المتغيرات المصاحبة للإجابة على أسئلة البحث في هذه الدراسة. **النتائج**: لا توجد فروق ذات دلالة إحصائية بين المجموعتين الضابطة والتجريبية في المتغيرات الديموغرافية في الأساس. في المجموعة التجريبية ، كانت درجات الالتزام بأنشطة الرعاية الذاتية بعد التدخل (M = 35.2) ،((SD = 4.8 أعلى بكثير مقارنة بدرجات ما قبل التدخل (M=29.1) و(SD=5.1) مع متوسط فرق 6.1، وفترة ثقة 95% (4.5-7.7) (p<0.001) في كافة المجالات. وفي المقابل لم تظهر المجموعة الضابطة أي تغييرات معنوية دالة احصائياً على درجات الالتزام بأنشطة الرعاية الذاتية بين قياسات ما قبل التدخل (M=28.9) (SD=4.9) وما بعد التدخل (M=29.3) (SD=5.2)، مع فارق متوسط (0.4)، وفترة ثقة تراوحت بين 1.2 و 2.0 (F=0.613). كشف تحليل المتغيرات المصاحبة عن تأثير كبير لرسائل الهاتف المحمول النصية على تحسين الالتزام بأنشطة الرعاية الذاتية بعد التحكم في المتغيرات الديموغرافية (ف (1،177)=36.71)، (p<0.001).

الخلاصة: كانت رسائل الهاتف المحمول النصية القصيرة فعالة في تحسين الالتزام بأنشطة الرعاية الذاتية بين مرضى السكري من النوع الثاني. يمكن أن يكون دمج رسائل التذكير المتنقلة في برامج الإدارة الذاتية لمرض السكري استراتيجية قيمة لتعزيز الرعاية الذاتية وتعزيز نتائج صحية أفضل في هذه الفئة من المشاركين. هناك حاجة إلى مزيد من البحث لاستكشاف الآثار طويلة المدى و مدى استدامة مثل هذه التدخلات.

.الكلمات المفتاحية: رسائل الهاتف المحمول القصيرة ، داء السكري من النوع الثاني ، أنشطة الرعاية الذاتية ، الأردن