Systematic Review

Managing Cancer and Living Meaningfully for Advanced Cancer: A Systematic Review

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ABSTRACT

Introduction: Managing Cancer and Living Meaningfully (CALM) is a supportive-expressive psychotherapy designed to address such barriers and to facilitate communication of mortality-related concerns in patients facing advanced disease and their primary caregivers. The study was meant to review the benefits of the CALM psychotherapy on patients with advanced or metastatic cancer and caregivers.

Methods: This study was done through a systematic review with The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) approach. It broadly used Scopus, Science Direct, and ProQuest database. The search utilized the Boolean phrases "cancer", "living meaningfully", and "psychotherapy" throughout the title, abstract, or keywords. The consideration criteria in the literature study were: an original article, the source from journals, article in English, and available in full text. We obtained 97 articles, and 11 were considered relevant for this systematic review.

Results: The findings from the results of this study are that CALM has several psychological benefits for patients with advanced cancer, including: can reduce anxiety and depression, relieve distress, promote psychological growth and well-being, and improve quality of life. Based on these findings, it can be concluded that the CALM psychotherapy has many benefits for patients with advanced cancer and their caregivers and can be used as additional therapy to improve the quality of life to face the end-of-life.

Conclusion: CALM may be a feasible intervention to benefit patients with advanced cancer. It may help them overcome obstacles in communication and alleviate death-related distress.

INTRODUCTION

The World Health Organization describes cancer as a large group of diseases that can start in almost any organ or tissue of the body when abnormal cells grow uncontrollably, go beyond their usual boundaries to invade adjoining parts of the body and/or spread to other organs. The latter process is called metastasizing and is a major cause of death from cancer. Cancer is the second leading cause of death globally, accounting for an estimated 9.6 million deaths, or one in six deaths in 2018 (WHO, 2020).

Advanced cancer is related to fears and provokes identified disease progression and symptom burden, dependency and disability, suffering, and worry about dying and death (An et al., 2017). The diagnosis of advanced cancer may trigger colossal trouble and the challenge of living meaningfully in the face of progressive disease. People right now face the burden of physical suffering, the threat of dependency and impending mortality, and the difficulty of making treatment decisions that have life-and-death implications while navigating a complex health care system (Rodin et al., 2019).

Early palliative care for such individuals has been shown to produce better outcomes, but the psychological dimensions of such care are much less systematized than those focused on symptom control

and advanced care-planning. These undermine confidence and any sense of meaning, may disrupt individual relationships and generate emotional distress. The psychological consequences of an advanced cancer diagnosis may include increased suicide rates. There is evidence to suggest that psychological distress may surpass physical side effects in terminally ill patients (Rodin et al., n.d.).

Therefore research related to psychological care in patients with advanced cancer needs to be developed to help cancer survivors improve their quality of life. The aims of the study was to review the benefits of the CALM psychotherapy on patients advanced or metastatic cancer and their caregivers.

MATERIALS AND METHODS

Strategy for searching studies

Articles published in English were searched in Scopus (medical and nursing subject category), Science Direct and ProQuest databases. The relevant literature was searched from March 25, 2015 to February 19, 2019. The publication date was limited to 2011 – 2019. The search utilized the Boolean phrases "managing cancer and living meaningfully" and/or "cancer" and/or"living meaningfully" and/or "psychotherapy" and/or "advance cancer" throughout the title, abstract, or keywords. This article used a systematic study review, compiled based on PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyzes) (Figure 1).

Study selection

The data obtained were then analyzed and synthesized based on inclusion and exclusion criteria. In this systematic review, the inclusion criteria are (1) respondents ≥ 18 years of age, (2) respondents are in stage 3 – 4 of cancer or advanced cancer, (3) using the CALM intervention program, (4) in English, (5) Original articles. The exclusion criteria were respondents with major communication difficulties, or/and cognitive impairment, or/and currently under psychiatric or psychological treatment, or/and unwillingness. The articles used are not limited to the type of study design. The articles must comply with the inclusion and exclusion criteria. The abstracts and the full text must be compatible and explain the CALM intervention of psychotherapy. The early literature search obtained in 97 articles, 26 from Scopus, 46 from Science Direct and 25 from ProQuest. The articles found were then reviewed in the abstract, relevance to the theme and adjusted for inclusion and exclusion criteria. Finally, 11 articles were considered relevant for this systematic review.

RESULTS

The findings from the results of this study suggest that CALM has several psychological benefits for patients with advanced cancer, including: reducing anxiety and depression, relieving distress, promoting
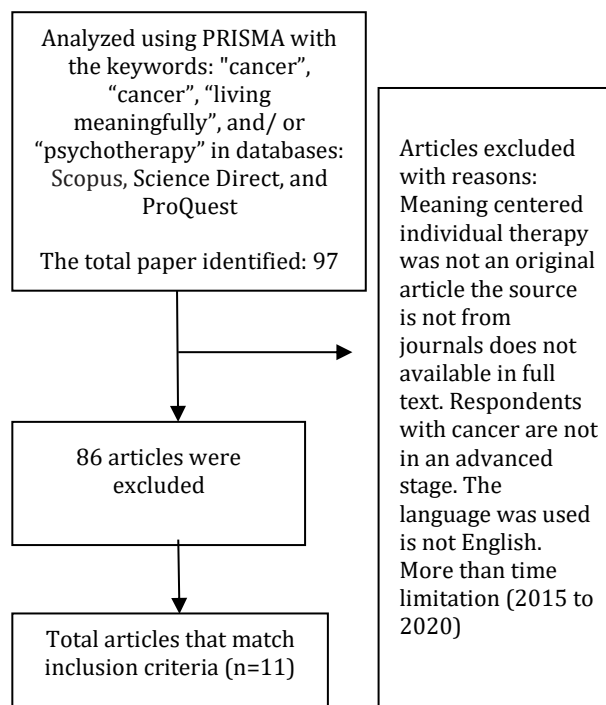

Figure.1. Flowchart of the research on Managing CALM for advanced cancer

psychological growth and well-being, It may help patients with advanced cancer overcome obstacles in communication and alleviate death-related distress (Table 1).

DISCUSSION

From the journals obtained and examined according to the theme, the articles previously used were screened according to the inclusion and exclusion criteria. Psychological therapy such as Cancer and Living Meaningfully (CALM) intervention can decrease depression, anxiety, and death-related distress, which can improve the quality of life.

Cancer created a lot of negative and stressful emotions for patients and their family and supportive care programs were critical in helping patients cope with their journey (Rodin, 2017). One of the stressful emotions for a patient with advanced cancer is death-related distress (An et al., 2017). Therefore, psychotherapy is needed to reduce anxiety and depressive symptoms.

The researchers propose a psychotherapeutic manualized, individual, semi-structured intervention to relieve distress and promote psychological well-being in advanced cancer patients. This intervention is called Cancer and Living Meaningfully (van der Spek et al., 2018)(S. Hales et al., 2017)(S. Hales et al., 2015)(Obesity et al., 2015), according to Canadians professor of psychiatry, Gary Rodin, and psychiatrist Sarah Hales of Toronto's Princess Margaret Cancer Centre. It is designed to help manage the "practical and profound" challenges people with advanced disease and their families face. Rodin and Hales shared their work on CALM with about 50 palliative care and oncology clinicians, including nurses,

Table 1. Theoretical mapping of research on Managing CALM for advanced cancer

Title, Author, Year	Type of Study	Participant	Intervention	Control	Outcome	Time
Managing Cancer and Living Meaningfully (CALM): A Randomized Controlled Trial of a Psychological Intervention for Patients With Advanced Cancer [3] Rodin et al., 2019	Randomized Controlled Trial	305 participants between August 3rd, 2012 until March 2016 in The Princess Margaret Cancer Centre (PM), the University Health Network in Toronto, Ontario, Canada.	CALM psychotherapy sessions	Usual Care only, which included routine oncology treatment and follow-up and clinic-based distress screening.	CALM is an effective intervention that provides a systematic approach to alleviating depressive symptoms in patients with advanced cancer and addresses the predictable challenges these patients face and no adverse effects were identified.	8-week intervention and follow-up scheduled 1 week after the intervention, and 3 and 6 months thereafter.
From Evidence to Implementation: The Global Challenge for Psychosocial Oncology [16] Rodin, 2017	Speaker Presentation	more than 20 countries to have CALM implemented routinely in cancer care	Emotion and Symptom-Focused Engagement (EASE), and a Managing Cancer and Living Meaningfully (CALM)	Usual Care	Showed in a large RCT that CALM improves depression, distress related to dying and death and preparation for the end of life (EOL)	-
Managing Cancer And Living Meaningfully (CALM): randomized feasibility trial in patients with advanced cancer [10] Lo et al., 2016	Randomized Feasibility Trial	60 adult patients with advanced cancer at the Princess Margaret Cancer Centre	CALM intervention	Usual care	Assessment of feasibility included rates of consent, randomization, attrition, intervention non-compliance, and usual care contamination. Primary outcome: depressive. Secondary outcomes: major depressive disorder (MDD), generalized anxiety, death anxiety, spiritual well-being, attachment anxiety and avoidance, self-esteem, experiential avoidance, quality of life (QOL) and post-traumatic growth.	Both groups were given intervention or control followed by 3 and 6 months follow-up
Managing Cancer And Living Meaningfully: study protocol for a randomized controlled trial [11] Lo et al., 2015	study protocol for a randomized controlled trial	The site is the Princess Margaret Cancer Centre, part of the University Health Network, in Toronto, Canada. Eligibility criteria include: ≥ 18 years of age;	intervention plus usual care	usual care alone	The primary outcome is the frequency of depressive symptoms and the primary endpoint is at 3 months. Secondary outcomes include diagnosis of major or minor depression, generalized anxiety, death anxiety, spiritual well-being, QOL, demoralization, attachment security, post-traumatic growth, communication with partners, and satisfaction with clinical interactions.	It is delivered over a 3–6 month period

Title, Author, Year	Type of Study	Participant	Intervention	Control	Outcome	Time
		English fluency; no cognitive impairment; and diagnosis of advanced cancer				
Managing Cancer And Living Meaningfully (CALM): Phase 2 trial of brief individual psychotherapy for patients with advanced cancer [17] Lo et al., 2014	Trial research – phase 2 intervention only	50 patients with advanced or metastatic cancer	assessed at 3 months (t1)	assessed at 6 months (t2)	CALM may be a feasible intervention to benefit patients with advanced cancer. The results are encouraging, despite attrition and small effect sizes, and support further study	These were assessed at 3 months and 6 months
Managing Cancer and Living Meaningfully (CALM): A qualitative study of a brief individual psychotherapy for individuals with advanced cancer [18] Nissim et al., 2011	Qualitative with Semi-structured interviews	Patients were recruited from a large urban regional cancer center in Toronto, Canada. The 10 interviewees included seven women and three men. All had completed between three to six CALM sessions before the interview.	Five interrelated benefits of CALM intervention were identified: (1) a safe place to process the experience of advanced cancer; (2) permission to talk about death and dying; (3) assistance in managing the illness and navigating the healthcare system; (4) resolution of relational strain; and (5) an opportunity to 'be seen as a whole person' within the healthcare system. These	-	Findings from a qualitative study suggest that the CALM intervention provides substantial benefits for patients with advanced cancer before the end of life. Findings informed the development of an RCT to evaluate the effectiveness of this intervention.	-

Title, Author, Year	Type of Study	Participant	Intervention	Control	Outcome	Time
			benefits were regarded by participants as unique in their cancer journey.			
Mentalization in CALM psychotherapy sessions: Helping patients engage with alternative perspectives at the end of life [19] Shaw et al., 2018	conversation analysis	Total of 7 therapy sessions and 5 hours, 24 minutes of data	The analysis identifies one subtle way a patient is invited to consider an alternative perspective relating to their disease progression.	-	The analysis reveals a skillful way in which therapists can cautiously and collaboratively introduce a patient to alternative perspectives concerning end-of-life, without invalidating the patient's perspective on this particularly delicate context.	5 hours and 24 minutes of data
Inviting end-of-life talk in initial CALM therapy sessions: A conversation analytic study [14] Shaw et al., 2016	Conversation analysis	Data was collected as part of a Phase III RCT of CALM at the Princess Margaret Cancer Centre	Open questions about the patients' experiences, feelings or understanding in the context of talk about their troubles, were found to regularly elicit talk concerning end-of-life.	-	The analysis shows that therapists provide patients with the opportunity to talk about EOL in a way that is supportive of the therapeutic relationship. The patients' readiness to engage in EOL talks displays the salience of this topic, as well as the reflective space provided by CALM therapy. Practice implications: The results provide important insight into the process of CALM therapy, which can be used to guide training.	Sessions lasting approximately one hour
Death talk and relief of death-related distress in patients with advanced cancer [2] An et al., 2017	Qualitative research	17 patients with advanced cancer	Managing Cancer and Living Meaningfully (CALM)	-	Patients with advanced cancer perceive barriers to effective communication of death distress to be related to their own reluctance, as well as the reluctance of their loved ones to address such fears. CALM therapy may help patients with advanced cancer \ overcome obstacles in communication and \ alleviate death-related distress.	6-month period
Efficacy of a brief manualized intervention Managing Cancer and Living Meaningfully (CALM)	single-blinded randomized-controlled trial: study protocol	-	Managing Cancer and Living Meaningfully (CALM)	supportive psycho-oncological intervention (SPI).	This study will contribute important statistical evidence on whether CALM can reduce depression and existential distress in a German sample of advanced and highly distressed cancer patients	6 months

Title, Author, Year	Type of Study	Participant	Intervention	Control	Outcome	Time
adapted to German cancer care settings: study protocol for a randomized controlled trial [13] Scheffold et al., 2015 "Double Awareness" in Psychotherapy for Patients Living With Advanced Cancer[15] Colosimo et al., 2017	Task analysis	-	Managing Cancer and Living Meaningfully (CALM)	-	CALM therapists are trained to facilitate meaning-making by providing patients with opportunities to mentalize their experience, for instance by using gentle questioning to invite the patients to explore a variety of perspectives. Finally, when the individual feels safe and has had an opportunity to construct and deepen meanings related to life and death, the therapist can help the patient bridge these dimensions by synthesizing meanings. This bridging process helps the patient see life and death as interconnected possibilities. Existential distress may not be eliminated, but it can be managed in this process.	

CALM: Cancer and Living Meaningfully; RCT: Randomized Controlled Trial; EOL: End of Life; MDD: Major Depressive Disorder; QOL: Quality of Life

psychiatrists, social workers and physicians from New Zealand and Australia, in a two-day workshop in Auckland in March (Rodin, 2017).

This short-term intervention was originally developed for advanced cancer patients. "Managing Cancer and Living Meaningfully (CALM)" is built up by 3–8 sessions (duration about 45–60 min) (Oberstadt et al., 2018) and optimally delivered in over 6 months (An et al., 2017). This intervention focuses on six dimensions: (1) symptom management and communication with healthcare providers, (2) changes in self and relations with close others, (3) spirituality, sense of meaning and purpose (4) thinking of the future, hope, and mortality (5) communication skills, and (6) emotional expression and control (Oberstadt et al., 2018). Each participant's primary caregiver (e.g., partner, adult son, or daughter) is invited to attend sessions when this is desired by the patient (An et al., 2017) (Oberstadt et al., 2018) in one or more of the therapy sessions, as deemed appropriate by the therapist (Oberstadt et al., 2018).

Based on the relational, attachment, and existential theory, CALM provides a therapeutic relationship and reflective space, with attention to the following domains: symptom management and communication with health care providers, changes in self and relations with close others, spiritual well-being and the sense of meaning and purpose, and mortality and future-oriented concerns (Rodin et al., n.d.). Outcomes that can be measured were depressive symptoms (An et al., 2017; S. J. Hales et al., 2015; Lo et al., 2015, 2016; Rodin et al., n.d.; Scheffold et al., 2015), death anxiety, attachment security, spiritual well-being and psychological growth (An et al., 2017; S. J. Hales et al., 2015; Lo et al., 2015, 2016), quality of life, post-traumatic growth (Lo et al., 2015, 2016), major depressive disorder (MDD), generalized anxiety, avoidance, self-esteem, experimental avoidance (Lo et al., 2016), demoralization, communication with partner and satisfaction with clinical interaction (Lo et al., 2015; Shaw et al., 2016). All over outcomes that provide a huge impact in alleviating depressive symptoms.

During CALM therapy, the psychotherapist and the patient explore the meanings of the patient's life history, including achievements and failures, as well as the disease itself (Oberstadt et al., 2018), by using gentle questioning to invite the patients to explore a variety of perspectives (Colosimo et al., 2017). Finally, when the individual feels safe and has had an opportunity to construct and deepen meanings related to life and death, the therapist can help the patient bridge these dimensions by synthesizing meanings (Colosimo et al., 2017). Thereby, the whole life trajectory of the patient, his/her aims, the experience of suffering, and death/dying play important roles in the therapy (Oberstadt et al., 2018). In the therapeutic contact, the therapist can explore how the patient makes sense of his or her situation and help the patient see life and death as interconnected possibilities and facilitate meaning-making as an adaptive way of coping with a situation beyond one's control. The distress that arises may not be eliminated, but it can be managed in this process.

One qualitative study demonstrates that individuals with advanced cancer are preoccupied with concerns related to dying and death and find relief in the opportunity to communicate this distress. Participants experienced the CALM therapist as a secure base who supported communication of death-related distress both within the therapy and in their close relationships. Open discussion of fears was commonly perceived by participants as therapeutic as it could be accepted by their therapist or family without causing perceived distress or discomfort in them. CALM therapy facilitated communication of death-related distress within families whether or not caregivers participated in the therapy sessions. Although health professionals and families may be reluctant to discuss such topics, patients facing mortality may find relief from being able to discuss fears that cannot be eliminated from awareness. Support for a wide range of healthcare providers to engage in a more open discussion of mortality-related concerns with patients with advanced disease is needed (An et al., 2017).

CONCLUSION

Based on the findings of the study, it can be concluded that CALM has several psychological benefits for patients with advanced cancer and their caregivers, including: reducing depressive symptoms, death anxiety, attachment security, promoting spiritual well-being and psychological growth, improving quality of life, alleviating post-traumatic growth, major depressive disorder (MDD), generalized anxiety, avoidance, self-esteem, experimental avoidance, demoralization, increasing communication with partner and satisfaction with clinical interaction. Some of these studies found one of the biggest impacts CALM therapy has is on alleviating the depressive symptom and thus it can be used as additional therapy to improve the quality of life to face the end-of-life. CALM may be a feasible intervention to benefit patients with advanced cancer. It may help patients with advanced cancer overcome obstacles in communication and alleviate death-related distress and no adverse effect was identified.

CONFLICT OF INTEREST

No Conflicts of interest have been declared.

REFERENCES

An, E., Wennberg, E., Nissim, R., Lo, C., Hales, S., & Rodin, G. (2017). Death talk and relief of death-related distress in patients with advanced cancer. *BMJ Supportive & Palliative Care*, *0*, 1–7. https://doi.org/10.1136/bmjspcare-2016-001277

Colosimo, K., Nissim, R., Pos, A. E., Hales, S., Zimmermann, C., Rodin, G., & Colosimo, K. (2017). "Double Awareness" in Psychotherapy for Patients Living With Advanced Cancer. *Journal of Psychotherapy Integration*.

Hales, S., Chiu, A., Panday, T., Malfitano, C., Jung, J., Rydall, A., Li, M., Nissim, R., Zimmermann, C., & Rodin, G. (2017). *Health and Medicine - Palliative and Supportive Care ; Recent Findings in Palliative and Supportive Care Described by Researchers from University Health Network [Managing Cancer And Living Meaningfully (CALM): randomised feasibility trial in patients w*. 1–3.

Hales, S. J., Jung, A., Chiu, T., Panday, A., Rydall, R., Nissim, C., Malfitano, D., Petricone-Westwood, C. Z., & Rodin, G. (2015). *Psychotherapy ; Findings from University Health Network Update Understanding of Psychotherapy [Managing Cancer And Living Meaningfully (CALM): phase 2 trial of a brief individual psychotherapy for patients with advanced cancer]*. *95*, 2–4.

Hales, S., Rydall, A., Panday, T., Chiu, A., Malfitano, C., Jung, J., Li, M., Nissim, R., Zimmermann, C., & Rodin, G. (2015). *Clinical Research ; Researchers from Princess Margaret Cancer Center Report New Studies and Findings in the Area of Clinical Trials and Studies [Efficacy of a brief manualized intervention Managing Cancer and Living Meaningfully (CALM) adapted to German*. 2–4.

Lo, C., Hales, S., Chiu, A., Panday, T., Malfitano, C., Jung, J., Rydall, A., Li, M., Nissim, R., Zimmermann, C., & Rodin, G. (2016). *Managing Cancer And Living Meaningfully (CALM): randomised feasibility trial in patients with advanced cancer*. 1–10. https://doi.org/10.1136/bmjspcare-2015-000866

Lo, C., Hales, S., Rydall, A., Panday, T., Chiu, A., Malfitano, C., Jung, J., Li, M., Nissim, R.,

Zimmermann, C., & Rodin, G. (2015). Managing Cancer And Living Meaningfully : study protocol for a randomized controlled trial. *Trials*, 1–8. https://doi.org/10.1186/s13063-015-0811-1

Oberstadt, M. C. F., Esser, P., Classen, J., & Mehnert, A. (2018). Alleviation of psychological distress and the improvement of quality of life in patients with amyotrophic lateral sclerosis: Adaptation of a short-term psychotherapeutic intervention. *Frontiers in Neurology*, *9*(APR). https://doi.org/10.3389/fneur.2018.00231

Obesity, I., Week, W., & Sep, A. A. (2015). *Clinical Research ; Study Results from University of Toronto in the Area of Clinical Trials and Studies Reported (Managing Cancer And Living Meaningfully : study protocol for a randomized controlled trial)*. 1–3.

Rodin, G. (2017). *Managing cancer and living meaningfully Critical care : Nursing initiatives highlighted*. *23*(4).

Rodin, G., Lo, C., Rydall, A., Shnall, J., Mal, C., Chiu, A., Panday, T., Watt, S., An, E., Nissim, R., Li, M., Zimmermann, C., & Hales, S. (2019). Managing Cancer and Living Meaningfully (CALM): A Randomized Controlled Trial of a Psychological Intervention for Patients With Advanced Cancer. *American Society of Clinical Oncology*, *36*(23). https://doi.org/10.1200/JCO.2017.77.1097

Scheffold, K., Philipp, R., Engelmann, D., Schulz-kindermann, F., Rosenberger, C., Oechsle, K., Härter, M., Wegscheider, K., Lordick, F., Lo, C., Hales, S., & Rodin, G. (2015). Efficacy of a brief manualized intervention Managing Cancer and Living Meaningfully (CALM) adapted to German cancer care settings : study protocol for a randomized controlled trial. *BMC Cancer*, 1–10. https://doi.org/10.1186/s12885-015-1589-y

Shaw, C., Chrysikou, V., Davis, S., Gessler, S., Rodin, G., & Lanceley, A. (2016). Inviting end-of-life talk in initial CALM therapy sessions : A conversation analytic study. *Patient Education and Counseling*. https://doi.org/10.1016/j.pec.2016.08.024

van der Spek, N., Jansen, F., Holtmaat, K., Vos, J., Breitbart, W., van Uden-Kraan, C. F., Tollenaar, R. A. E. M., Cuijpers, P., Coupé, V. M. H., & Verdonck-de Leeuw, I. M. (2018). Cost-utility analysis of meaning-centered group psychotherapy for cancer survivors. *Psycho-Oncology*, *27*(7), 1772–1779. https://doi.org/10.1002/pon.4726

WHO. (2020). *Cancer*.

Systematic Review

Effectiveness of Mobile App-Based Interventions to Support Diabetes Self-Management: A Systematic Review

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ABSTRACT

Introduction: Diabetes is a major health problem worldwide due to its rapidly growing prevalence and high disease burden. Nowadays, the evolution of mobile technology provides a large number of health-related mobile applications (apps) mainly focusing on the self-management of diabetes. The aim of this paper is to systematically review the effectiveness of mobile app-based self-management interventions on clinical and/or psychological outcomes in patients with type 1 and type 2 diabetes.

Methods: A systematic search of four databases (Scopus, Medline, CINAHL, and Proquest) was conducted using the terms "diabetes" AND "self-management" AND "mobile applications" OR "mobile based" OR "smartphone". Studies published in English from 2016 to 2020 were considered. Only randomized controlled trials (RCTs) for patients with type 1 and type 2 diabetes that reported any of the study outcomes were included. Using our search strategies, we identified 4339 articles. After removing duplicate studies, a total of 12 articles met the inclusion and exclusion criteria included in the review.

Results: The majority measured self-monitoring of blood glucose monitoring frequency, glycated hemoglobin (HbA1c) and/or psychological or cognitive outcomes. The most positive findings were associated with mobile app-based health interventions as a behavioral outcome, with some benefits found for clinical and/or psychological diabetes self-management outcomes for patients with type 1 and type 2 diabetes mellitus.

Conclusion: Therefore, more research with larger and longer studies to develop the ideal mobile-app based self-management tool for diabetes is needed.

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INTRODUCTION

Diabetes mellitus (DM) is a major health problem worldwide due to its rapidly growing prevalence and high disease burden (Binte et al., 2019). Worldwide, diabetes mellitus has been diagnosed in 415 million people. According to the International Diabetes Federation (IDF), by 2045 this number will rise to 629 million (International Diabetes Federation, 2019). The prevalence of DM has resulted in a substantial financial burden on medical systems, families, and societies (Chao et al., 2019). Currently, in the United States, only 50% of diabetes patients are achieving the recommended target glycosylated hemoglobin (A1c, %) level of 7% or below (Casagrande et al., 2013). Uncontrolled diabetes leads to deleterious complications, such as retinopathy, neuropathy, and nephropathy(Fox et al., 2004). Its complications are a global health emergency. Annual global health expenditure on diabetes is estimated at around USD 760 billion. It is projected to reach USD 825 billion by 2030 and increase to USD 845 billion by 2045 (International Diabetes Federation, 2019). Furthermore, the WHO projects that diabetes will be the seventh leading cause of death in 2030 (Mathers & Loncar, 2006).

As the prevalence of type 1 and type 2 diabetes continues to rise worldwide, more individuals and

families are living with the challenge of integrating an exhausting, complex, and long term regimen into their lives to control their progressive illness and prevent diabetes complications (Gonzalez et al., 2016). Indeed, the management of diabetes mellitus is challenging for both patients and clinicians. To successfully self-manage, diabetes patients must have high levels of health literacy and numeracy. Clinicians often advocate lifestyle change including diet, exercise, interpreting blood glucose trends, adjusting medication doses within brief clinic visits and sometimes engaging with patients who may have a limited understanding of their condition or treatment plan (Shan et al., 2019).

Long-term medication use and lifestyle changes are necessary for the successful management of both type 1 and type 2 DM (Gonzalez et al., 2016). The diverse lifestyle changes requirements for the self-management of diabetes including regular medication taking, self- monitoring of blood glucose (SMBG), changes in diet and physical activity, foot self-care, and visits with health care providers are detailed elsewhere in this issue (Gonzalez et al., 2016). Traditionally, self-management support for diabetic patients comprised face-to-face patient education using printed materials, demonstrations or videos (Binte et al., 2019). Therefore, effective tools to support patients in their self-management to enhance the quality of life and help to reduce complications are needed.

The rise of mobile-based applications (apps) over the past decade has led to increasing interest in using this technology to assist patients or clinicians in chronic disease management such as diabetes mellitus. Diabetes mobile-based applications as an emerging set of technologies are a promising tool for self-management. This technology combines the functions of the mobile phone, wireless network for data transmission, and sometimes HCPs for providing feedback (Hou et al., 2016). Accordingly, the American Diabetes Association (ADA) has stated that mobile apps may be a useful element of effective lifestyle modification to prevent diabetes (American Diabetes Association, 2017).

The purpose of diabetes apps is increasing the patient's self-management skills by storing personal data, such as glucose, hemoglobin A1c or glycated hemoglobin (HbA1c), blood pressure, body weight etc., and facilitating them in making treatment decisions by utilizing pre-stored validated algorithms (Doupis et al., 2020). Most of them provide services such as glucose and meal tracker, insulin calculator, planned physical activity, and health education presented in the form of diaries, pictures, videos or animations (Doupis et al., 2020; Veazie et al., n.d.). Some applications have facilitated real-time communication between a healthcare professional and the patient (Diabetes Diary (Skrøvseth et al., 2015), Diabetes Interactive Diary (Rossi et al., 2013), D-Partner (Doupis et al., 2020), Diabeo (Jeandidier et al., 2018), Diabetes Pal (Bee et al., 2016b), and BlueStar (Agarwal et al., 2019)). However, most of them have not been approved by the US Food and Drug Administration (FDA) or other corresponding regulatory authorities and BlueStar was the first mobile app-based in the USA to be given FDA approval as a mobile prescription therapy (Doupis et al., 2020).

There was current uncertainty on the clinical and psychological effectiveness of diabetes apps and limited research on the mechanisms of patient engagement, including use by specific populations. Previous studies have shown that the use of diabetes applications is currently limited because they fail to assess patient engagement among older adults with diabetes (Quinn et al., 2015). So, the aim of this paper is to systematically review the effectiveness of mobile app-based self-management interventions on clinical and/or psychological outcomes in patients with type 1 and type 2 diabetes.

MATERIALS AND METHODS

Data Sources and Search Strategy

The PRISMA statement and checklist was followed. Five databases were used in the searching process: Scopus, Medline, CINAHL, and Proquest for studies published between 1 January 2016 and 1 January 2020. The terms "Diabetes mellitus" AND "self-management" AND "mobile applications" OR "mobile based" OR "smartphone" were used during the search.

Inclusion and Exclusion Criteria

We included studies that were randomized controlled trials (RCTs) and that met the following inclusion criteria. 1) Study participants were patients who were age 14 years and above with a confirmed diagnosis of type 1 and type 2 diabetes mellitus. 2) Studies evaluated the effectiveness of the mobile app-based self-management interventions. 3) Studies separated participants into at least one group receiving mobile app-based self-management interventions and one group receiving usual care. 4) Studies that investigated at least one of the following outcomes: self-efficacy, self-care activities, health-related quality of life and/or clinical outcomes, such as glycated hemoglobin (HbA1c), fasting blood glucose, body mass index (BMI), and blood pressure. We excluded studies wherethe participants were pregnant women who required different therapeutic strategies. We also excluded studies that used qualitative data as an outcome measure, were not written in English, and did not use mobile app-based technology for diabetes self-management purposes.

Study Selection

The results of the systematic searches were imported into a reference manager, Mendeley software. Duplicates were removed using the software and manual. Then, we independently screened the titles and abstracts of the studies and categorized them into
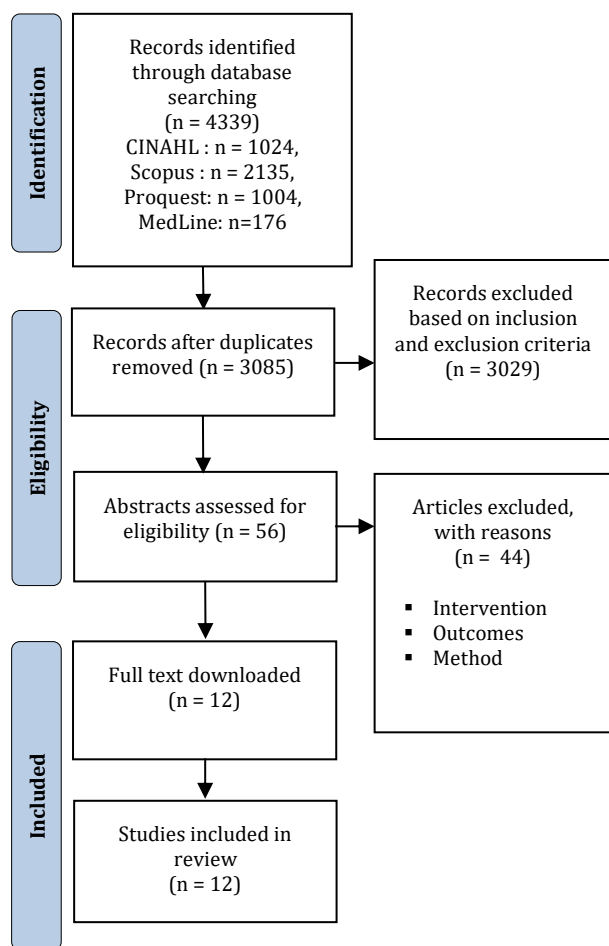
Figure 1. PRISMA flowchart of included studies.

those that meet, potentially meet or do not meet the eligibility criteria. Studies with titles and abstracts deemed irrelevant and that did not meet the eligibility criteria were thus removed. The full texts of those that met or could potentially meet the eligibility criteria were retrieved.

Risk of Bias Assessment

The quality of the studies in this review was analyzed by reviewers. The risk of bias was assessed using the Cochrane risk of bias tool for randomized controlled trial (Cochrane, 2016). We used a study's overall risk of bias as a determinant measure for three quality categories: low risk of bias meant a study was likely high quality, a moderate risk of bias meant a study was likely moderate quality, and a high risk of bias meant a study was likely low quality.

RESULTS

These studies examined only type 1 diabetes, only type 2 diabetes or both type 1 and type 2 diabetes. The main characteristics of the 12 studies identified in this systematic review are summarized in Table 1.

Study and participant characteristics

We identified two studies from the twelve evaluating mobile applications only for type 1 diabetes mellitus

(Agarwal et al., 2019; Garg et al., 2017), eight studies evaluating mobile applications only for type 2 diabetes mellitus (Agarwal et al., 2019; Anzaldo-Campos et al., 2016; Bee et al., 2016b; Boels et al., 2019; Chao et al., 2019; Dugas et al., 2018; Franc et al., 2019; Kusnanto et al., 2019), two evaluating mobile applications for both type 1 and type 2 (Gunawardena et al., 2019; L. Zhang et al., 2019). The size of the study ranged from 29 to 330 participants. Participants ranged in mean age from 14 to 80 years old and had had diabetes for an average of no more than 3 years. Average of baseline HbA1c more than 7.0 was measured with laboratorium standard method or a single automated glycohemoglobin analyzer then the result was recorded in the application. Study length and length of time that participants used the apps and also an evaluation of the interventions ranged from 3 to 12 months. For most studies, the intervention group used the app with additional support from a clinician doctor or nurse diabetes educator. The control group typically received usual care, standard education, or use of a paper diary and the comparison group (intervention group) used diabetes mobile-based apps.

Risk of Bias

Of the 12 RCT studies, nine were found to have low to moderate risk of bias (Agarwal et al., 2019; Anzaldo-Campos et al., 2016; Boels et al., 2019; Castensøe-Seidenfaden et al., 2018; Chao et al., 2019; Dugas et al., 2018; Gunawardena et al., 2019; Kusnanto et al., 2019; L. Zhang et al., 2019), and 3 had a high risk of bias (Bee et al., 2016a; Garg et al., 2017; Jeandidier et al., 2018)

Features

Common features of apps for diabetes management included the ability to track health data such as blood glucose, diet programs, prescriptions, and exercise, patient feedback such as reminders to take medication or measure blood glucose, and diabetes education such as foot care.

Impact on HbA1c

All studies assessed changes in HbA1c as the main outcome of interest and showed a reduction on HbA1c level but five studies were not statistically significant (Agarwal et al., 2019; Bee et al., 2016b; Boels et al., 2019; Chao et al., 2019; Dugas et al., 2018). DiaSocial app has no significant statistic in lowering HbA1c between-group comparison (Dugas et al., 2018).

Impact on lipid or total cholesterol

Two studies assessed the impact of diabetes application on lipid or total cholesterol (Anzaldo-Campos et al., 2016; L. Zhang et al., 2019). Those studies had better control of HDL or LDL level at month 3 and 6 (all p<.05) but no significant differences were observed (all p>.05).

Table 1. General characteristic of selected studies (n=12)

Category	n	%
Year of publishing		
2016	2	16.6
2017	1	8.3
2018	2	16.6
2019	7	58.3
Type of DM		
T1DM	2	16.6
T2DM	8	66.6
T1DM and T2DM	2	16.6
Participants Age		
Adolecense	4	33.4
Adult	8	66.6

DM: Diabetes mellitus: T1DM: Type 1 Diabetes mellitus: T2DM: Typ2 2 Diabetes mellitus

Impact on body mass index

Three studies assessed the impact of diabetes application on body mass index (BMI) (Anzaldo-Campos et al., 2016; Boels et al., 2019; L. Zhang et al., 2019). No significant differences were founded for BMI in all those studies in this review (all p>.05).

Impact on hypoglycemia event

Three studies assessed the impact of diabetes application on hypoglycaemia events (Bee et al., 2016b; Boels et al., 2019; Castensøe-Seidenfaden et al., 2018). The hypoglycemic event was marginally lower in the intervention group, but this difference was also not statistically significant and no severe hypoglycemia was reported.

Impact on psychological aspects

We identified four studies from twelve that assessed psychological aspects such as self-efficacy, depression, quality of life, knowledge, and adherence (Agarwal et al., 2019; Anzaldo-Campos et al., 2016; Chao et al., 2019; Kusnanto et al., 2019). The impact of self-efficacy has increased through the use of DM-calendar apps and there was improved behavior of good self-management referred from National Standards Diabetes Self-Management Education (DSME) (Funnell et al., 2010; Kusnanto et al., 2019). A significant interaction effect was also observed for diabetes knowledge but not for any of the other self-reported outcomes: self-efficacy, depression, lifestyle, and quality of life (all P values >0.05) (Anzaldo-Campos et al., 2016). But other studies stated that the results of the case group was better than those of the control group, especially those for knowledge score (P=.05) (Chao et al., 2019). Participants at a high risk indicated a high motivation to change and to achieve high scores in the self-care knowledge assessment.

DISCUSSION

Our findings suggest the significant glycated haemoglobin (HbA1C) reduction associated with SGM was probably due to the app's ability to continuously engage the participants in the dietary and exercise advice given by diabetes educators (Castensøe-Seidenfaden et al., 2018; Franc et al., 2019; L. Zhang et al., 2019). Patient engagement with technology, educational content and self-care behaviors influence outcomes of mobile app-based interventions. People living with diabetes are more likely to check their mobile phones or smartphones more than once a day (Gunawardena et al., 2019). This allows the mobile app to maintain the attention of an individual while managing symptoms of their illness to prevent further adverse outcomes or complications associated with diabetes such as retinopathy, neuropathy, nephropathy, foot ulcers, and other morbid conditions such as cardiovascular disease, chronic kidney disease, functional and cognitive decline, and even mortality. Another reason for this may be that patients generally show interest or enthusiasm toward treatment through mobile app advances that ease the burden imposed by traditional strategies to manage diabetic symptoms and complications. We believe this might be the driving reason for a more prominent effect of apps on A1C levels after 3 months of the trial.

In the other point of view, clinicians often direct patients to attend in-person diabetes self-management classes, which may be burdensome and this may be partly responsible for the low attendance rates (National Center for Chronic Disease Prevention and Health Promotion, 2015). Mobile-based application interventions for education and self-management generally provide holistic content, are targeted towards patients with type 1 or type 2 diabetes, and are informed by behavioral change theories (Orsama et al., 2013), such as the Information-Motivation-Behavioral Skills Model, social cognitive theory (Arora et al., 2014), motivational interviewing (Block et al., 2015) or the theory of planned behavior (Holmen et al., 2014). Patients are encouraged to monitor glucose, diet, insulin dosages, and exercise regularly, and this data can be used to adjust feedback messages sent through the application (Y. Zhang et al., 2018). The content of the messages includes diabetes education, health promotion, motivational messages, reminders for medications and, self-monitoring blood glucose, or specific behavioral changes to implement, which are

Table 2. Summary of selected studies

Author	Type of DM	Design	Sample	Variable	Result
(Anzaldo-Campos et al., 2016)	T2DM	Randomized controlled trial	301 participants were enrolled in the study and were allocated randomly: - 99 to Project Dulce-only (PD) - 102 to Project Dulce Technology Enhanced With Mobile Tools (PD-TE), - 100 to standart care/control group (CG)	Clinical: 1. Glycated haemoglobin (HbA1c) 2. Total cholesterol, low-density lipoprotein cholesterol (LDL-c), high-density lipoprotein cholesterol (HDL-c), triglycerides 3. Systolic blood pressure (SBP) 4. Diastolic blood pressure (DBP) 5. Body mass index (BMI) Self-reported: 1. Self-efficacy 2. Depression 3. Lifestyle 4. quality of life 5. diabetes knowledge	HbA1c reductions from baseline to month 10 were significantly greater in intervention groups. Significant improvement in diabetes knowledge when compared with control. No statistically significant differences were detected between PD and PD-TE on these indicators. Several within-group improvements were observed on other clinical and self-report indicators but did not vary significantly across groups.
(Gunawardena et al., 2019)	T1DM and T2DM	Randomized clinical trial	67 participants were randomized: - Smart Glucose Manager SGM (n = 27) - Control group (n = 25).	Glycated hemoglobin (HbA1C)	At the 6-month follow up, the SGM group had significant lower A1c levels than the control group. For both groups, A1c values decreased from baseline to the 3 months. From 3 months to 6 months, the SGM group showed further improvement of A1c, whereas the control group did not. A1c improvement was positively correlated with SGM usage.
(Dugas et al., 2018)	T2DM	Randomized control trial	29 participants were randomized: - usual care group (n = 5) - intervention group (n = 24)	1. Glycated hemoglobin (HbA1C) 2. Adherence	There were no differences in adherence levels across treatment conditions. Between group comparisons detected no significant effects on HbA1C change over time.
(Boels et al., 2019)	T2DM	Open two-arm multicenter parallel randomized controlled superiority trial	330 participants were randomized: - Intervention group (n=115) - Control group (n=115)	1. HbA1c 2. Hypoglycemic event 3. Body mass index 4. Glycemic variability 5. Dietary habits 6. Quality of life.	HbA1c level was slightly lower in the intervention group in both the unadjusted and the adjusted analysis, but this difference was not statistically significant. There was no effect on secondary outcomes included dietary habits and quality of life. No adverse events were reported.

Author	Type of DM	Design	Sample	Variable	Result
(L. Zhang et al., 2019)	T1DM and T2DM	prospective randomized controlled trial	276 participants were randomized: - control group (group A) (n=78) - app self-management group (group B) (n=78) - app interactive management group (group C) (n=78)	1. HbA1c 2. Fasting plasma glucose (FPG) 3. body weight 4. lipid	At months 3 and 6, all 3 groups showed significant decreases in HbA1c levels. Patients in the app interactive management group had a significantly lower HbA1clevel than those in the app self-management group at 6 months.
(Franc et al., 2019)	T2DM	randomized controlled trial	191 participants were randomized: - group 1 (standard care, n = 63) - group 2 (G2, interactive voice response system, n = 64) - group 3 (G3, Diabeo-BI app software, n = 64).	1. HbA1c levels 2. fasting blood glucose (FBG)	HbA1c levels decreased significantly more in patients from the intervention than in the control. HbA1c decreases from baseline were also significantly higher in G2 and G3 compared with the control. The glycaemic control target (HbA1c < 7.0%) was achieved in twice as many patients as in the control.
(Chao et al., 2019)	T2DM	Randomized controlled trials	121 participants were stratified randomized: - Case-group patients participated (n=62) - Control-group patients (n=59)	1. HbA1c 2. Self-knowledge 3. Self-care	The associated clinical outcomes in the case group with the mobile-based intervention were slightly better than in the control group. In addition, 86% (42/49) of the participants improved their health knowledge through the mobile-based app and information and communications technology.
(Garg et al., 2017)	T1DM	Randomized controled trial	100 participants were stratified randomized: - control group (n=50) - intervention grup (n=50)	1. A1C 2. Complete metabolic panel 3. Complete cell counts	There was a decrease in A1c among both the control and intervention groups at 3 months, although the amount of change in A1c was not different between groups. However, at 6 months, there was a significant decrease in A1c from baseline only in the intervention group.
(Kusnanto et al., 2019)	T2DM	randomized controlled trial	30 participants were randomized: - Control group (n=15) - Intervention group (n=15)	1. Self-efficacy 2. HbA1c	Education with DM-calendar media has increased the perception of self-efficacy and improved the behavior of good self-management that can be seen from changes in controlled HbA1c level, lipid profile and insulin.
(Agarwal et al., 2019)	T2DM	Multicenter Pragmatic Randomized Controlled Trial	240 participants were randomized: - immediate treatment group (ITG) (n=110)	1. HbA1c 2. Patient self-management 3. experience of care	The results of an analysis of covariance controlling for baseline HbA1c levels did not show evidence of intervention impact on HbA1c levels at 3 months. Similarly, there was no

Author	Type of DM	Design	Sample	Variable	Result
			- control group (n=113)	4. self-reported health utilization	intervention effect on secondary outcomes measuring diabetes self-efficacy, quality of life, and health care utilization behaviors.
(Castensøe-Seidenfaden et al., 2018)	T1DM	Randomized Controlled Trial	151 Participants were randomized: - intervention group (n=76) - control (n=75)	1. HbA1c 2. Hypoglycemia 3. Hospitalizations	At 12 months, HbA1c was significantly higher in the intervention group. The apps did not improve HbA1c, but it may be a useful tool for complementing self-management in young people with T1DM. This finding did not occur when comparing app users with nonusers. Most young people and half of the parents reported that the apps helped them.
(Bee et al., 2016b)	T2DM	A Pilot Randomized Controlled Trial	66 participants were randomized: - intervention group (n =33) - control group (n=33)	1. fasting plasma glucose 2. HbA1c 3. Hypoglycemia	Reductions from baseline were numerically greater in the intervention group at allthree follow-ups, mean reduction of HbA1c from baseline was numerically greater in the intervention group than the control group with no significant difference between groups.

usually sent automatically according to an algorithm (Schramm, 2018; Shan et al., 2019).

Previous studies showed that performance expectancy had the strongest direct effect on behavioral intention (Y. Zhang et al., 2019). Furthermore, novel mobile apps should aim to initiate behavioral changes and treatment adjustments in a positive way for both clinical and psychological outcomes, considering that diabetes is a chronic and complicated disease in which glycemic management alone may not be enough to improve health outcomes (Modzelewski et al., 2018). Other evidence indicates that the use of some mobile apps with additional support from a healthcare provider or study staff may be useful in improving short-term outcomes, especially HbA1c, compared with controls for both type 1 and type 2 diabetes (Veazie et al., n.d.). This study suggests that mobile apps have the potential to improve diabetes self-management skills in patients with diabetes mellitus both type 1 or type 2. But, there is limited evidence that the use of apps improves other important outcomes such as quality of life, depression, blood pressure, weight, or body mass index (BMI) (Holmen et al., 2014), (Pramanik et al., 2019).

Emerging evidence shows that mobile apps provide benefits for diabetes treatment after an average of 3 months. Similar with we have found in this review, previous studies by Osborn et al. found that both type 1 and type 2 diabetes patients reported a mean A1C reduction over 4 months using an app called One Drop (Osborn et al., 2017). However, this reduction was detected not in a randomized trial design but an observational setting. In addition, diabetes-related complications such as neuropathy, retinopathy, or hypertension were not measured, so we could not determine if the use of the apps reduced their incidence or severity and also assess what components of the mobile-apps based were most associated with long-term compliance to the management of diabetes. So, further research must explore many aspects that have not been reviewed in previous studies both clinical and psychological output.

CONCLUSION

Most of the reviewed mobile-app-based diabetes management tools have been shown to positively effect outcomes, including HbA1c levels, hypoglycemia rates, cholesterol level, self-efficacy, quality of life, diabetes knowledge and more. Giving that, now the need for individualized or self-care management for patients with diabetes is more evident than ever.

The development and evaluation of more comprehensive mobile apps that allow logging of glucose readings, calculation of carbohydrates and insulin doses, incorporate reminders for medication, support education to prevent complications, and provide feedback are warranted and should incorporate both patient and clinician feedback on

lifestyle or workflow integration, respectively, as well as usability and content. Thus, further long-term, multicenter studies are necessary to prove the long-term impact of the available applications today, while continuing efforts should target the development of the ideal mobile-app based self-management tool for diabetes. Hence, guidelines from scientific organizations and authorities in the field of mobile health are also necessary to successfully carry on the programs.

CONFLICT OF INTEREST

No conflict of interest has been declared by the authors.

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REFERENCES

Agarwal, P., Mukerji, G., Desveaux, L., Ivers, N. M., Bhattacharyya, O., Hensel, J. M., Shaw, J., Bouck, Z., Jamieson, T., Onabajo, N., Cooper, M., Marani, H., Jeffs, L., & Sacha Bhatia, R. (2019). Mobile app for improved self-management of type 2 diabetes: Multicenter pragmatic randomized controlled trial. *Journal of Medical Internet Research*, *21*(1), 1–13. https://doi.org/10.2196/10321

American Diabetes Association. (2017). Comprehensive medical evaluation and assessment of comorbidities. Sec. 3. In Standards of Medical Care in Diabetes. *Diabetes Care*, *40*, 25–32.

Anzaldo-Campos, M. C., Contreras, S., Vargas-Ojeda, A., Menchaca-Díaz, R., Fortmann, A., & Philis-Tsimikas, A. (2016). Dulce wireless Tijuana: A randomized control trial evaluating the impact of project Dulce and short-term mobile technology on glycemic control in a family medicine clinic in Northern Mexico. *Diabetes Technology and Therapeutics*, *18*(4), 240–251. https://doi.org/10.1089/dia.2015.0283

Arora, S., Peters, A. L., Burner, E., Lam, C. N., & Menchine, M. (2014). Trial to examine text message-based mhealth in emergency department patients with diabetes (TExT-MED): A randomized controlled trial. *Annals of Emergency Medicine*, *63*(6), 745-54.e6. https://doi.org/10.1016/j.annemergmed.2013.10.012

Bee, Y. M., Batcagan-Abueg, A. P. M., Chei, C.-L., Do, Y. K., Haaland, B., Goh, S.-Y., Lee, P. C., Chiam, P. P. S., Ho, E. T. L., & Matchar, D. B. (2016a). A Smartphone Application to Deliver a Treat-to-Target Insulin Titration Algorithm in Insulin-Naive Patients With Type 2 Diabetes: A Pilot Randomized Controlled Trial. *Diabetes Care*, *39*(10), e174–e176. https://doi.org/10.2337/dc16-0419

Bee, Y. M., Batcagan-Abueg, A. P. M., Chei, C. L., Do, Y. K., Haaland, B., Goh, S. Y., Lee, P. C., Chiam, P. P. S., Ho, E. T. L., & Matchar, D. B. (2016b). A smartphone application to deliver a treat-to-target insulin titration algorithm in insulin-naive patients with type 2 diabetes: A pilot randomized controlled trial. *Diabetes Care*, *39*(10), e174–e176. https://doi.org/10.2337/dc16-0419

Binte, H., Jiao, N., Jiang, Y., Hong, J., & Wang, W. (2019). International Journal of Nursing Studies Effectiveness of smartphone-based self-management interventions on self-ef fi cacy , self-care activities , health-related quality of life and clinical outcomes in patients with type 2 diabetes : A systematic revie. *International Journal of Nursing Studies*, 103286. https://doi.org/10.1016/j.ijnurstu.2019.02.003

Block, G., Azar, K. M. J., Romanelli, R. J., Block, T. J., Hopkins, D., Carpenter, H. A., Dolginsky, M. S., Hudes, M. L., Palaniappan, L. P., & Block, C. H. (2015). Diabetes prevention and weight loss with a fully automated behavioral intervention by email, web, and mobile phone: A randomized controlled trial among persons with prediabetes. *Journal of Medical Internet Research*, *17*(10). https://doi.org/10.2196/jmir.4897

Boels, A. M., Vos, R. C., Dijkhorst-Oei, L. T., & Rutten, G. E. H. M. (2019). Effectiveness of diabetes self-management education and support via a smartphone application in insulin-treated patients with type 2 diabetes: Results of a randomized controlled trial (TRIGGER study). *BMJ Open Diabetes Research and Care*, *7*(1), 1–4. https://doi.org/10.1136/bmjdrc-2019-000981

Casagrande, S. S., Fradkin, J. E., Saydah, S. H., Rust, K. F., & Cowie, C. C. (2013). The prevalence of meeting A1C, blood pressure, and LDL goals among people with diabetes, 1988-2010. *Diabetes Care*, *36*(8), 2271–2279. https://doi.org/10.2337/dc12-2258

Castensøe-Seidenfaden, P., Husted, G. R., Jensen, A. K., Hommel, E., Olsen, B., Pedersen-Bjergaard, U., Kensing, F., & Teilmann, G. (2018). Testing a smartphone app (Young with diabetes) to improve self-management of diabetes over 12 months: Randomized controlled trial. *JMIR MHealth and UHealth*, *6*(6). https://doi.org/10.2196/mhealth.9487

Chao, D. Y. P., Lin, T. M. Y., & Ma, W. Y. (2019). Enhanced self-efficacy and behavioral changes among patients with diabetes: Cloud-based mobile health platform and mobile app service. *Journal of Medical Internet Research*, *21*(5). https://doi.org/10.2196/11017

Cochrane. (2016). *The RoB 2 . 0 tool (individually randomized , parallel group trials)*. 1–21.

Doupis, J., Festas, G., Tsilivigos, C., & Efthymiou, V. (2020). Smartphone-Based Technology in Diabetes Management. *Diabetes Therapy*. https://doi.org/10.1007/s13300-020-00768-3

Dugas, M., Crowley, K., Gao, G. G., Xu, T., Agarwal, R., Kruglanski, A. W., & Steinle, N. (2018). Individual differences in regulatory mode moderate the effectiveness of a pilot mHealth trial for diabetes management among older veterans. *PLoS ONE*, *13*(3), 1–21. https://doi.org/10.1371/journal.pone.0192807

Fox, C. S., Sullivan, L., D'Agostino, R. B., & Wilson, P. W. F. (2004). The Significant Effect of Diabetes Duration on Coronary Heart Disease Mortality: The Framingham Heart Study. *Diabetes Care*, *27*(3), 704–708. https://doi.org/10.2337/diacare.27.3.704

Franc, S., Joubert, M., Daoudi, A., Fagour, C., Benhamou, P. Y., Rodier, M., Boucherie, B., Benamo, E., Schaepelynck, P., Guerci, B., Dardari, D., Borot, S., Penfornis, A., D'Orsay, G., Mari, K., Reznik, Y., Randazzo, C., & Charpentier, G. (2019). Efficacy of two telemonitoring systems to improve glycaemic control during basal insulin initiation in patients with type 2 diabetes: The TeleDiab-2 randomized controlled trial. *Diabetes, Obesity and Metabolism*, *21*(10), 2327–2332. https://doi.org/10.1111/dom.13806

Funnell, M. M., Brown, T. L., Childs, B. P., Haas, L. B., Hosey, G. M., Jensen, B., Maryniuk, M., Peyrot, M., Piette, J. D., Reader, D., Siminerio, L. M., Weinger, K., & Weiss, M. A. (2010). National standards for diabetes self-management education. *Diabetes Care*, *33*(SUPPL. 1). https://doi.org/10.2337/dc10-S089

Garg, S. K., Shah, V. N., Akturk, H. K., Beatson, C., & Snell-Bergeon, J. K. (2017). Role of Mobile Technology to Improve Diabetes Care in Adults with Type 1 Diabetes: The Remote-T1D Study iBGStar® in Type 1 Diabetes Management. *Diabetes Therapy*, *8*(4), 811–819. https://doi.org/10.1007/s13300-017-0272-5

Gonzalez, J. S., Tanenbaum, M. L., & Commissariat, P. V. (2016). Psychosocial factors in medication adherence and diabetes self-management: Implications for research and practice. *American Psychologist*, *71*(7), 539–551. https://doi.org/10.1037/a0040388

Gunawardena, K. C., Jackson, R., Robinett, I., Dhaniska, L., Jayamanne, S., Kalpani, S., & Muthukuda, D. (2019). The Influence of the Smart Glucose Manager Mobile Application on Diabetes Management. *Journal of Diabetes Science and Technology*, *13*(1), 75–81. https://doi.org/10.1177/1932296818804522

Holmen, H., Torbjørnsen, A., Wahl, A. K., Jenum, A. K., Småstuen, M. C., Årsand, E., & Ribu, L. (2014). A Mobile Health Intervention for Self-Management and Lifestyle Change for Persons With Type 2 Diabetes, Part 2: One-Year Results From the Norwegian Randomized Controlled Trial RENEWING HEALTH. *JMIR MHealth and UHealth*, *2*(4), e57. https://doi.org/10.2196/mhealth.3882

Hou, C., Carter, B., Hewitt, J., Francisa, T., & Mayor, S. (2016). *Do Mobile Phone Applications Improve Glycemic Control (HbA 1c) in the Self-management of Diabetes ? A Systematic Review , Meta-analysis , and GRADE of 14 Randomized Trials*. *39*(November), 2089–2096. https://doi.org/10.2337/dc16-0346

International Diabetes Federation. (2019). *IDF Diabetes Atlas* (9 th).

Jeandidier, N., Chaillous, L., Franc, S., Benhamou, P.-Y., Schaepelynck, P., Hanaire, H., Catargi, B., Farret, A., Fontaine, P., Guerci, B., Reznik, Y., Penfornis, A., Borot, S., Serusclat, P., Kherbachi, Y., D'Orsay, G., Detournay, B., Simon, P., & Charpentier, G. (2018). DIABEO App Software and Telemedicine Versus Usual Follow-Up in the Treatment of Diabetic Patients: Protocol for the TELESAGE Randomized Controlled Trial. *JMIR Research Protocols*, *7*(4), e66. https://doi.org/10.2196/resprot.9154

Kusnanto, Widyanata, K. A. J., Suprajitno, & Arifin, H. (2019). DM-calendar app as a diabetes self-management education on adult type 2 diabetes mellitus: a randomized controlled trial. *Journal of Diabetes and Metabolic Disorders*, *18*(2), 557–563. https://doi.org/10.1007/s40200-019-00468-1

Mathers, C. D., & Loncar, D. (2006). Projections of global mortality and burden of disease from 2002 to 2030. *PLoS Medicine*, *3*(11), e442–e442.

Modzelewski, K. L., Stockman, M. C., & Steenkamp, D. W. (2018). Rethinking the Endpoints of mHealth Intervention Research in Diabetes Care. *Journal of Diabetes Science and Technology*, *12*(2), 389–392. https://doi.org/10.1177/1932296817733007

National Center for Chronic Disease Prevention and Health Promotion. (2015). *Emerging practices in diabetes prevention and control: Medicaid coverage for DSME*.

Orsama, A. L., Lähteenmäki, J., Harno, K., Kulju, M., Wintergerst, E., Schachner, H., Stenger, P., Leppänen, J., Kaijanranta, H., Salaspuro, V., & Fisher, W. A. (2013). Active assistance technology reduces glycosylated hemoglobin and weight in individuals with type 2 diabetes: Results of a theory-based randomized trial. *Diabetes Technology and Therapeutics*, *15*(8), 662–669. https://doi.org/10.1089/dia.2013.0056

Osborn, C. Y., van Ginkel, J. R., Marrero, D. G., Rodbard, D., Huddleston, B., & Dachis, J. (2017). One Drop | Mobile on iPhone and Apple Watch: An Evaluation of HbA1c Improvement Associated With Tracking Self-Care. *JMIR MHealth and UHealth*, *5*(11), e179. https://doi.org/10.2196/mhealth.8781

Pramanik, B. K., Angelin, J. J., Mathai, V. J., Mathai, S., Korula, S., & Simon, A. (2019). Smartphone App as Motivational Intervention to Improve Glycemic Control in Adolescents with Type 1 Diabetes. *Indian Journal of Pediatrics*, *86*(12), 1118–1123. https://doi.org/10.1007/s12098-019-03035-x

Quinn, C. C., Khokhar, B., Weed, K., Barr, E., & Gruber-Baldini, A. L. (2015). Older Adult Self-Efficacy Study of Mobile Phone Diabetes Management.

Diabetes Technology & Therapeutics, *17*(7), 455–461. https://doi.org/10.1089/dia.2014.0341

Rossi, M. C., Nicolucci, A., Lucisano, G., Pellegrini, F., Di Bartolo, P., Miselli, V., Anichini, R., & Vespasiani, on behalf of the DID St, G. (2013). Impact of the "Diabetes Interactive Diary" Telemedicine System on Metabolic Control, Risk of Hypoglycemia, and Quality of Life: A Randomized Clinical Trial in Type 1 Diabetes. *Diabetes Technology & Therapeutics*, *15*(8), 670–679. https://doi.org/10.1089/dia.2013.0021

Schramm, W. (2018). Digital Diabetes Self-Management: A Trilateral Serial. *Journal of Diabetes Science and Technology*, *12*(3), 709–711. https://doi.org/10.1177/1932296818761973

Shan, R., Sarkar, S., & Martin, S. S. (2019). Digital health technology and mobile devices for the management of diabetes mellitus: state of the art. *Diabetologia*, *62*(6), 877–887. https://doi.org/10.1007/s00125-019-4864-7

Skrøvseth, S. O., Årsand, E., Godtliebsen, F., & Joakimsen, R. M. (2015). Data-Driven Personalized Feedback to Patients with Type 1 Diabetes: A Randomized Trial. *Diabetes Technology & Therapeutics*, *17*(7), 482–489. https://doi.org/10.1089/dia.2014.0276

Veazie, S., Winchell, K., Gilbert, J., Paynter, R., Ivlev, I., Eden, K. B., Nussbaum, K., Weiskopf, N., Guise, J., & Helfand, M. (n.d.). *Rapid Evidence Review of Mobile Applications for Self-management of Diabetes*. *2*, 1167–1176. https://doi.org/10.1007/s11606-018-4410-1

Zhang, L., He, X., Shen, Y., Yu, H., Pan, J., Zhu, W., Zhou, J., & Bao, Y. (2019). Effectiveness of smartphone app-based interactive management on glycemic control in Chinese patients with poorly controlled diabetes: Randomized controlled trial. *Journal of Medical Internet Research*, *21*(12), 1–10. https://doi.org/10.2196/15401

Zhang, Y., Li, X., Luo, S., Liu, C., Liu, F., & Zhou, Z. (2018). Exploration of users' perspectives and needs and design of a type 1 diabetes management mobile app: Mixed-methods study. *JMIR MHealth and UHealth*, *6*(9), 1–20. https://doi.org/10.2196/11400

Zhang, Y., Liu, C., Luo, S., Xie, Y., Liu, F., Li, X., & Zhou, Z. (2019). Factors influencing patients' intention to use diabetes management apps based on an extended unified theory of acceptance and use of technology model: Web-based survey. *Journal of Medical Internet Research*, *21*(8), 1–20. https://doi.org/10.2196/15023

Systematic Review

Education-Based Mobile Apps Platform in Patients Undergoing Surgery: A Systematic Review

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ABSTRACT

Introduction: Providing sufficient information during a pre-operative helps patients understand their condition and plan of care, to identify and manage potential complications, and to reduce hospital readmission. New innovation mobile application platforms put education in the hands of patients and their families. The aim of study was to investigate the effect of mobile application education in patients undergoing surgery.

Methods: A systematic review study was based on PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyzes) with article sources using the Scopus, Science Direct, PubMed and ProQuest databases. Limited to the last 5 years (2015-2020) using English as well as full-text articles. This was done using a combination of keywords and Boolean operators (AND and OR). Keywords used in searching are "Education" "Pre-operative Education", "Perioperative", "Mobile Application", "Smartphone", "Multimedia" and "Surgery".

Results: Total article found were 438 articles and we just included 15 articles which related to topic. The design RCT was 10 articles, 2 quasi-experimental articles, 1 cohort study, and 2descriptive study. Mobile application platform has multiple benefit and challenges to effective delivery of health information to patients, new models of health care demand patient empowerment and so are fundamentally dependent on success with patient education. Patients indicated they understood of the content prior to discharge.

Conclusion: Additionally, patient demonstrated mobile application advances allow delivery of both individualized and "just-in-time" education. Our findings indicate that education based mobile application platform have a positive effect on patients undergoing surgery.

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INTRODUCTION

Surgical patients often experience pre-operative related problems such as anxiety and lack of knowledge (Lin et al., 2016)(Mundi et al., 2015). Patients undergoing surgery are often faced with complex treatment decisions without sufficient information regarding the association of these choices with outcomes that matter most to them (Panda et al., 2019).Perioperatively, patient education helps patients understand their condition and the plan of care, to identify and manage potential complications, and to reduce hospital re admission.

This type of information reduces healthcare-associated costs through decreased length of stay and improved self-management after discharge. Effective patient education has multiple requirements; some relate to the form, content, and mode of delivery required for adults, whereas other contingencies are patient-sided challenges related to illness and hospitalization. Finally, there are multiple requirements of providers.

The format and delivery of education can impact a patient's ability to learn and act. Information acquisition is affected by the approach to education (type of setting, presenter), mode of delivery (written,

electronic, face-to-face, etc.), and how often information is presented (Tomaszek et al., 2019). Adult education is most effective when the content is individualized,

when multiple delivery means are utilized, and when delivery occurs in multiple sessions (Stamenkovic et al., 2018). Although perioperative education is critical, hospitalization creates patient-dependent education barriers. Surgery may result in pain, fatigue, and nausea; sleep deprivation, alteration of sleep wake cycles, medication effects, and cognitive impairment are also

common, particularly in older adults (Lee et al., 2014).There are also provider-dependent factors relevant to effective patient education. Post-operative patient education has traditionally been delivered through writing (e.g., pamphlets), verbal instruction by a nurse, or a combination of these. With verbal education, nurses are typically responsible for the selection of topics that they perceive as important
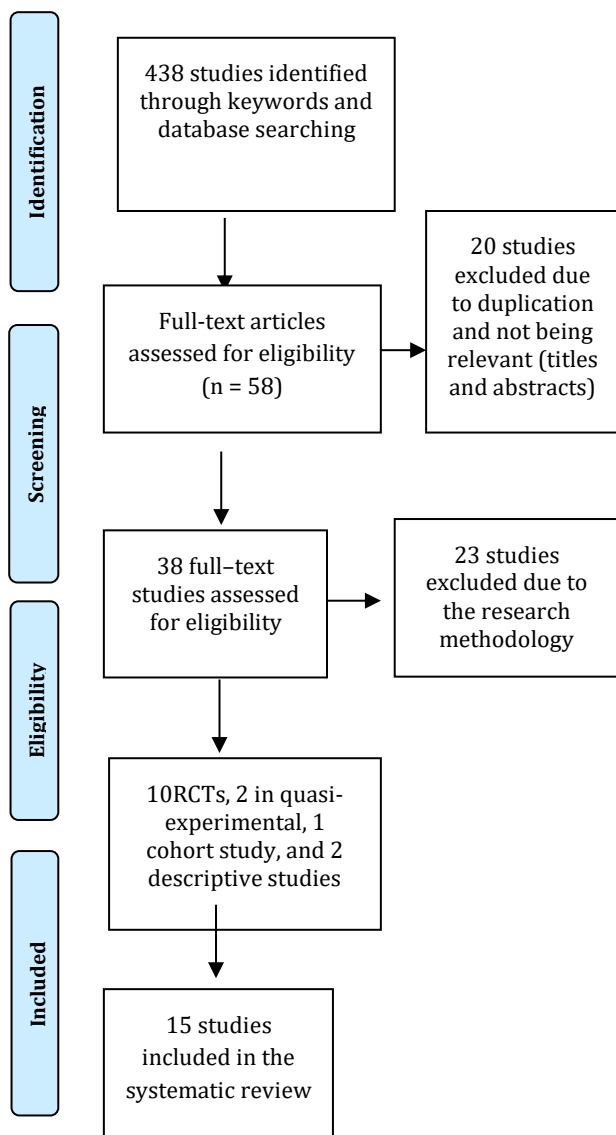

Figure 1. Flow diagram

(Cakmak et al., 2018).Limitations of this approach include provider-dependent inconsistencies, disconnection between patient needs and the provider's appraisal, providing too much information in written format, and information that may not correlate with patients' knowledge level(Hoon et al., 2013). Furthermore, verbal only instructions are frequently forgotten or remembered inaccurately, and timing dyssynchrony between nurse and patient availability/readiness is common. Educational topics may not be available, content inconsistencies are common, and keeping content up to date is difficult (Patel et al., 2016).

New approaches to patient education are required. There is a current growing movement in mobile technologies and applications that collaborate to build a new modality of healthcare (Sousa & Turrini, 2019).Advances in mobile telecommunication, improved mobile internet and affordability have led to a significant increase in smartphone use within medicine (Patel et al., 2016).Mobile applications on smartphones have played an increasingly significant role in patient-centered health and medicine (Panda et al., 2019). Smartphone mobile apps have been developed to target both consumers and healthcare professionals in myriad scenarios and settings, such as health, fitness and lifestyle education and management apps, ambient assisted living apps, continuing professional education tools, and apps for public health surveillance (Lalloo et al., 2017).E-learning on mobile applications is slowly becoming the standard of teaching in many fields because of multiple advantages, such as lack of physical barrier, flexibility, and options of asynchronous learning. Technological innovations will continue to bring new solutions, but also new challenges at the same time (Roy et al., 2019).The aim of this study was to identify the use of mobile application platforms in perioperative surgery.

MATERIALS AND METHODS

This paper reported on a complementary intervention in the nursing area since 2015-2020. The study adopted a systematic literature review methodology to clarify the advantages of mobile applications on perioperative care in surgery patients. By systematically reviewing the literature, we were able to synthesize the existing literature and empirical evidence in a transparent and replicable way in order to identify areas where the knowledge is still scarce and to point out future research questions to academics, practitioners and policymakers. From a range of 438 papers in total, we identified 38 papers that need to be thoroughly revised and, after we decided on the inclusion criteria, it limited the papers down to 15 focused on mobile application and related multimedia innovation for perioperative care on patient undergoing surgery.

Data Collection

The study uses a systematic review study based on PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyzes), in searching for article sources using the Scopus, Science Direct, PubMed and ProQuest databases. Article search is limited to the last 5 years (2015-2020), articles that use English as well as full-text articles. This was done using a combination of keywords and Boolean operators (AND and OR). Keywords used in searching are "Education" "Pre-operative Education" "Perioperative", "Mobile Application", "Smartphone", "Multimedia" and "Surgery".

Study Selection and Data Extraction

The inclusion criteria of the research were 1) experimental and non-experimental studies (including descriptive study), 2) research conducted from 2015 to 2020 and 3) research samples or respondents who were patients undergoing surgery or related point of view about surgery. There was no age limitation for the participants in the article, because the focus of the search was on the mobile application usefulness and implication. The articles were clarified if the results of the study did not explain the estimated effects of the intervention and studies focusing only on describing the use of mobile application in educating patients. The steps of the data selection and extraction are reported in Figure 1.

RESULTS

The results of the review of 15 journal articles used in this study are related to the benefits of mobile application and other kind multimedia innovation for surgery patient. The total number of respondents in this review was 1341 participants. The researcher found three articles that did not mention the number of participants.

DISCUSSION

The literature review showed that researchers have been analyzing mobile application benefit based on patient point of view. Only limited study showed both advantages for patient and surgeon or physician point of view (Patel et al., 2016)(Uesugi et al., 2013).New models of mobile apps platforms demand patient empowerment and so are fundamentally dependent on success with patient education. Remarkable advances in technology and information systems create previously unknown opportunities to achieve. In aging population having an average age over 60 years undergoing very major surgery, patients still utilize very aggressive education programs. Furthermore, patients indicated they understood the content prior to discharge(Roy et al., 2019).

Education tools and helping patient in making a decision

Mobile application can complement teaching techniques and educational tools in patient undergoing surgery (Roy et al., 2019). In addition, it can potentially be used as a platform for helping patient in making a decision regarding appropriate recovery or dietary programs. The approach to education (setting, educator), mode of delivery (written, electronic, face-to-face, etc.), and timing may affect patient's ability to retain information. Education is most effective when the content is personalized, when multiple delivery means are utilized, and when delivery occurs in multiple sessions, the addition of multimedia material is associated with greater patient satisfaction and maximizes information gain (Pecorelli et al., 2018).

Providing insight into the recovery of patients

Providing consultation may allow for considerable advances in shared decision-making, recovery monitoring, and patient engagement (Panda et al., 2019).There has been remarkable growth in smartphones use among surgeons. Apps are being developed for every conceivable use (Patel et al., 2016).

Favorable experience

Patients reported favorable experience with app usage, reporting that it fits easily into their existing life pattern, while helping them prepare for surgery. The app accomplished the primary intent of cost-effectively educating, assessing, and engaging patients (Mundi et al., 2015).Patients participating in the trial reported high usability and satisfaction with the app; most of them felt that the app was very helpful to understand and achieve their recovery goals and motivate them to recover from surgery (Pecorelli et al., 2018).

Decreased anxiety levels

The reduction in anxiety can be attributable to the audiovisual presentation, indicating that it might be easier to understand a video presentation than a purely verbal briefing (Lin et al., 2016)(Shao et al., 2019).Patient anxiety may result from lack of information in the pre-operative period. The 'fear of feeling ill' component of anxiety was assessed by measurements. The pre-operative video addressed these two dimensions and described the experience that patients should expect during the perioperative period. Previous studies of surgical patients indicate that pre-operative anxiety is reduced by having had positive experiences in previous surgery, feeling a sense of security and caring, being well-informed and having positive expectations.

Table 1. The studies included in the systematic review

Author	Type of Study	Participants	Intervention	Outcome
(Bouwsma et al., 2018)	RCTs	433 participants	An internet-based care program	Return to work (RTW) duration
(Lalloo et al., 2017)	Descriptive study	10 applications	Characterize, evaluate functionality of apps.	Character, content, and function of application
(Lin et al., 2016)	RCTs	100 participants	Educational anesthetic video	Anxiety, experimental effect, and satisfaction
(Mundi et al., 2015)	RCTs	30 participants	Algorithmic EMA text messages	Satisfaction, behavior
(Panda et al., 2019)	Cohort Study	139 participants	Application of accelerometer data	Post-operative physical activity
(Patel et al., 2016)	Descriptive study	Useful apps specifically helpful in the perioperative care of microsurgical reconstruction	Application on Smartphone	Communication, storage, educational, flap monitor
(Pereira et al., 2019)	RCTs	Patients who underwent upper or lower extremity microsurgical reconstruction	Augmentation of reality for microsurgical planning with a smartphone (ARM-PS)	Information regarding vascular anatomy
(Roy et al., 2019)	RCTs	271 participants	Smartphone application as an educational tool	Effectiveness for teaching method
(Shao et al., 2019)	RCTs	128 participants	Multimedia-based pre-operative nursing visit	STAI score, VAS scores and vital signs
(Pecorelli et al., 2018)	RCTs	45 participants	Mobile device application	Validity and usability
(Soh et al., 2019)	RCTs	44 patients	Mobile technology of incentive spirometer (IS) (Go-breath)	Performance rates of IS count, active coughing, and deep breathing
(Sousa & Turrini, 2019)	Quasi-experiment	30 participants	Educational mobile application	Usability and user satisfaction
(Rauwerdink et al., 2019)	RCTs	Patients undergoing elective colorectal surgery	patient-centered mobile application	Compliance, health-related quality of life, physical activity, and patient satisfaction
(Pulijala et al., 2015)	RCTs	50 participants	A mobile app with interactive 3D animations	efficacy of Sur-Face
(Yang et al., 2016)	Quasi-experiment	61 participants	Smartphone text messaging	Knowledge, anxiety

Supporting self-management of post-operative pain

Education was the most common self-management feature offered (Lalloo et al., 2017). Individually tailored pre-operative education and perioperative pain management planning, the use of validated pain assessment tools to track response to pain interventions and inform treatment adjustments as needed, as well as the use of evidence-based, non-pharmacological pain management (e.g., cognitive, behavioral strategies, physical modalities) in conjunction with indicated pharmacological modalities. A complex myriad of surgical, psychological, socio-environmental, and patient-related risk factors have been shown to influence postsurgical pain experience. Pre- and postsurgical psychological factors associated with increased pain include anxiety, depression, low self-efficacy, and the tendency to catastrophize about pain. Apps that are designed to pair psychological and physical pain self-management strategies with goal setting may be particularly effective for reducing pain and enhancing postsurgical outcomes.

Enhancing post-operative recovery

In the days after surgery, patients receiving the intervention returned to work faster (Bouwsma et al., 2018). Implementation of mobile application through internet-based care program targeting the patient's self-management leads to accelerated post-operative recovery following surgery. The majority of patients benefited greatly from the care program. Patients reported slightly better on the outcomes recovery-specific quality of life and pain (both intensity score and disability score) at two weeks following surgery. The differences disappeared with longer follow-up.

Issues of confidentiality, consent, storage and data retention

Although, the benefits of smartphone apps to a microsurgical breast reconstructive surgeon are evident, the issues of confidentiality, consent, storage and retention warrant attention. There must be some caution with regard to storing and transferring patient's sensitive data. There are both ethical and legal factors when processing this type of data, although guidance varies between countries. A clinical smartphone application, and collected data, used for patient care is likely to be considered part of a patient's medical record, even when stored electronically. Doctors should be aware of the applicable health records legislation within the country in which they practice. In addition, it is usual for local freedom of information legislation to give patients access their own clinical photographs if and when requested (Patel et al., 2016).

Although there are multiple challenges to effective delivery of health information to patients, new models of healthcare demand patient empowerment and so are fundamentally dependent on success with patient education. Additionally, we demonstrated that computing and technology advances allow delivery of both individualized and ''just-in-time'' education. Finally, we showed that patients can quickly learn and consume education delivered with new, but user-friendly, technology.

CONCLUSION

Mobile computing allows for highly effective delivery of customizable, and, therefore, relevant, patient education. Relevance is increased when the education is ''just-in-time'' and linked to the patients' daily care experience. The potential for extending this health education model and the implications are profound, as we move toward care models where patients are informed, empowered participants in their healthcare.

CONFLICT OF INTEREST

Author was an independent researcher and declared no conflict of interest on this study. This study was not supported by any part of institutions or organization. No third party of mobile application or smartphone vendor endorsed the author.

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REFERENCES

Bouwsma, E. V. A., Huirne, J. A. F., Van De Ven, P. M., Vonk Noordegraaf, A., Schaafsma, F. G., Schraffordt Koops, S. E., Van Kesteren, P. J. M., Brölmann, H. A. M., & Anema, J. R. (2018). Effectiveness of an internet-based perioperative care programme to enhance postoperative recovery in gynaecological patients: Cluster controlled trial with randomised stepped-wedge implementation. *BMJ Open*, *8*(1). https://doi.org/10.1136/bmjopen-2017-017781

Cakmak, M., Kose, I., Zinzircioglu, C., Karaman, Y., Tekgul, Z. T., Pektas, S., Balik, Y., Gonullu, M., & Bozkurt, P. S. (2018). Effect of video-based education on anxiety and satisfaction of patients undergoing spinal anesthesia. *Brazilian Journal of Anesthesiology (English Edition)*, *68*(3), 274–279. https://doi.org/10.1016/j.bjane.2018.01.004

Hoon, L. S., Chi Sally, C. W., & Hong-Gu, H. (2013). Effect of psychosocial interventions on outcomes of patients with colorectal cancer: A review of the literature. *European Journal of Oncology Nursing*, *17*(6), 883–891. https://doi.org/10.1016/j.ejon.2013.05.001

Lalloo, C., Shah, U., Birnie, K. A., Davies-Chalmers, C., Rivera, J., Stinson, J., & Campbell, F. (2017). Commercially Available Smartphone Apps to Support Postoperative Pain Self-Management: Scoping Review. *JMIR MHealth and UHealth*, *5*(10), e162. https://doi.org/10.2196/mhealth.8230

Lee, J. H., Jung, H. K., Lee, G. G., Kim, H. Y., Park, S. G., & Woo, S. C. (2014). Effect of behavioral intervention using smartphone application for preoperative anxiety in pediatric patients. *Korean Journal of Anesthesiology*, *65*(6), 508–518. https://doi.org/10.4097/kjae.2013.65.6.508

Lin, S. Y., Huang, H. A., Lin, S. C., Huang, Y. T., Wang, K. Y., & Shi, H. Y. (2016). The effect of an anæsthetic patient information video on perioperative anxiety. *European Journal of Anaesthesiology*, *33*(2), 134–139. https://doi.org/10.1097/EJA.0000000000000307

Mundi, M. S., Lorentz, P. A., Grothe, K., Kellogg, T. A., & Collazo-Clavell, M. L. (2015). Feasibility of Smartphone-Based Education Modules and Ecological Momentary Assessment/Intervention in Pre-bariatric Surgery Patients. *Obesity Surgery*, *25*(10), 1875–1881. https://doi.org/10.1007/s11695-015-1617-7

Panda, N., Solsky, I., Huang, E. J., Lipsitz, S., Pradarelli, J. C., Delisle, M., Cusack, J. C., Gadd, M. A., Lubitz, C. C., Mullen, J. T., Qadan, M., Smith, B. L., Specht, M., Stephen, A. E., Tanabe, K. K., Gawande, A. A., Onnela, J. P., & Haynes, A. B. (2019). Using Smartphones to Capture Novel Recovery Metrics after Cancer Surgery. *JAMA Surgery*, *02114*, 1–7. https://doi.org/10.1001/jamasurg.2019.4702

Patel, N. G., Rozen, W. M., Marsh, D., Chow, W. T. H., Vickers, T., Khan, L., Miller, G. S., Hunter-Smith, D. J., & Ramakrishnan, V. V. (2016). Modern use of

smartphone applications in the perioperative management in microsurgical breast reconstruction. *Gland Surgery*, *5*(2), 150–157. https://doi.org/10.3978/j.issn.2227-684X.2016.02.02

Pecorelli, N., Fiore, J. F., Kaneva, P., Somasundram, A., Charlebois, P., Liberman, A. S., Stein, B. L., Carli, F., & Feldman, L. S. (2018). An app for patient education and self-audit within an enhanced recovery program for bowel surgery: a pilot study assessing validity and usability. *Surgical Endoscopy*, *32*(5), 2263–2273. https://doi.org/10.1007/s00464-017-5920-3

Pereira, N., Kufeke, M., Parada, L., Troncoso, E., Bahamondes, J., Sanchez, L., & Roa, R. (2019). Augmented Reality Microsurgical Planning with a Smartphone (ARM-PS): A dissection route map in your pocket. *Journal of Plastic, Reconstructive and Aesthetic Surgery*, *72*(5), 759–762. https://doi.org/10.1016/j.bjps.2018.12.023

Pulijala, Y., Ma, M., & Ayoub, A. (2015). Design and Development of Sur-Face: An Interactive Mobile App for Educating Patients Regarding Corrective Surgery of Facial Deformities. *Springer International Publishing Switzerland*, *1*, 3–12. https://doi.org/10.1007/978-3-319-19126-3

Rauwerdink, A., Jansen, M., De Borgie, C. A. J. M., Bemelman, W. A., Daams, F., Schijven, M. P., & Buskens, C. J. (2019). Improving enhanced recovery after surgery (ERAS): ERAS APPtimize study protocol, a randomized controlled trial investigating the effect of a patient-centred mobile application on patient participation in colorectal surgery. *BMC Surgery*, *19*(1). https://doi.org/10.1186/s12893-019-0588-3

Roy, M., Dip, F., Rosales, A., Roche, M., & Hutchins, R. R. (2019). Smartphone Application as an Education Platform in Hepato-Pancreato-Biliary Surgery. *Surgical Innovation*, *26*(5), 613–620. https://doi.org/10.1177/1553350619848210

Shao, J., Xiao, T., Shi, M., Zhou, X., Wang, Z., Lin, T., Xu, R., Ni, H., & Zhang, A. (2019). Effect of multimedia-based nursing visit on perioperative anxiety in esophageal squamous cell carcinoma patients undergoing video-assisted thoracoscopic surgery. *Psychology, Health and Medicine*, *24*(10), 1198–1206. https://doi.org/10.1080/13548506.2019.1595687

Soh, J. Y., Lee, S. U., Lee, I., Yoon, K. S., Song, C., Kim, N. H., Sohn, T. S., Bae, J. M., Chang, D. K., & Cha, W. C. (2019). A mobile phone–based self-monitoring tool for perioperative gastric cancer patients with incentive spirometer: Randomized controlled trial. *Journal of Medical Internet Research*, *21*(2), 1–11. https://doi.org/10.2196/12204

Sousa, C. S., & Turrini, R. N. T. (2019). Development of an educational mobile application for patients submitted to orthognathic surgery. *Revista Latino-Americana de Enfermagem*, *27*. https://doi.org/10.1590/1518-8345.2904.3143

Stamenkovic, D. M., Rancic, N. K., Latas, M. B., Neskovic, V., Rondovic, G. M., Wu, J. D., & Cattano, D. (2018). Preoperative anxiety and implications on postoperative recovery: What can we do to change our history. *Minerva Anestesiologica*, *84*(11), 1307–1317. https://doi.org/10.23736/S0375-9393.18.12520-X

Tomaszek, L., Cepuch, G., & Fenikowski, D. (2019). Influence of preoperative information support on anxiety, pain and satisfaction with postoperative analgesia in children and adolescents after thoracic surgery: A randomized double blind study. *Biomedical Papers*, *163*(2), 172–178. https://doi.org/10.5507/bp.2018.060

Uesugi, Y., Hayashi, S., Fujishiro, T., Kanzaki, N., & Nishiyama, T. (2013). Effectiveness of distance education intervention using video footage in postoperative patients after total hip arthroplasty. *International Journal of Orthopaedic and Trauma Nursing*, *17*(2), 91–98. https://doi.org/10.1016/j.ijotn.2013.01.002

Yang, J. Y., Lee, H., Zhang, Y., Lee, J. U., Park, J. H., & Yun, E. K. (2016). The Effects of Tonsillectomy Education Using Smartphone Text Message for Mothers and Children Undergoing Tonsillectomy: A Randomized Controlled Trial. *Telemedicine and E-Health*, *22*(11), 921–928. https://doi.org/10.1089/tmj.2016.0019

Systematic Review

The Influence of Impedance and Enhancement Factors of Discharge Planning Implementation at Hospital: A Systematic Review

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ABSTRACT

Introduction: Discharge Planning is one of various nursing duty agendas, starting from when patients are admitted to hospital up to being allowed to go home. The phenomenon of implementation discharge planning for patients today is not optimal whereby nurses just do limited implementation of routine activities in the form of information on re-control. Based on those facts, the author wishes to study the analysis of impedance and enhancement factors in discharge planning implementation at hospitals.

Methods: The researcher conducted investigation in February 2020 and involved exploration of some scientific papers journal from ScienceDirect, ProQuest, Scopus, and, PubMed as references with keywords nursing discharge planning, enhancement and impedance factors, implementation, and, hospital. This paper identified15 relevant research articles from 500 original full texts between 2010 and 2018 and analyzed inclusion criterion of enhancement and impedance factors in discharge planning implementation. It involves three RCTs, eight descriptive, and four qualitative research papers

Results: As a result, there are found eight enhancement and five impedance factors influencing in discharge planning implementation. Meanwhile, from 3250 research respondents, 2125 persons reports enhanced factors contrary 1.125 samples imply impedance factors.

Conclusion: The implementation discharge planning is influenced by some factors that should be given attention by nurses to do discharge planning properly.

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INTRODUCTION

Discharge planning is dynamic and systematic process starting when patients were admitted up to permitted to leave hospital related with activity evaluation, preparation , and coordination to provide health observation, and , social service preparation (Nursalam, 2018). This process will give a professional healthcare team an opportunity to prepare patient to become more independent to their healthcare at home Discharge planning must be focused on the patient's problem an includes; promotive, preventive, rehabilitative and nursing care aspects.

Nursing healthcare at hospital will have meaningful value when continued at home, principally by: focusing on patients' health needs (Yilmaz & Ozsoy, 2010), identifying probably health problems at home (Backer et al., 2007), integrating and collaborating team inter-professional healthcare (R. Watts et al., 2005), adjusting implementation program with environment resources (Yilmaz & Ozsoy, 2010), applying discharge planning at every system / level of healthcare (Gray, Constance; Christensen, Martin; Bakon, 2016).

Today, implementation discharge planning for patients is not optimal whereby nurses just do limited implementation of routine activities in the

form of information on re-control (Nursalam, 2018). Other conditions related to implementation of discharge planning have been investigated by Voie, Tunby and Strømsvik (2018) who explained how discharge plan implementation by NICU of premature patients at hospital are a result of: 1) different expectation and lack of communication between NICU nurses and public health nurses, 2) responsibility and interaction between two groups of nurses not clearly defined, 3) public health nurse's competence not recognized by NICU nurses and patients (Pauline Voie , Mona; Tunby , Jorunn; Strømsvik, 2018).

Based on such facts, the author wishes to study an analysis of the influence of impedance and enhancement factors in discharge planning implementation at hospital. This analysis is aimed to give; 1) nurses' awareness of enhancement and impedance in providing nursing discharge planning, purposely to make clients satisfied and to avoid organizations struggle to create an identity in the market and to help them contribute to the community they serve; 2) therefore, organizations must recognize the influence of impedance and enhancement factors of discharge planning implementation at hospital to improve the quality of nursing care.

MATERIALS AND METHODS

Search strategies

We searched for articles published from 2010 to 2018 using PubMed, ScienceDirect, Scopus, and ProQuest as databases. We entered keywords by using the terms discharge planning, enhancement and impedance factors, and implementation as variables. Using these terms, we also combined other keywords, such as Nurse * OR Nursing *for Nursing so as to retrieve all relevant articles. In addition, only studies written in English were used for the current study. Search results in the form of titles and abstracts are the responsibility of the author to read and select articles that are relevant to the criteria set by the author

Selection criteria

The inclusion criteria of the articles are: 1) including discharge planning implementation as part of nursing activity; 2) is original research; abstract and 3) the subjects of the study are nurses and patients; 4) the location of the study is a hospital. Exclusion criteria from the articles sought are those focusing on location in the non-clinical area and the research is a thesis or part of a conference process.

Data extraction

From the fifteen studies chosen, we extracted the types of research, research subjects, and research data sources. Research subjects in fifteen of these studies could be nurses, nurse leaders, and patients.
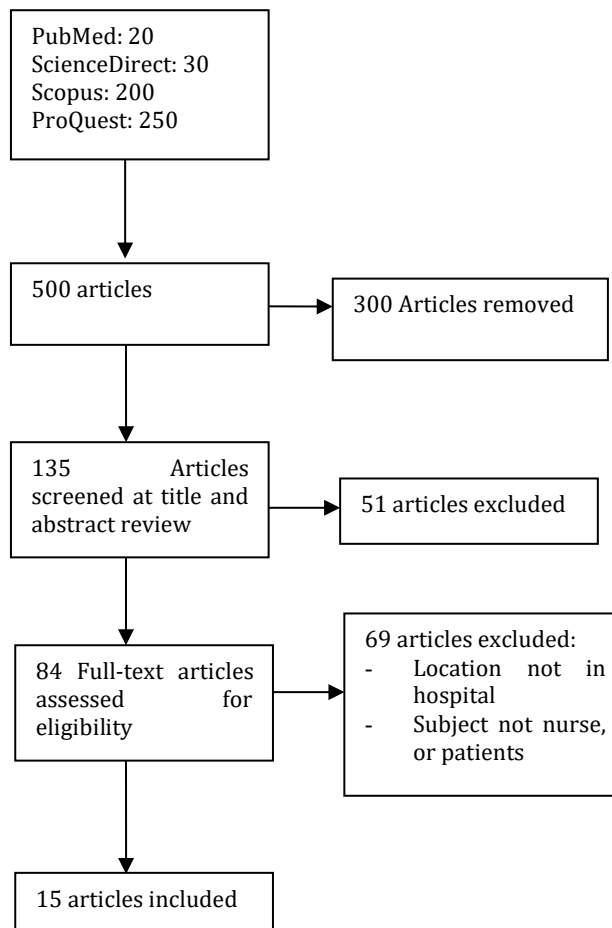
Figure 1. Literature search flow

In addition, we extracted the results of articles that discussed the relationship between enhancement and impedance factors and discharge planning implementation at hospital. Discussion of differences in research results requires consideration from the author.

RESULTS

Selection of Studies

The initial search retrieved a total of 500 studies: 20 from PubMed, 30 from ScienceDirect, 250 from ProQuest, and 200 from Scopus. From this, 300 articles have been deleted. Based on inclusion and exclusion criteria, the author reviewed each article and reached a consensus regarding its exceptions. The review process for selected articles was developed in three stages, including title review, abstract review, and full text review. We extracted 84 studies from abstract titles and reviews and 69 studies from full text review. Finally fifteen articles in total were selected for this study. The retrieval and screening process is summarized in Figure 1.

Based on the research subject, we found the number of respondents was 3250 respondents with details of nurses as many as 1551 respondents and patients as many as 1699. Based on the location of the study, we found all of 15 studies were conducted at the hospital. Based on the research design, we found eight quantitative studies with the type of descriptive

Table 1. General Characteristics of Subject Study (n=15)

Category	n	%
Year of publishing		
2010	1	6.67
2011	1	6.67
2012	1	6.67
2013	1	6.67
2014	2	13.3
2015	3	20
2016	1	6.67
2017	1	6.67
2018	3	20
Participants		
Nurses	11	73.3
Patients	4	26.6
Participants' ages		
Children	1	6.67
Adults	14	93.3
Type of study		
Descriptive research	8	53.3
RCT	3	20
Qualitative research	4	26.7

RCT: Randomized control trial

studies and three types of cross RCTs, and, four qualitative studies. For data sources, the questionnaire is the instrument used from the fifteen articles. We identified several instruments, including R for Hospital Discharge Scale, complete the Self-Directed Learning Readiness Scale, and Delphi Survey Questionnaire methodology and a satisfaction questionnaire The enhancement and impedance questionnaire and discharge planning implementation questionnaire were tested for reliability with Cronbach' alpha and everything was stated as reliable, but some instruments were also utilized. From the fifteen journals, we found that the analysis tests used were Pearson correlation coefficient, independent-samples *t*-test, SEM, ANOVA, t-test, independent *t*-test, Mann–Whitney, multiple logistic regression, and Chi Square. Table 1 Summary of studies' methods.

Outcomes measure

From the results of a review of fifteen articles it was found that the implementation of discharge planning at hospital can be influenced by enhancement and impedance factors. The enhancement factors that have been identified include: the level of knowledge of a nurse toward discharge planning implementation (Roberts & Moore, 2018); the ability of the discharge planning format to be implemented (Durocher et al., 2016); patient readiness to do discharge planning and pro-active treatment rooms carry out discharge planning (Yilmaz & Ozsoy, 2010); effective communication (Fitzgerald et al., 2011); and, a family role in implementing discharge planning (Durocher et al., 2016). Meanwhile, it is found that the factors that impede discharge planning implementation at hospital are : lack of planning of discharge programs and lack of coordination of health workers with

different disciplines (Yilmaz & Ozsoy, 2010); lack of nurse communication in hospitals with nurses in community services and there no continuity of staff (Fitzgerald et al., 2011).

DISCUSSION

This systematic review of enhancement and impedance factors in discharge planning implementation at hospital will try to explore some factors involved in these conditions. Firstly, a correlation of those factors with each other has identified from the enhancement factors side; Carrie et al (2012) state that the ability of the discharge planning format to be implemented is very influential for effective discharge planning implementation.

In the discussion of the participants from their research it also stated that the lack of a number of human resources, skills and time also greatly affected the implementation of discharge planning effectively (Yilmaz & Ozsoy, 2010). It means there is also a relation to the level of knowledge of a nurse. Elly (2011) explained that the effectiveness of discharge planning implementation for nurses who have been trained in the method and concept of discharge planning will be more effective in implementing discharge planning than nurses who have not trained (Mohamed et al., 2014). Also Rudd and Smith (2013) in found that treatment rooms that proactively carry out discharge planning will be able to reduce length of stay and decrease costs (Rudd, Caroline; Smith, 2013). Furthermore, there are also enhancement factors from the patients' side. Patient readiness to do discharge planning is also an important factor in achieving discharge planning implementation effectiveness at hospital, with its predictors being sex, age, education status, marital status, all of which will be very helpful in achieving

Table 2. Summary of studies on enhancement and impedance factors in discharge planning implementation at hospital.

Study and Author	Population / sample	Intervention	Comparison	Outcome	Time
Effectiveness of an instructional program on nurses knowledge and practice concerning patients discharge planning post cardiac surgery at cardiac centers and hospitals in Baghdad city (Abdulrdha & Mansour, 2018)	The study samples are composed of (58) nurses who have been working in the surgical wards of Ibn Al-Bitar specialized center for cardiac surgery; Iraqi Center for Heart Disease and Ibn al Nafees hospital; those nurses are divided equally into the study group (29) and control group (29}	Those nurses are divided equally into the study group experiment (29) and control group (29). Nurses as treatment group who participated in education program.	level of knowledge at general information, follow-up, wounds care, exercise program and daily activity, common health problems, medication, nutrition and risk factor modification are tested by t-test.	Effectiveness of educational program regarding nurses' practice toward planning patients' discharge had a positive effect on nurses' practice as compared with control group in relation to all discharge planning domains	January, 2nd, 2017, to June 1st, 2018
Patients' readiness for discharge: Predictors and effects on unplanned readmissions, emergency department visits and death (Kaya & SainGuven, 2018).	This 1-year prospective cohort study included 1,601 respondents	1. The Patient Readiness for Hospital Discharge Scale/Short Form is used. 2. Data were analyzed using a Chi-square test, Mann–Whitney U test, univariate logistic regression analysis and multiple logistic regression analysis.	The determination of patients self-assessment	The results of multiple logistic regression analysis revealed that age, sex, marital status, educational status, presence of someone to help at home after discharge and length of stay were predictors of patients' readiness for hospital discharge	September 2018
Improving discharge planning using the re-engineered discharge program (Roberts & Moore, 2018)	Sixty-nine participants	Complete the Self-Directed Learning Readiness Scale prior to the RED education intervention. 1.Provide thirty-minute education interventions addressing various learning preferences	1. Nurses' readiness to learn (RTL) before receiving education on the re-engineered discharge (RED) program 2. Measured utilization of the RED discharge process from patient chart reviews following an educational intervention.	Participants scored high M = 219.8 (SD 23.7) on the SDLR, indicating nurses' high RTL prior to educational intervention chart. Reviews found usage of the RED 12 actionable item pre-intervention, (n = 60) M = 6.55 (SD 1.478) compared to post-intervention (n = 60) M = 10.08 (SD 1.544) indicated statistically significant improvement in pre-discharge patient education and planning (t = 17.730, p=0.000 [CI 3.13–3.93])	2018
Framework and components. For	A total of 24 nurses participated.in the	Delphi methodology was	Delphi approach	1. A total of 24 participants	24 Augus

Study and Author	Population / sample	Intervention	Comparison	Outcome	Time
effective discharge planning system (Yam et al., 2012) an instructional program on nurse knowledge and practice concerning patients' discharge planning post cardiac surgery at cardiac centers and hospitals in Baghdad	consensus-building process	adopted to engage a group of experienced healthcare professionals to rate and discuss the framework and components of an effective discharge planning. The framework consisted of 36 statements under five major themes: initial screening, discharge planning process, coordination of discharge, Implementation of discharge, and post-discharge follow-up. Each statement was rated independently based on three aspects including clarity, validity and applicability on a 5-point Likert-scale	and findings of the second stage on pre-testing the framework developed so as to validate and at test to its applicability and practicability in which consensus was sought on the key components of discharge planning.	participated in the consensus-building process. In round one rating, consensus was achieved in 25 out of 36 statements. Among those 11 statements not reaching consensus, the major concern was related to the "applicability" of the statements. 2.The participants expressed a lack of manpower, skills and time in particular during weekends and long holidays in carrying out assessment and care plans within 24h after admission	t 2011 and re-search text accepted 2012
Barriers to effective discharge planning: a qualitative study investigating the perspectives of frontline healthcare professionals (Wong et al., 2011)	A total of 41 healthcare professionals (9 Physicians, 13 Nurses, 6 Occupational Therapists, 5 Physiotherapists, and 8 Medical Social Workers) participated in the FGD. Majority of the participants were female, and the age range was 30-59 years old.	Focus groups interviews were conducted with different healthcare professionals who were currently responsible for coordinating the discharge planning process in the public hospitals	1.Current practice on hospital discharge 2.Barriers to effective hospital discharge	1. Participants highlighted that there was no standardized hospital-wide discharge planning and policy-driven approach in the public health sector in Hong Kong. 2.Potential barriers included lack of a standardized policy-driven discharge planning program, and lack of communication and coordination among different health service providers and patients as the main issues	July-August 2010. Research text is accepted in 2011
Mediators of marginalization in discharge planning with older adults .Qualitative study (Durocher et al., 2016).	22 participant interviews including five older adults, seven family members and eight healthcare professionals	Critic bioethical approaches seeking to examine ethical issues in the provision of healthcare in relation to social and political structures, practices	The themes of analysis included underlying beliefs, valued approaches and conventional practices	1. Findings included the identification of co- constituting influences on participants' perspectives and behaviors in the process of discharge planning, which intersected to affect older adults'	2016 year

Study and Author	Population / sample	Intervention	Comparison	Outcome	Time
		and processes		agency and participation in discharge planning. 2. Resulting that discourses of 'ageing-as-decline' beliefs privileging healthcare professionals' expertise; approaches that prioritized safety over all other values; and established conventions that guided the discharge-planning family conference served to marginalize	
Effectiveness of a discharge-planning program and home visits for meeting the physical care needs of children with cancer (Yilmaz & Ozsoy, 2010).	The research population was all children, and their caregivers, who were admitted to the pediatric oncology unit at the hospital in Izmir, which.is located in western Turkey.	For the experimental group, 24 child discharge planning ,discharge teaching, home visits, and telephone consultation were provided and planned investigating	effectiveness of a discharge-planning program on helping caregivers meeting the physical care needs of children with cancer between 0–18 years of age.	A discharge-planning program and a hospital-based home care model had a very significant effect on the care needs of children with cancer and their caregiver	2010
Factors that enhance or impede critical care nurses' discharge planning practices (R. Watts et al., 2005).	502 critical care nurses, identified from the Australian College of Critical Care Nursing (ACCCN)	A total of 218 eligible participants completed the survey. One-to-one semi-structured interviews with 13 Victorian critical care nurses were also conducted	Australian College of Critical Care Nursing (ACCCN) (Victoria) database were invited to participate in this study. A 31-item questionnaire was developed and distributed	1.Participants reported that a lack of time was a barrier to discharge planning 2.Communication, however, could enhance or impede the discharge planning process in critical care.	2015
Discharge planning (Rudd, Caroline; Smith, 2013)	They were well-attended, with more than 50%, 42 of the 69 trained staff from the unit, attending.	: Two audits were conducted by a small team of nurses to measure the effectiveness of discharge management and planning in a four-ward orthopedic and trauma unit	lost bed days and reduce costs	1.The findings showed that some wards were proactive: planning started on admission and patients were given realistic planned discharge dates and a list of probable capabilities.	2013

Study and Author	Population / sample	Intervention	Comparison	Outcome	Time
				2.Discharge planning varied from ward to ward, and there was no shared common practice	
A Survey of Malaysian Critical Intensive Care unit nurses' awareness of patients' transition experiences (PE) and transitional care practice (TCP) (Mohamed et al., 2014).	The survey had a response rate of 65.2% (178 of 273 eligible nurses). The respondents' mean age was 29.6 years. Most of the respondents were from public hospitals and the majority had one to five years' experience working as registered nurses, and in CICU	1.A descriptive questionnaire was used to survey Registered Nurses in seven CICUs in four hospitals in Malaysia. 2.Data were analyzed using descriptive statistics and correlation analysis	Public teaching hospital nurses (TCP) transitional care practice	There was a positive correlation between nurses' awareness of patients' transition experience and its impact, and their awareness of transitional care practice performance (rs=0.42; p<0.05). .	2014
Collaboration challenges faced by nurses when premature infants are discharged (6).		1. Qualitative individual interviews were undertaken with two NICU nurses and two public health nurses. 2. A qualitative content analysis was used to analyze the data.		Three main themes were identified: different expectations and lack of communication between NICU nurses and public health nurses; Responsibilities and interactions between the two professional groups were not clearly defined; and the public health nurses' competence was not recognized by the NICU nurses and .parents.	2018 year
. The role of relatives in discharge planning from psychiatric hospital the perspective of patients and their relatives (Backer et al., 2007).	98 psychiatric inpatients and 40 of their relatives with family involvement in discharge planning	Satisfaction questionnaires were completed		Most participants were satisfied if relatives were involved in discharge planning. However, up to 89% of patients, and 84% of relatives, reported no communication between clinical staff and relatives regarding discharge	2015
Nurses' *discharge planning* and risk assessment: behaviors, understanding and barriers (Jane Graham[1], Robyn Gallagher[2]	31 Nurse	Quantitative Descriptive research	- nurse comprehension toward discharge plan - Nurse adherence to implement discharge planning	- Nurse adherence toward implementation discharge planning is low 20 % - Impedance factors are is lack of time to implementation discharge planning	2015

Study and Author	Population / sample	Intervention	Comparison	Outcome	Time
and Janine Bothe[3], 2015)					
How do critical care nurses define the discharge planning process (R. J. Watts et al., 2005).	502 Victorian critical care nurses were approached to take part in the study	Utilizing an exploratory descriptive approach,		Three common themes emerged. A significant number of participants did not believe that discharge planning occurred in critical care, and, therefore, thought that they could not provide a definition. There was uncertainty as to what the discharge planning process actually referred to in terms of discharge from critical care to the general ward or discharge from the hospital	2014
Assessing the effectiveness of advanced nurse practitioners undertaking home visits in and out of hours urgent primary care service in England (Collins, 2017).	34 advanced nurse practitioners at London	Observation and survey	To measure the effectiveness of advanced nurse practitioners (ANPs) against national quality requirements for out-of-hours	Advanced nurse practitioners are as effective as GPs in undertaking urgent home visits. Their documentation is more consistent and their refer-on rate to secondary care is less than that of GP colleagues.,	2017
concerning patients discharge planning post cardiac surgery at cardiac centers and hospitals in Baghdad city					

discharge planning, especially when at home (R. J. Watts et al., 2005).

In further discussion, it will affect also the readiness of their support system to provide back up to fulfill patient necessity at home. The role of the family cannot be denied as a very helpful support system, especially when the patient is at home. The patient will feel motivated to obey the treatment in order to speed up recovery. Fitzgerald (2011) has revealed he role of the family as care giver, observer, and a reminder to always remember the importance of being obedient in the treatment corridor (Durocher et al., 2016). From the other side, there are some impedance factors in discharge planning implementation, namely, lack of coordination between health workers with different disciplines also plays a role in discharge planning. Wong et al.

(2011) explains that the potential barriers include lack of standardized policy-driven discharge planning programs, and lack of communication and coordination among different health service providers and patients in both acute and sub-acute care settings, which were identified as mainly system issues.

Improving the quality of hospital discharge was suggested, including a multidisciplinary approach with clear identified roles among healthcare professionals and a communication of health professionals' enhancement of knowledge and patient psychology (R. Watts et al., 2005). Secondly, lack of nurse communication in hospital with nurses in community service (Rudd, Caroline; Smith, 2013). Based on those impedance factors, communication is the most crucial problem to properly afford

implementation discharge planning at hospital. Finally, Watts et al. (2015) implied that several factors influence the effectiveness of the implementation of the discharge, including inadequate effective communication (Fitzgerald et al., 2011).

CONCLUSION

The study results show discharge planning is a very important activity in nurse health care. Unfortunately, it has still lack of implementation at hospital up to now. Based on those conditions, this systematic review seeks to know what kind of factors influence discharge planning implementation at hospital. The results refer to two crucial factors, namely, enhancement and impedance factors. By knowing those factors the nurses, hopefully not only improve enhancement, but also impedance factors in their healthcare to provide high quality nursing care and patient safety optimally.

CONFLICT OF INTEREST

No conflict of interest has been declared

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REFERENCES

Abdulrdha, & Mansour. (2018). Effectiveness of an instructional program on nurse's knowledge and practice concerning patients discharge planning post cardiac surgery at cardiac centers and hospitals inbaghdad city. *Journal of Nursing Management*, *26*, 707–716.

Backer, T. E., Howard, Æ. E. A., & Moran, Æ. G. E. (2007). The Role of Effective Discharge Planning in Preventing Homelessness. *Journal Primary Prevent*, *28*, 229–243. https://doi.org/10.1007/s10935-007-0095-7

Collins, D. (2017). Assessing the effectiveness of advanced nurse practitioners undertaking home visits in an out of hours urgent primary care service in England. *Journal of Nursing Management*, *25*, 519–530.

Durocher, E., Gibson, B. E., & Rappolt, S. (2016). Mediators of marginalisation in discharge planning with older adults. *Cambridge University Press*.

Fitzgerald, L. R., Nurs, D. T., & Lecturer, S. (2011). Hospital discharge : recommendations for performance improvement for family carers of people with dementia. *Australian Health Review*, 364–370.

Gray, Constance; Christensen, Martin; Bakon, S. (2016). Nurse initiated and criteria led discharge from hospital for children and young people. *Nursing Children and Young People*, *28*(8). https://doi.org/10.7748/ncyp.2016.e714

Kaya, S., & SainGuven, G. (2018). Patients' readiness for discharge: Predictors and effects on unplanned readmissions, emergency department visits and death. *Journal of Nursing Management*.

Mohamed, S., Parker, S., & Arbon, P. (2014). A survey of Malaysian Critical Intensive Care unit nurses 'awareness of patients' transition experiences (PE) and transitional care practice (TCP). *Intensive & Critical Care Nursing*, *30*(4), 196–203. https://doi.org/10.1016/j.iccn.2013.12.006

Nursalam. (2018). *Manajemen Keperawatan aplikasi dalam praktik keperawatan profesional* (5th ed.). Salemba Medika.

Pauline Voie , Mona; Tunby , Jorunn; Strømsvik, N. (2018). Collaboration challenges faced by nurses when premature infants are discharged. *Nursing Children and Young People*, *3*(2). https://doi.org/10.7748/ncyp.2018.e960

Roberts, S., & Moore, L. (2018). Improving discharge planning using the re-engineered discharge programme. *Journal of Nursing Management*.

Rudd, Caroline; Smith, J. (2013). Discharge planning. *Nursing Standard*, *17*.

Watts, R., Gardner, H., & Pierson, J. (2005). Factors that enhance or impede critical care nurses ' discharge planning practices. *Intensive and Critical Care Nursing*, *21*, 302–313. https://doi.org/10.1016/j.iccn.2005.01.005

Watts, R. J., Pierson, J., & Gardner, H. (2005). How do critical care nurses define the discharge planning process ? *Intensive and Critical Care Nursing*, *21*, 39–46.
https://doi.org/10.1016/j.iccn.2004.07.006

Wong, E. L. Y., Yam, C. H. K., Cheung, A. W. L., Leung, M. C. M., Chan, F. W. K., & Wong, F. Y. Y. (2011). Barriers to effective discharge planning : a qualitative study investigating the perspectives of frontline healthcare professionals. *BMC Health Services Research*, *11*(1), 242. https://doi.org/10.1186/1472-6963-11-242

Yam, C. H. K., Wong, E. L. Y., Cheung, A. W. L., Chan, F. W. K., Wong, F. Y. Y., & Yeoh, E. (2012). Framework and components for effective discharge planning system : a delphi methodology. *BMC Health Services Research*, *12*(1), 1. https://doi.org/10.1186/1472-6963-12-396

Yilmaz, M. C., & Ozsoy, S. A. (2010). Effectiveness of a discharge-planning program and home visits for meeting the physical care needs of children with cancer. *Springer*, 243–253. https://doi.org/10.1007/s00520-009-0650-2

Systematic Review

A Systematic Review of Effectiveness of Music Therapy on Depression In The Elderly

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ABSTRACT

Introduction: There are many non-pharmacological therapies in reducing symptoms of depression in older adult, one of which is music therapy. The aim of this article is to determine the effectiveness of the use of music therapy in reducing symptoms of depression in the elderly.

Methods: A systematic approach was performed in this review using the PRISMA approach and journal sources from several databases including Scopus, ScienceDirect, SAGE, NCBI, CINAHL/EBSCO in the last 6 years from 2014 to 2019. Boolean operators were used within search process using AND and OR. The inclusion criteria are elderly aged ≥60 years with depression, either home or hospital treatment. Exclusion criteria are additional physical illness such as Diabetes Mellitus, CVA and other chronic diseases. Literature review, editorial, critical synthesis, and the like also become an exclusion criteria in this review.

Results: Overall, the review consists of 13 articles with seven articles using RCT design, two quasi-experimental design, two pre-posttest design, and two exploratory design. In this review, several articles used an individual therapy and others a combination of music therapy with other activities such as singing, dancing and writing a lyric. Average time spent for a music therapy in elderly with depression was given from two weeks to six months, which may have been effective in making an impact. Every week had one or two sessions with a duration of 30-60 minutes for every session.

Conclusion: Music therapy is effective to reduce depression in the elderly.

INTRODUCTION

Depression is a common psychiatric disorder with symptoms including low mood, low energy, poor concentration, loss of pleasure, poor self-care and low self-esteem (Gold et al., 2019). Depression and anxiety are disorders that often occur in older people. At age of 65 years old, the risk of getting depression increases three times if compared with the general population (Aalbers et al., 2017). Depression can also cause deterioration of cognitive function and may result in increased risk of dementia. Depression is also a major cause of disability in the elderly and, if not treated immediately, will cause complex problems. Long-term care providers will also aggravate this problem if this cannot be understood correctly (Gold et al., 2019). Depression is the most important problem in the elderly and often occurs in older people over 60 years of age (Gök Ugur, Yaman Aktaş, Orak, Saglambilen, & Aydin Avci, 2017). Some reasons why the elderly often experience depression are disability, economic factors, loss of spouse, family and relatives (Verrusio et al., 2014). The elderly who live in a care home have three times the risk of depression compared to the elderly who live at home (Gök Ugur et al., 2017).

Globally, based on the WHO figures, around 50 million people were living with dementia in 2017 and
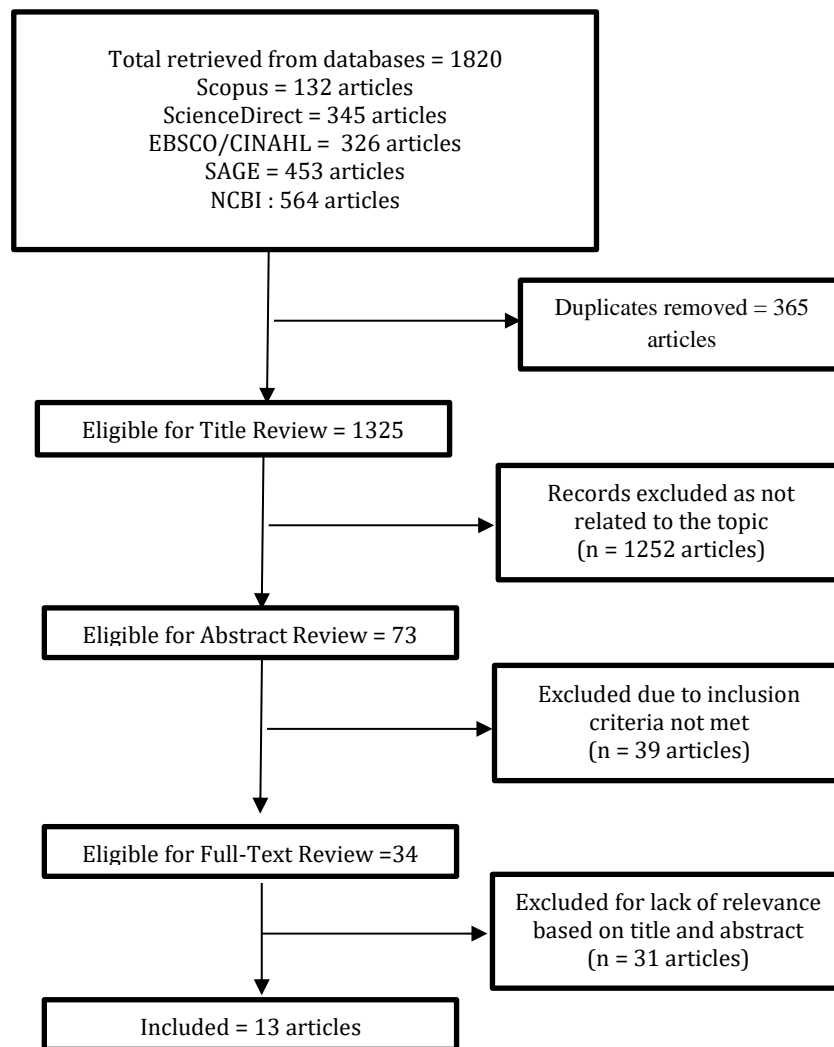
Figure 1. Search Strategy

approximately 7% of the elderly (over 60 years) suffer from depression worldwide. This number is expected to reach 82 million by 2030 and 152 million in 2050(Kemenkes RI, 2016). From 1990 to 2025, the elderly population in Asia will increase from 50% of the world's elderly to 58% (Kalapala et al., 2017). Geriatric citizens in Indonesia reach 28.8 million or 11.34% in regard to the average life expectancy (UUH) of approximately 71 years. A Health Research Association report of 2013 states that the prevalence of elderly aged 55-64 were depressed at 15.9%, the elderly aged 65-74 years at 23.2%, and the elderly aged over 75 years at 33.7%. This result shows an increase, especially in Asia, America, and Africa (Foo et al., 2018),

Pharmacological treatment of depression in old age is often associated with adverse reactions and drug interactions due to polypharmacy and age-related physiological changes (IbraheemSayied, Ibrahim, Ali Abd El-Fatah Saraya, & Rabea Osman, 2019). Therefore, a safer alternative for the treatment of depression in older adults should be sought. Responding to the challenge posed by pharmacological treatment in old age, music intervention has been identified by researchers as an

area of interest. Music therapy is one of the complementary therapies that can have a variety of positive effects on users (Gold et al., 2019). The use of music as a healing intervention is common in history (Kendra D. Ray & Götell, 2018). This therapy has been used in particular specialisms such as psychiatry, neurology and cardiac care, as well as general surgery and geriatric care. Music is a powerful stimulus that generates and modulates mood and emotion (Petrovsky, Cacchione, & George, 2015). The use of music therapy has changed over time and has gone through some innovations. The use of music therapy is also different or each region, such as in Taiwan music therapy uses Buddhist music (Tai, Wang, & Yang, 2015) and in China it uses Japanese music (Wang, Yu, & Chang, 2017) It is also performed individually (IbraheemSayied et al., 2019) and also by groups (Verrusio et al., 2014) and also combined with movement or singing (Verrusio et al., 2014).

Music is often used to set the mood and emotions in daily life and also can affect the motivation, self-image, and coping mechanisms around a difficult emotional state through some forms of music therapy. The therapist explicitly helps people processing feelings that have been generated by the

Table 1. General Characteristics of Selected Studies (n=13)

Category	n	%
Year of Publication		
2014	2	15.38
2015	2	15.38
2016	2	15.38
2017	2	15.38
2018	2	15.38
2019	3	20.00
Type of Study		
RCT	7	53.84
Pretest and posttest study design	2	15.38
Exploratory design	2	15.38
Quasi-experiment	2	15.38
Instrument		
MMSE	5	38.46
GDS-SF	3	23.07
HAMD	1	7.69
CSD	1	7.69
MMSE and GDS	3	23.07
Duration of Intervention		
< 6 months	10	76.92
≥6 months	3	23.07

music (Aalbers et al., 2017). Music affects the right hemisphere of the brain and, thus, leads to the secretion of dopamine, noradrenaline, encephalin and endorphin, which causes psycho-physiological responses through the limbic system, thereby reducing behavioral and psychological levels of depression (Gök Ugur et al., 2017).

A study conducted by Nadia in a nursing home in Egypt with 42 patients suffering from moderate to severe depression showed that there is a decrease in the level of depression by session 12. This result is more effective than standard intervention of nursing home care (IbraheemSayied et al., 2019). In other study by Sakamoto in India (Mathew, Sundar, Subramaniam, & Parmar, 2017), the merger between music therapy with other activities such as dancing and singing was also proven effective to decrease the level of depression in the elderly. Several published studies have revealed the benefits of therapy in depression. One study revealed that six weeks of using music therapy can reduce agitation in the elderly (K. D. Ray & Mittelman, 2015). Other studies also showed the same results, that the use of music for four weeks can reduce blood pressure in the elderly (Tai et al., 2015). All of the studies showed positive results from the use of music therapy for the elderly, even with different times and ways. This systematic review is to identify research that used music therapy to reduce depression symptoms in the elderly.

MATERIALS AND METHODS

The following review steps were performed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)

guidelines for conducting a systematic review. A systematic search was first conducted using the following databases: Scopus, Science Direct, SAGE, NCBI, CINAHL/EBSCO using search strategies described in figure 1. Searches were conducted from December 10th, 2019. The search is restricted to publications from 2014 to 2019 in the scope of nursing, age, music therapy, and depression; the search is also be restricted to document type "Article" in English. Studies published in the English language from the past 6 years (from 2014 to 20019) were included. Appropriate medical subject headings (MeSH) were used along with text word searches and phrases. Keywords with Boolean operators that were searched in each database include (music therapy) OR (music intervention) OR (musical intervention) AND (depression) OR (depressive disorder) OR (depressive symptoms) OR (major depressive disorder) AND (elderly) OR (older adults) OR (older people) OR (aged). Furthermore, where possible, in a given database, non-human studies were excluded.

RESULTS

Results of systematic review of all 13 articles are attached to Table 1. The most number of years of publication is 2019 with three articles and the most used design in this systematic review is RCT. Instrument to determine the level of depression in the elderly using MMSE is five articles and the rest of the articles used CSD, GDS-SF instruments, and HAMD.

Kind of Music Therapy

There are various kinds of music therapy. The majority of researchers present music in accordance with participants' wishes, on the other hand, some researchers also prepared a type of music to be the choice of the elderly, such as Chinese music, Buddhist spiritual music, active and passive music (Tai et al., 2015) (Cooke, Moyle, Shum, Harrison, & Murfield, 2010). Some types of music therapy also use religious music as an intervention and also combine with some other interventions such as writing lyrics (Kalapala et al., 2017), with therapists or independently (Karmonik et al., 2016), listening passively and actively (clapping, singing, dancing) (Liu, Niu, Feng, & Liu, 2014; Mathew et al., 2017; Petrovsky et al., 2015; Kendra D. Ray & Götell, 2018).

Duration of Therapy

Average time spent on a music therapy in elderly with depression is as many as 20-32 sessions which have been effective in having an impact. The number of sessions each week 1-2x accounted for the majority of the sessions. Duration of therapy gave an average of more than three weeks to one year (Tai et al., 2015).

Effectiveness of Music Therapy on Depression

Using music therapy in elderly with depression showed positive results when showing significant mental changes. Thirteen articles showed change in

symptoms of depression in the elderly. The use of music therapy between short duration and long duration has a different change. This is proven in evidence in the use of music therapy with a long duration (> 1 year) having insignificant changes as opposed to the use of music therapy with short duration (3-5 weeks).

DISCUSSION

The purpose of this systematic review is to expose research that used music therapy to reduce depression symptoms in the elderly. Music therapy uses music in a professional manner and the elements act as an intervention in a medical environment for individuals, groups, families, or people who strive to optimize their quality of life, improve their cognitive, social-welfare, communicative, emotional, intellectual and spiritual health (Aalbers et al., 2017).

In addition, music therapy also has a positive impact on improving mood, overcoming sleep disorders and can reduce blood pressure in the elderly. The method of using music therapy is different in each country, such as in Taiwan religious music from Buddhism is used, in Egypt it uses Murathal (Tai et al., 2015) and several other methods combining with singing, writing song lyrics, improvising songs and dancing together (IbraheemSayied et al., 2019). The use of music therapy for both individuals and groups is also found in certain regions (Verrusio et al., 2014). Although using different methods, the use of music therapy had a positive impact on the elderly at the end of the studies, although some research results show results that are not very significant. The duration of music therapy varies greatly from the shortest ay two weeks and the longest of six months, giving 30-45-minute sessions two or three times every week. The advantage of using music therapy is the low cost and it does not cause side effects. The longest research conducted by Kendra lasted four weeks, giving music therapy for the first two weeks and then for the next two weeks giving music, singing and dancing activities led by practitioners. The use of music therapy for four weeks showed a reduction in signs of depression and an improvement in the quality of life in the elderly who lived in a nursing home (Kendra D. Ray & Götell, 2018).

Hacer used a randomized controlled trial design study of a population of 64 men and women who were treated at home divided into two treatment groups and control. This RCT study design, the endpoints of which were evaluated under stringent conditions, assessed the impact of music therapy on patients suffering from mild depression, moderate to severe. The results after giving an intervention showed significant differences between the two groups regarding depression. Significant difference was observed between the two groups in change between the treatment group and the control group which showed progress in reducing levels of depression scores in the treatment group, while the average scores remained constant in the control group (Gök Ugur et al., 2017).

One interesting study is that by Moon Fai Chan, a randomized controlled trial with participants who listened to music of their choice as long as 30 minutes per week, for four weeks. This study was in elderly women aged 42 with depression and the therapy was for four weeks. The result of the experimental group shoed there was a statistically significant reduction in geriatric depression score and quality of sleep in week 4. In the control group, there was no statistically significant reduction in depression and sleep quality improvement for four weeks. However, for all outcome measures, no significant differences were found between groups for four weeks.

The use of music therapy may stimulate and affect someone's mood (Verrusio et al., 2014). One theory that tries to explain how music can affect the human psychological response is the theory of Music, Mood and Movement (MMM). This theory revealed that music produces a psychological response of the mood and then leads to better health outcomes (Murrock & Higgins, 2009 p. 2252). Musical elements such as melody, tone and harmony can affect the emotional response for those who listen (Murrock & Higgins, 2009). When the elements pass through the auditory cortex of the brain, music processing occurs in the limbic system of the brain to obtain emotion (Tramo, 2001). According to Jourdain (1997), the music reminds us of the past experience of the emotions etched in them; this changes the emotional state of the listener. This shows that, when the right music is played. It has the potential to change the emotional state of the listener, thereby achieving therapeutic results such as reducing depressive symptoms.

Based on an analysis of 13 journals, the authors reported that music therapy has a beneficial effect on these symptoms. Another study focused on the psychological and behavioral disorders and evaluated the effect of music therapy on behavior and depressive symptoms (Petrovsky et al., 2015). The use of music therapy is effective and does not cause side effects in the elderly such as the use of sedatives (Liu et al., 2014). Using music therapy as prescribed can reduce some symptoms, such as depression, and can increase the life expectancy of the elderly (Mathew et al., 2017). The use of music therapy should be recommended for health workers, especially nurses or healthcare workers with the elderly (Karmonik et al., 2016).

Limitation

Limitation in this review is the lack of specific types of music therapy that have an impact on depression, cognitive, or social, or psychosocial. Some studies also illustrate the types of respondents were less taken. Design of this article also differs because lack of the number of the articles when searching.

Clinical Implication

The scientific studies that have been done to showed that the use of intervention in the form of music therapy has an effect on the elderly with depression, behavioral, emotional, and cognitive. The results of this study are very useful in the field of nursing as this can help nurses to improve condition of elderly while providing a program either interpersonal, or making elderly and family independent.

CONCLUSION

The use of music therapy can be applied practically and easily, especially because music can be combined with various activities, such as singing, clapping, dancing and others. Nurses and caregivers may be able to use music interventions to prevent or eliminate depression. Healthcare providers and nurses must remain knowledgeable about music and other alternative therapies because music therapy is more affordable and has little or no negative reaction compared by drugs.

CONFLICT OF INTEREST

The author declares that there is no conflict of interest in this study.

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REFERENCES

Aalbers, S., Re, F., Spreen, M., Jcf, K., Ac, V., Maratos, A., … Xj, C. (2017). Music therapy for depression (Review) SUMMARY OF FINDINGS FOR THE MAIN COMPARISON. *Cochrane Database of Systematic Reviews*, (11). https://doi.org/10.1002/14651858.CD004517.pub3.www.cochranelibrary.com

Cooke, M., Moyle, W., Shum, D., Harrison, S., & Murfield, J. (2010). *Controlled Trial Exploring the Effect of Music on Quality of Life and Depression in Older People with*. 765–776. https://doi.org/10.1177/1359105310368188

Foo, S. Q., Tam, W. W., Ho, C. S., Tran, B. X., Nguyen, L. H., McIntyre, R. S., & Ho, R. C. (2018). Prevalence of depression among migrants: A systematic review and meta-analysis. *International Journal of Environmental Research and Public Health*, *15*(9), 55–64. https://doi.org/10.3390/ijerph15091986

Gök Ugur, H., Yaman Aktaş, Y., Orak, O. S., Saglambilen, O., & Aydin Avci, İ. (2017). The effect of music therapy on depression and physiological parameters in elderly people living in a Turkish nursing home: a randomized-controlled trial. *Aging and Mental Health*, *21*(12), 1280–1286. https://doi.org/10.1080/13607863.2016.1222348

Gold, C., Eickholt, J., Assmus, J., Stige, B., Wake, J. D., Baker, F. A., … Geretsegger, M. (2019). Music

Interventions for Dementia and Depression in ELderly care (MIDDEL): Protocol and statistical analysis plan for a multinational cluster-randomised trial. *BMJ Open*, *9*(3), 1–14. https://doi.org/10.1136/bmjopen-2018-023436

IbraheemSayied, N., Ibrahim, H., Ali Abd El-Fatah Saraya, O., & Rabea Osman, S. (2019). *Effectiveness of Music Therapy on the Depression levels among Elderly at Assiut Geriatric Clubs*. *8*(2), 58–65. https://doi.org/10.9790/1959-0802055865

Kalapala, G. R., Zechariah, B. R., Babu, P., Thufail, ., Sailu, ., & Srujan, . (2017). A study on the effectiveness of music therapy on depression among elderly people at selected old age home: An epidemiological study on public health perspective in Hyderabad. *Research in Pharmacy and Health Sciences*, *3*(3), 344–349. https://doi.org/10.32463/rphs.2017.v03i03.17

Karmonik, C., Brandt, A., Anderson, J. R., Brooks, F., Lytle, J., Silverman, E., & Frazier, J. T. (2016). Music Listening Modulates Functional Connectivity and Information Flow in the Human Brain. *Brain Connectivity*, *6*(8), 632–641. https://doi.org/10.1089/brain.2016.0428

Kemenkes RI. (2016). *Lansia yang Sehat, Lansia yang Jauh dari Demensia*.

Liu, X., Niu, X., Feng, Q., & Liu, Y. (2014). Effects of five-element music therapy on elderly people with seasonal affective disorder in a Chinese nursing home. *Journal of Traditional Chinese Medicine*, *34*(2), 159–161. https://doi.org/10.1016/s0254-6272(14)60071-6

Mathew, D., Sundar, S., Subramaniam, E., & Parmar, P. N. (2017). Music therapy as group singing improves Geriatric Depression Scale score and loneliness in institutionalized geriatric adults with mild depression: A randomized controlled study. *International Journal of Educational and Psychological Researches*, *3*(1), 6. https://doi.org/10.4103/2395-2296.198415

Petrovsky, D., Cacchione, P. Z., & George, M. (2015). Review of the effect of music interventions on symptoms of anxiety and depression in older adults with mild dementia. *International Psychogeriatrics*, *27*(10), 1661–1670. https://doi.org/10.1017/S1041610215000393

Ray, K. D., & Mittelman, M. S. (2015). Music therapy: A nonpharmacological approach to the care of agitation and depressive symptoms for nursing home residents with dementia. *Dementia*. https://doi.org/10.1177/1471301215613779

Ray, Kendra D., & Götell, E. (2018). The use of music and music therapy in ameliorating depression symptoms and improving well-being in nursing home residents with dementia. *Frontiers in Medicine*, *5*(OCT), 1–6. https://doi.org/10.3389/fmed.2018.00287

Tai, S. Y., Wang, L. C., & Yang, Y. H. (2015). Effect of music intervention on the cognitive and

depression status of senior apartment residents in Taiwan. *Neuropsychiatric Disease and Treatment*, *11*, 1449–1454. https://doi.org/10.2147/NDT.S82572

Verrusio, W., Andreozzi, P., Marigliano, B., Renzi, A., Gianturco, V., Pecci, M. T., … Gueli, N. (2014). Exercise training and music therapy in elderly with depressive syndrome: A pilot study. *Complementary Therapies in Medicine*, *22*(4), 614–620. https://doi.org/10.1016/j.ctim.2014.05.012

Wang, S. C., Yu, C. L., & Chang, S. H. (2017). Effect of music care on depression and behavioral problems in elderly people with dementia in Taiwan: a quasi-experimental, longitudinal study. *Aging and Mental Health*, *21*(2), 156–162. https://doi.org/10.1080/13607863.2015.1093602

Systematic Review

Systematic Review of Family Members in Improving the Quality of Life of People with T2DM

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ABSTRACT

Introduction: Many patients with type 2 diabetes (T2DM) experience psychological issues affecting their ability to cope and manage their disease. Unfortunately, healthcare providers, including nurses, often report a lack of resources to provide sufficient support. During short and busy consultations, nurses and physicians often focus on etiology, diagnosis, pathophysiology, and treatment of the disease, while patients are more concerned with the consequences and impact on their daily life and family relations. The study aimed to find out forms of family support to improve the quality of live T2DM.

Methods: Articles were framework using POCOT searching Science Direct, Scopus, Google Scholar databases, limited to the last 5 years and framework using POCOT. The articles were from 2015 to 2020 and the language used was English. The study focused on family support and Diabetic Mellitus type 2 (T2DM).

Results: From 359 articles, 15 articles were included, most of the findings of the studies showed that family plays an important role in increasing self-efficacy so it contributes to blood sugar control which supports T2DM patients' quality of life. The support that has been carried out by the family includes communication in the patient's treatment program, diet and blood sugar check, motivation in physical activity, support for medical expenses, accompanying them for controls. Patients with higher perceived diabetes-specific family and friend support had healthier behaviors.

Conclusion: Family support helps improve the quality of life and reduce physical and psychological complications in people with T2DM.

INTRODUCTION

Diabetes is a chronic medical condition that requires people suffering from it to engage in a lifelong therapeutic self-management regimen in order to maintain glycemic control (Uchendu & Blake, 2016). Social support has to be understood within its particular cultural context which should be part of the framework of any intervention that aims at using existing social support to improve diabetes management (Pesantes et al., 2018). Many patients with type 2 diabetes experience psychological issues affecting their ability to cope and manage their disease. Unfortunately, healthcare providers, including nurses, often report lack of resources to

provide sufficient support (Bennich et al., 2017). Family social support is a process that occurs over a lifetime, with the nature and type of social support varying in each stage of the family life cycle. Family social support allows the family to function fully and can improve adaptation in family health (R, A, R, Felicia, & Preveena, 2018). Full involvement of family members in health education helped patients with T2DM improve their quality of life compared to patients without family involvement (Shi et al., 2016a).

Peer-support intervention, based on the social support theory, may result in improved diabetes care outcomes and subsequently improved quality of life in patients with T2DM (Peimani, Monjazebi, &

Ghodssi-ghassemabadi, 2018). High-quality relationships with and diabetes management support from intimate partners improve diabetes-specific and general quality of life, self-management behaviors, and metabolic outcomes (Young-hyman, Groot, Hill-briggs, & Gonzalez, 2016).

Dunbar et al. (2005) explained that family support correlates with promoting self-care behaviors, following medical diets, decreasing emotional stress, coping with changes in life, enhancing self-efficacy, reducing the frequency of hospitalization, achieving weight loss, better-controlled blood sugar levels, and ultimately, improving QOL, particularly if the focus of family support is on treating and controlling the disease (Ebrahimi, Ashrafi, & Rudsari, 2017). This study aims to describe the forms of family support for family members suffering from T2DM.

MATERIALS AND METHODS

Strategy for Searching

This study used a systematic review with the search "what the forms of family support improve the quality of life in T2DM?". Trials to be included in the review were identified through electronic database searching from the earliest available time to 2019 in the following databases: Science Direct, Scopus, and Google Scholar by using keywords "family support", "diabetes mellitus type 2 and "quality of life (QoL)". The inclusion criteria in this review were experimental study and non-experimental study, studies published from 2015 to 2019, English as the language used, focused on family support in type 2 diabetes mellitus and quality of life. The exclusion criteria were studies that did not involve adolescent patients.

Based on the literature research from three databases, Science Direct, Scopus and Google Scholar, there were a total of 359 papers. The detailed identification process of the paper selection can be seen in Figure 1. This study reviewed 15 chosen articles.
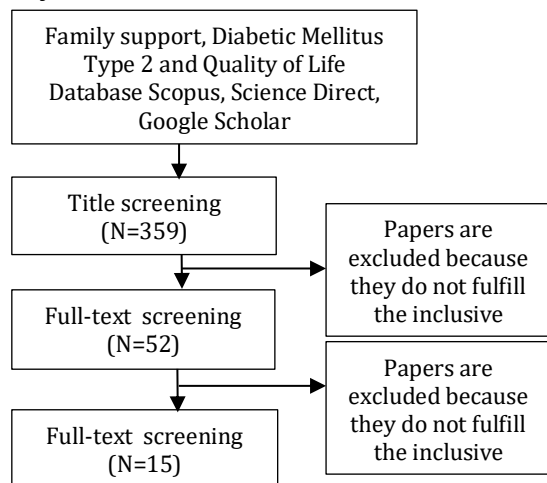
Study Selection

Figure 1 Article selection process. Adapted from Harris et al. (Harris, Harris, Quatman, & Manring, 2013)

Table 1. General characteristics of the selected studies (n=15)

Category	n	%
Publication year		
2015	1	6,67
2016	5	33,33
2017	3	20
2018	5	33,33
2019	1	6,67
Type of DM		
T1DM		
T2DM	15	100
Type of Study		
Cross-Sectional	8	53,33
RCT	3	20
Descriptive	1	6,67
Qualitative	1	6,67
Mix method	2	13,33

RESULTS

General Type of Studies

15 articles were analyzed (Table 1). All of the studies (100%) focused on studies type 2 diabetes mellitus (T2DM). The type of research design There were 8 (53,33%) cross-sectional articles.

The measuring instrument used was the interview (experiences living with type 2 diabetes, changes and adherence to self-management behaviors, attitude and knowledge of obesity ant T2DM, attitudes toward intervention using monetary incentives) (Pesantes et al., 2018), a family-support assessment Questionnaire (R et al., 2018), persuasive social control strategies (Yang, Pang, & Cheng, 2016), Chronic Illness Resource Survey (CIRS)(Soto, Louie, Cherrington, Parada, & Horton, 2015), KAP Questionnaire (Shi et al., 2016b), Diabetes Care Profile (DCP, self –perception of glycemic control) (Shawon, Hossain, Adhikary, & Gupta, 2016), Diabetes Knowledge Questionnaire (DKQ), Diabetes Health Literacy , Diabetes Self-Care Activities Questionnaire, Diabetes Distress Scale, International Physical Activity Questionnaire (IPAQ) (Mcewen, Pasvogel, Murdaugh, & Hepworth, 2017), Perceptions of Collaboration Questionnaire (PCQ), other important climate questionnaires (IOCQ), Perceived Diabetes Self-Management Scale (PDSMS-4) (Lindsay S Mayberry, Berg, Greevy, & Wallston, 2019), partner care, summary of diabetes self-care activity (SDSCA) (Lindsay S Mayberry & Lee, 2018), Diabetes Family Behavior Checklist-II (DFBC-II, DAWN II (Lindsay Satterwhite Mayberry, Harper, & Osborn, 2016), Family APGAR Questionnaire, FRA, Life-Orientation Test (LOT), Diabetes Knowledge Test (DKT) (Fain, 2016), Depression Scale, Diabetes Care Profile (Chiu & Du, 2018), Quality of life Questionnaire (QOL) (Ebrahimi et al., 2017), DSME Standard care (Yeary et al., 2017), Summary of Diabetes Self-Care Activities Scale (SDSCA) (Ravi, Kumar, & Gopichandran, 2018).

Author	Types of DM	Design	Sample	Variable	Result
(Pesantes et al., 2018)	DMT2	Qualitative	20	The role of family members in providing support to their relatives with T2DM	Support from family members mostly from their spouses and children.
(R et al., 2018)	DMT2	Cross- sectional	100	Family support assessment, quality of life of patients with type 2 Diabetes Mellitus	The family is the main source of support. The support provided is viewed from 4 dimensions, namely the emotional dimension, the dimensions of appreciation, the instrumental dimension, and the information dimension
(Yang et al., 2016)	DMT2	Cross-sectional	199	The differential associations between persuasion/pressure, psychological outcomes, and behavioral adherence at different levels of self-efficacy and to inform current family-oriented intervention programs.	Patients with lower self-efficacy ben- efited from persuasion, but were adversely affected by pressure. In contrast, patients with higher self-efficacy were adversely affected by persuasion, but were less negatively affected by pressure
(Soto et al., 2015)	DMT2	Cross-sectional	317	Self Interpersonal and organization support in performing diabetes related self management behaviors and A1C levels	Higher levels of self-support were significantly associ- ated with eating, Self-support was also related to A1C. Family/friend support was significantly associated with eating fruits and vegetables and engaging in physical activity most days/week
(Shi et al., 2016b)	DMT2	Cross-sectional	120	Family involvement on health education for controlling the diabetes	Family involvement is beneficial to the control of T2DM
(Shawon et al., 2016)	DMT2	Cross-sectional	144	The attitude towards diabetes and social and family support	Positive attitude towards diabetes management and support from friends and family were associated with adequate diabetes management
(Ravi et al., 2018)	DMT2	Cross-sectional	200	Diabetes family support improves diabetes self-management and glycemic control	Family support was significantly associated with better self-management activities, but better self-management did not reflect as better glycaemic control.
(Mcewen et al., 2017)	DMT2	Randomized Controlled trial	157	Effects of a family-based self-management support intervention for adults with type 2 diabetes (T2DM).	Family-based interven-tions to improve diabetes self-management and substan- tiate the need for intensive, longer, tailored interventions to achieve glycemic control.

We will explain and answer the research question in the results section: what the study found about family support and quality of life. In this study, researchers found that family support is closely related to T2DM care management and its relationship and quality of life. DMT2 sufferers support providers include children, spouses, close family. The types of support include emotional

(Lindsay S Mayberry et al., 2019)	DMT2	mixed-methods	904	Develop and evaluate a measure assessing helpful and harmful family/friends' involvement in adults' type 2 diabetes (T2D) self-management.	The Family and Friend Involvement in Adults' Diabetes (FIAD) is a reliable and valid measure assessing family/friend involvement in adults' T2DM.
(Lindsay S Mayberry & Lee, 2018)	DMT2	Cross-sectional	313	Self-management, diabetes distress, and HbA1c	Emotional closeness with a CarePartner may be important for supporting T2DM self-management and reducing dia- betes distress. CarePartners may appropriately engage more frequently when patients with no in-home supporter have poorly controlled diabetes.
(Lindsay Satterwhite Mayberry et al., 2016)	DMT2	Mixed-methods study	68	family mem- bers in interventions to support diabetes self-care.	Findings can inform the design and content of interventions targeting family involvement in adults' type 2 diabetes, with implications for assessing family behaviors, intervention modalities, and who to engage.
(Fain, 2016)	DMT2	nonexperimental	77	Family functioning, family resilience, life orientation (measure of optimism), and diabetes knowledge	Previous evidence suggesting that a family member's perspective of living and functioning with diabetes affects the entire family and its ability to deal with stress.
(Chiu & Du, 2018)	DMT2	Cross-sectional	398	Depressive symptom scores. Family and friend support	The level of family or friend support for diabetes management and depressive symptoms might be an important part of individu- alized diabetic care.
(Ebrahimi et al., 2017)	DMT2	A Randomized Clinical Trial	120	Quality of life	Educating the families of patients was shown in this study to improve the QOL of the patient.
(Yeary et al., 2017)	DMT2	a randomized, controlled	240	Family Model of Diabetes Self-Management Education (DSME)	The utilization of a CBPR approach that involves the local stakeholders and the engagement of the family-based social infrastructure of Marshallese communities increase potential for the intervention's success and sustainability

support, appreciation, instruments, information, diet, activity, stress reduction. Some research also shows that family control helps improve T2DM management so it affects the quality of life.

DISCUSSION

The family is the main source of support. Individuals with chronic conditions receive help to manage such conditions from family members, mainly spouses and children (Pesantes et al., 2018), interpersonal support (e.g., family and friends), health care professionals, the neighborhood, community organizations, the workplace, health insurance (Soto et al., 2015).

People with chronic diseases such as T2D stand to benefit from a family setting that provides care in terms of physical, emotional, and financial support for the management of their disease (Ebrahimi et al., 2017). The support provided is viewed from 4 dimensions, namely the emotional dimension, the

dimension of appreciation, the instrumental dimension, and the information dimension. It was also conveyed that the support of the family is closely related to the patients' compliance with treatment so it will affect their quality of life (R et al., 2018).

Emotional well-being is an important part of diabetes care and self-management. Psychological and social problems can impair the individual's or family's ability to carry out diabetes care tasks and therefore potentially compromise health status (Care & Suppl, 2018). Family members should consider the patient's levels of self-efficacy in diabetes management (Yang et al., 2016). Supportive behaviors included the provision of emotional support, such as empathy and alleviation of diabetes-related distress, and the provision of instrumental support such as paying for medications and helping participants inject their insulin. Emotional support enabled patients to improve their diet, follow their treatment and increased their physical activity (Pesantes et al., 2018). Diabetes distress, the emotional burden experienced by adults with T2DM, has been shown to influence glycemic control (Mcewen et al., 2017). Families provide physical support to the patient and also emotional support in times of need (Ravi et al., 2018).

Educational courses included psychological intervention, nutritional therapy, exercise intervention, medical care, blood glucose monitoring and oral care (Shi et al., 2016b). Family support correlates with promoting self-care behaviors, following medical diets (Ebrahimi et al., 2017). Individual/family factors are those characteristics of the individual and direct family (Polly & Kathleen, 2010). Dietary changes have consistently been reported to be the most difficult, especially in low income persons with diabetes, as factors like culture, lifelong habits, family and socioeconomic resources influence dietary intake (Mcewen et al., 2017). Education about good glycemic management is crucial in order to achieve and maintain a better control over their diabetes status to stall further complications (Shawon et al., 2016). Helpful family and friend involvement were independently associated with greater diabetes self-efficacy, better dietary behaviors, more physical activity, more frequent blood glucose testing and better medication adherence (Lindsay S Mayberry et al., 2019). Family support should be the focus of diabetes education for families living with diabetes (Fain, 2016)

The Face-it intervention not only focuses on physical health but also addresses a broader perspective, including mental and social wellbeing. Gilbert et al. argue in favor of the integration of psychosocial wellbeing (e.g., social support) (Nielsen et al., 2020). Close family members are associated with patient adherence (Chiu & Du, 2018). Family-based, culturally-adapted diabetes interventions have positive effects on diabetes outcome (Yeary et al., 2017).

CONCLUSION

Family support plays a large role in T2DM care. Emotional, knowledge and financial support are forms of family support that help improve the quality of life in T2DM patients. Nurses and the medical staff can collaborate with families to emphasize that there needs to be a balance between the emotional, physical and financial support for T2DM sufferers. The weak point of this literature review is that it has not explained in detail how to form a balance of support between emotional, physical and financial support.

CONFLICT OF INTEREST

The authors declare there is no conflict of interest.

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REFERENCES

Bennich, B. B., Røder, M. E., Overgaard, D., Egerod, I., Munch, L., Knop, F. K., … Konradsen, H. (2017). Supportive and non - supportive interactions in families with a type 2 diabetes patient : an integrative review. *Diabetology & Metabolic Syndrome*, 1–9. https://doi.org/10.1186/s13098-017-0256-7

Care, D., & Suppl, S. S. (2018). Lifestyle Management : Standards of Medical Care in Diabetes d 2018. *Diabetes Care*, *41*(January), 38–50. https://doi.org/10.2337/dc18-S004

Chiu, C., & Du, Y. (2018). *Longitudinal investigation of the reciprocal relationship between depressive symptoms and glycemic control : The moderation effects of sex and perceived support.* https://doi.org/10.1111/jdi.12969

Ebrahimi, H., Ashrafi, Z., & Rudsari, D. M. (2017). *Effect of Family-Based Education on the Quality of Life of Persons With Type 2 Diabetes : A Randomized Clinical Trial. 00*(0), 1–7.

Fain, J. A. (2016). Factors Affecting Resilience in Families of Adults With Diabetes. *The Diabetes Educator.* https://doi.org/10.1177/0145721716637124

Harris, J. D., Harris, J. D., Quatman, C. E., & Manring, M. M. (2013). *How to Write a Systematic Review How to Write a Systematic Review.* (May 2014). https://doi.org/10.1177/0363546513497567

Mayberry, Lindsay S, Berg, C. A., Greevy, R. A., & Wallston, K. A. (2019). Patient Education and Counseling Assessing helpful and harmful family and friend involvement in adults' type 2 diabetes self-management. *Patient Education and Counseling*, *102*(7), 1380–1388. https://doi.org/10.1016/j.pec.2019.02.027

Mayberry, Lindsay S, & Lee, A. A. (2018). Out-of-home informal support important for medication adherence , diabetes distress , hemoglobin A1c among adults with type 2 diabetes. *Journal of*

Behavioral Medicine. https://doi.org/10.1007/s10865-018-0002-0

Mayberry, Lindsay Satterwhite, Harper, K. J., & Osborn, C. Y. (2016). *Family behaviors and type 2 diabetes : What to target and how to address in interventions for adults with low socioeconomic status.* https://doi.org/10.1177/1742395316644303

Mcewen, M. M., Pasvogel, A., Murdaugh, C., & Hepworth, J. (2017). Effects of a Family-based Diabetes Intervention on Behavioral and Biological Outcomes for Mexican American Adults Purpose. *Effects of a Fmily Based Intervention*, 1–14. https://doi.org/10.1177/0145721717706031

Nielsen, K. K., Dahl-petersen, I. K., Jensen, D. M., Ovesen, P., Damm, P., Jensen, N. H., ... Vinter, C. A. (2020). *Protocol for a randomised controlled trial of a co-produced , complex , health promotion intervention for women with prior gestational diabetes and their families : the Face-it study.* 1–12.

Peimani, M., Monjazebi, F., & Ghodssi-ghassemabadi, R. (2018). Patient Education and Counseling A peer support intervention in improving glycemic control in patients with type 2 diabetes. *Patient Education and Counseling*, *101*(3), 460–466. https://doi.org/10.1016/j.pec.2017.10.007

Pesantes, M. A., Valle, A. Del, Diez-canseco, F., Bernabé-ortiz, A., Portocarrero, J., Trujillo, A., ... Miranda, J. J. (2018). *Family Support and Diabetes : Patient ' s Experiences From a Public Hospital in Peru.* https://doi.org/10.1177/1049732318784906

Polly, R., & Kathleen, S. J. (2010). The Individual and Family Self-management Theory: Background and Perspectives on Context, Process, and Outcomes. *NIH Public Access*, *57*(4), 217–225. https://doi.org/10.1016/j.outlook.2008.10.004. The

R, A., A, S. W., R, a aRIGA, Felicia, & Preveena. (2018). Relationship between family support with quality of life among type 2 diabetes mellitus patients at Amplas primary health care in Medan , Indonesia Relationship between family support with quality of life among type 2 diabetes mellitus patients at Amplas. *Journal of Physics: Conference Series*, 1–6. https://doi.org/10.1088/1742-6596/1116/5/052004

Ravi, S., Kumar, S., & Gopichandran, V. (2018). *Do supportive family behaviors promote diabetes self-management in resource limited urban settings ? A cross sectional study.* 1–9.

Shawon, S. R., Hossain, F. B., Adhikary, G., & Gupta, R. Das. (2016). Attitude towards diabetes and social and family support among type 2 diabetes patients attending a tertiary - care hospital in Bangladesh : a cross - sectional study. *BMC Research Notes*, 1–8. https://doi.org/10.1186/s13104-016-2081-8

Shi, M., Xu, M., Liu, Z., Duan, X., Zhu, Y., & Shi, H. (2016a). Patient Education and Counseling Effectiveness of family involvement in newly diagnosed type 2 diabetes patients : a follow-up study. *Patient Education and Counseling*, *99*(5), 776–782. https://doi.org/10.1016/j.pec.2015.12.018

Shi, M., Xu, M., Liu, Z., Duan, X., Zhu, Y., & Shi, H. (2016b). Patient Education and Counseling Effectiveness of family involvement in newly diagnosed type 2 diabetes patients : a follow-up study. *Patient Education and Counseling*, (2015). https://doi.org/10.1016/j.pec.2015.12.018

Soto, S. C., Louie, S. Y., Cherrington, A. L., Parada, H., & Horton, L. A. (2015). An Ecological Perspective on Diabetes Self-care Support, Self-management Behaviors, and Hemoglobin A1C Among Latinos. *The Diabetes Educator*, *41*(2), 214–223. https://doi.org/10.1177/0145721715569078

Uchendu, C., & Blake, H. (2016). Systematic Review or Meta-analysis Effectiveness of cognitive – behavioural therapy on glycaemic control and psychological outcomes in adults with diabetes mellitus : a systematic review and meta-analysis of randomized controlled trials. *Diabaaetic Medicine*, 328–339. https://doi.org/10.1111/dme.13195

Yang, F., Pang, J. S., & Cheng, W. J. Y. (2016). Self-Care Adherence and Psychological Functioning of Older Patients with Type 2 Diabetes : Effects of Persuasion , Social Pressure , and Self-Efficacy. *Journal of Clinical Psychology in Medical Settings*. https://doi.org/10.1007/s10880-016-9470-y

Yeary, K. H. K., Associate, P. D., Long, C. R., Assistant, P. D., Bursac, Z., Ph, D., ... Assistant, P. D. (2017). *Design of a randomized , controlled , comparative-effectiveness trial testing a Family Model of Diabetes Self-Management Education (DSME) vs . Standard DSME for Marshallese in the United States.* 6. https://doi.org/10.1016/j.conctc.2017.03.007

Young-hyman, D., Groot, M. De, Hill-briggs, F., & Gonzalez, J. S. (2016). *Psychosocial Care for People With Diabetes : A Position Statement of the American Diabetes Association.* *39*(December), 2126–2140. https://doi.org/10.2337/dc16-2053

Systematic Review

A Systematic Review of the Factors Associated with Cervical Cancer Screening Uptake among Women in Low and Middle-Income Countries

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ABSTRACT

Introduction: The high prevalence of cervical cancer is a global health problem. Approximately 90% of deaths from cervical cancer occur in low- and middle-income countries. This can be because of the awareness and uptake of cervical cancer screening services having remained poor in these countries. This review aims to explore the factors influencing cervical screening uptake among women in low and middle-income countries.

Methods: The studies were systematically identified by searching electronic databases with the keywords "cervical cancer AND screening AND low of income countries AND middle of income countries." The results consisted of 94 articles from Scopus, 100 articles from Science Direct, 74 articles from EBSCO, and 32 articles from PubMed. Following this, 16 studies were included in this systematic review with the inclusion criteria being quantitative or qualitative studies exploring the factors influencing woman's cervical cancer screening uptake covering women in low- and middle- income countries, a clear study outcome and details on the associated factors, barriers to, and facilitators of screening uptake.

Results: Knowledge about the disease and its prevention, knowing someone with cervical cancer and someone who has ever been screened, attitude and perception, husband approval, advice from the health care providers, and the distance to health care service were all important factors related to cervical cancer screening uptake in low and middle-income countries. The uptake of cervical cancer screening services was poor in low and middle-income countries. There is a need to strengthen the knowledge and awareness of woman related to cervical cancer screening services.

Conclusion: The available evidence shows that intrapersonal and organizational factors are the most important factors that influence woman to undergo cervical cancer screening.

INTRODUCTION

The high prevalence of cervical cancer is a global health problem. It causes hundreds of thousands of deaths among women annually worldwide. With an estimated 570,000 cases and 311,000 deaths in 2018 worldwide, this disease ranks as the fourth most frequently diagnosed cancer and the fourth leading cause of cancer death in women (Bray et al., 2018). Approximately 90% of deaths from cervical cancer occur in low- and middle-income countries (Idowu,

Olowookere, Fagbemi, & Ogunlaja, 2016). Cervical cancer is a malignant proliferation of the cells of the uterine cervix and it occurs when abnormal cells in the lining of the cervix grow in an uncontrolled way (Donatus et al., 2019). This disease is potentially preventable and some effective screening programs can lead to reduced morbidity and mortality (Schliemann et al., 2019).

Early detection and education to promote early diagnosis and the screening of cervical cancer greatly increase the chances of successful treatment and

survival (Islam, Billah, Hossain, & Oldroyd, 2017). One of the screening methods is a cytology-based approach. The beneficial effects of this program are that it has hastened the decline in cervical cancer rates upon its implementation in high-income countries (Bray et al., 2018). This success has been attributed to greater access to healthcare, an increased uptake of cervical screening, and the increased awareness of screening practices among the women in these countries (Ncube, Bey, Knight, Bessler, & Jolly, 2015). In contrast, in low and middle-income countries, this program can't achieve a major impact in most settings because of the low screening uptake (Liebermann, VanDevanter, Hammer, & Fu, 2018).

Prior research in low- and middle- income countries has shown there to be several factors that are thought to affect the uptake of cervical cancer screening. Based on the "ecological models" by Mc Leroy et al about the factors that affect health behavior, they can be divided into 5 levels. These levels are interpersonal and intrapersonal factors, community, organizational and policy-related (Owen, Heart, & Fisher, 2008). The intrapersonal level describes an individual's characteristics such as knowledge and attitude which influences behavior. The interpersonal level describes their interactions with the primary groups of family and friends. This provides social support related to their health behavior. The organizational level includes the rules or regulations (and the physician's recommendations) that may constrain or modify their health behavior. The community level concerns the influence of social networks or the standards that exist either formally or informally among groups and organizations (e.g. acculturation). The policy-related level describes the existence of policies that support disease prevention and detection, control and management (e.g. health insurance) (Chan & So, 2017).

The objective of this systematic review was to explore the factors associated with the uptake of screening among women in low- and middle- income countries. These findings could be used to inform public policy and to develop and implement strategies to increase screening activities, thereby reducing the incidence, morbidity, and mortality of the disease. Understanding the factors and facilitators with cervical cancer screening encountered by the women in low and middle-income countries can guide the government in conducting health sector efforts to increase the screening rate among the population.

MATERIALS AND METHODS

Literature Search

The literature review was employed according to the PRISMA guidelines. The database search was performed in January 2020 for articles dated in the last 10 years. The databases included Scopus, EBSCO, PubMed, and Science Direct. The following keywords

were used alone or in combination: factors, cervical cancer, screening, low-income countries, middle-income countries. The limitations of the literature search were that they had been published in the last 10 years and English-only articles. Once all of the articles were found, duplicate articles were removed.

Inclusion/Exclusion Criteria

The criteria for inclusion in this review were as follows: (1) quantitative or qualitative studies exploring the factors influencing woman's cervical cancer screening uptake; (2) studies covering women in low- and middle- income countries and (3) studies with the outcome related to the associated factors, barriers to, and facilitators of screening uptake. The criteria for exclusion included the following: (1) unpublished studies; (2) language used was not English and (3) outside of the limitation on publication, between 2011 - 2020.

Study Selection
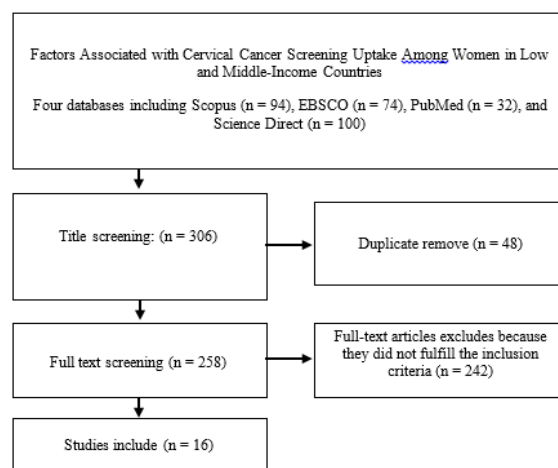
Figure 1. Flowchart of the Articles Selected for the Systematic Review and the Selection Process Using PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyzes)

Data Extraction

The following information was extracted from the 16 articles: information on the demographics, study design, outcome measures, sample size, associated factors, barriers to and facilitators of the screening uptake, country and year of publication.

RESULTS

General Features and Types of Study

All 16 studies were published between 2012 and 2020 and they were conducted in low and middle-income countries. Among these, 14 (88%) adopted quantitative and 2 (12%) adopted qualitative approaches. The target participants were women in the countries where the studies took place. They were grouped into 2 major categories: low-income

Table 1. General characteristics of the selected studies (n=16)

Category	n	%
Year of publishing		
2012	1	6
2015	3	19
2016	3	19
2017	3	19
2018	3	19
2019	1	6
2020	2	12
Type of Country		
Middle-income countries	10	63
Low-income countries	6	37
Factors associated		
with cervical cancer screening uptake		
Intrapersonal factors	16	100
Interpersonal factors	1	6
Community	1	6
Organizational factors	5	31,25
Type of study		
Cross-sectional	12	80
Case control	1	7
Qualitative	2	13

countries consisting of Ethiopia (n=2), Tanzania (n=2) and Uganda (n=2) and middle-income countries consisting of Cambodia (n=1), Cameroon (n=1), Indonesia (n=1), Iran (n=1), Jamaica (n=1), Kenya (n=2) and Nigeria (n=3). The sample size of the studies ranged from 82 to 9016, and the participants' ages ranged from 15 to 69 years old.

All of the studies (100%) that were included in this review reported that intrapersonal factors are associated with the uptake of cervical cancer screening. Good knowledge about the disease and its prevention were found to be the most important factors in 8 (50%) articles. Having good knowledge was a facilitator to get cervical cancer screening because it can make the women more aware and thus encourage them to undergo the screening intensively. Four studies (25%) mentioned that attitude and perception about the screening are associated factors that influenced the women to undergo cervical cancer screening. Having known somebody with cervical cancer or somebody who had undergone cervical cancer screening was a motivating factor for women to access screening in 5 (31.25%) studies.

The interpersonal factor mentioned in 1 (6%) study in this review was husband approval. The support from the husband is a way of providing social support for the women to undergo cervical cancer screening. To increase the awareness and knowledge about cervical cancer screening, 1study (6%) mentioned that the community factors can be altered through the management and health promotion conducted using public events, media, religious communities and other civic society channels.

The uptake of cervical cancer screening is associated with the organizational factors mentioned in 5 (31.25%) of the included studies. Women found it difficult to present for screening when the health facilities were not nearby. Being recommended to attend screening by the health care workers was a significant facilitator that was mentioned in 3 (18.75%) studies. Women who had been recommended by a health-care-worker were more likely to have been screened for cervical cancer compared with women who had not advised.

DISCUSSION

Intrapersonal Factors

The intrapersonal level describes an individual's characteristics, such as knowledge and attitude, which influence their behavior. It was noticed that some of the factors were common among women in low and middle-income countries. These factors include knowledge about the disease and its prevention (Ndikom & Ofi, 2012; Nigussie, Admassu, & Nigussie, 2019; Orang'O et al., 2016; Touch & Oh, 2018), knowing someone with cervical cancer and knowing someone who has ever been screened (Ncube et al., 2015; Ndikom & Ofi, 2012; Nigussie et al., 2019), attitude and perception, level of education (Anwar et al., 2018; Weng, Jiang, Haji, Nondo, & Zhou, 2020), literacy and media exposure (Tiruneh, Chuang, Ntenda, & Chuang, 2017), fear about the result of the screening, awareness, belief, self-efficacy, and having a history of gynecological examination (Donatus et al., 2019; Idowu et al., 2016).

Knowledge about the disease and its prevention is the most important factor at the intrapersonal level. If women have information concerning cervical cancer severity, they may utilize the screening services. This may be due to their knowledge about cervical cancer clearing up any rumors about cervical cancer and increasing their awareness about the advantages of undergoing screening (Nigussie et al., 2019). Level of education was consistently associated with higher odds of having an awareness about the cervical cancer screening uptake (Anwar et al., 2018). Education level was found to be positively associated with level of knowledge which means that a lack of knowledge could be due to the low education level and the low coverage of cancer awareness initiatives in the country (Weng et al., 2020).

Some evidence shows that knowing someone who has ever been screened for cervical cancer is associated with cervical cancer screening service utilization. Women who know someone who has ever screened been were more likely to undergo cervical cancer screening themselves when compared with women who do not know someone who has been screened for cervical cancer (Nigussie et al., 2019). This result is consistent with the study done in Uganda. This might be due to the screened women discussing it with unscreened women, focusing on the screening service-procedure and the time that it takes. This will decrease the fear of the women towards undergoing screening (Ndejjo, Mukama, Kiguli, & Musoke, 2017).

Belief and self-efficacy should be a concern of women in cervical cancer screening. Farzaneh et al showed that the perceptions of a specific health behavior play an important role in reducing the cervical cancer risk and engaging in the health behavior of focus (Farzaneh, Heydari, Shekarchi, & Kamran, 2017).

Interpersonal Factors

The interpersonal level describes the interactions with the primary group, their family, and friends. This provides social support to a given health behavior. In this review, we found that husband approval is the only interpersonal factor that influences a woman to get cervical cancer screening. The first family member closest to the wife is the husband, so the husbands' approval of cervical cancer screening is therefore strongly associated with the participants' cervical cancer screening status (Lyimo & Beran, 2012). This was confirmed by Rahmawati et al's (Rahmawati & Dewanti, 2018) study, which showed that the negative attitude of men towards the screening or the treatment of cervical cancer is to be a considered a

Table 2. Summary of the Selected Studies

Author	Type Of Country	Design	Sample	Variables	Results
(Nigussie et al., 2019)	Low-income country	Cross-sectional	737 respondents	Cervical cancer screening service utilization and the associated factors	Having a history of gynecological examinations, good knowledge of cervical cancer screening, perceived susceptibility to cervical cancer, government employee, knowing someone who has ever been screened and getting advice from the health care providers.
(Teame et al., 2019)	Low-income country	Case control	624 respondents	Factors affecting the utilization of cervical cancer screening services	Age, employee status, having ever given birth and a history of multiple sexual partners.
(Anwar et al., 2018)	Middle-income country	Cross-sectional	5397 respondents	Determinants of cancer screening awareness and participation.	Level of education, social participation, health insurance and a shorter distance to the health services were the determinant factors of cervical cancer screening participation.
(Tiruneh et al., 2017)	Middle-income country	Cross-sectional	9016 respondents	Individual- and community-level factors related to cervical cancer screening.	Media exposure, a higher household wealth index, employed, insured, and had visit a health facility in the last 12 months in addition to sexual autonomy.
(Steinhardt et al., 2015)	Middle-income country	Cross-sectional	2505 respondents	Factors associated with the limited uptake of the screening services.	A high percentage of women knew that it is appropriate for all women to getcervical cancer screening, but only a small proportion of women actually got screening. The associated factors were Knowledge, Fear and Beliefs.
(Weng et al., 2020)	Low-income country	Cross-sectional	1483 respondents	Attitudes toward the acceptability of and barriers to cervical cancer screening (CCS).	Educational level, Family income, Personal and family history, Paritas, Fear of screening and the Inconvenience of screening.
(Ndejjo et al., 2017)	Low-income country	Qualitative	119 participants	Community knowledge, facilitators and barriers to cervical cancer screening	The perceptions of cervical cancer and screening were majorly positive with many of the participants stating that they were at risk of getting cervical cancer. The facilitators to accessing cervical cancer screening were experiencing signs and symptoms of cervical cancer, a family history of the disease and awareness of the disease/screening service.

(Pyatak et al., 2018)	Middle-income country	Cross-sectional	440 respondents	Knowledge, attitude, and the practices related to cervical cancer prevention	The intrapersonal factors related to cervical cancer prevention are knowledge about the disease and prevention, and personal choice.
(Donatus et al., 2019)	Middle-income country	Cross-sectional	253 respondents	Cervical cancer knowledge and associated factors for uptake in cervical cancer screening.	The majority of the participants had heard of cervical cancer and had undergone cervical cancer screening. Following this, 24.51% and 29.25% of the participants respectively could not identify any of the risk factors and symptoms of cervical cancer.
(Farzaneh, Heydari, Shekarchi, & Kamran, 2017)	Middle-income country	Cross-sectional	1,134 respondents	Screening behaviours for breast and cervical cancer, self-efficacy, beliefs, and the barriers to breast and cervical cancer screening.	Females who had high belief scores were more likely to undertake a mammogram, BSE, and pap smears. Females who had high self-efficacy scores were more likely to perform regular screening for breast and cervical cancer.
(Ncube, Bey, Knight, Bessler, & Jolly, 2015)	Middle-income country	Cross-sectional	403 respondents	Women's cervical cancer screening history, knowledge, attitudes and the practices regarding the disease and screening	Interpersonal: being married, age, parity, perception of the consequences of not having a pap smear ad knowing a person with cervical cancer. Health care system: discussing cancer with the health provider.
(Ndikom & Ofi, 2012)	Middle-income country	Qualitative	82 participants	Awareness, perception of the utilization of the cervical cancer screening service	Intrapersonal factors: ignorance, illiteracy, belief in not being at risk, having many contending issues, nonchalant attitude to their health, financial constraints and a fear of having a positive result.
(Idowu, Olowookere, Fagbemi, Ogunlaja, 2016)	Middle-income country	Cross-sectional	338 respondents	Determinants of cervical cancer screening uptake	Knowledge and self awareness were the determinant factors of cervical cancer screening uptake.
(Okunowo et al., 2018)	Middle-income country	Cross-sectional	225 respondents	Knowledge of cervical cancer and an uptake of Pap smear screening	The knowledge of the women in this study regarding the symptoms and risk factors of cervical cancer was very poor. Fear of a positive result, and the recommendation to be screened given by doctors/nurses were the important factors.
(Lyimo & Beran, 2012)	Low-income country	Cross-sectional	354 respondents	Demographic, knowledge, attitude, and accessibility factors are associated with the uptake ofcervical cancer screening	Women's level of education, and their knowledge of cervical cancer and its prevention, embarrassment and pain concerning the screening, preference for the health provider female, awareness, husband's approval of the cervical cancer screening and the distance to the cervical cancer screening services.
(Ndejjo, Mukama, Musabyimana, & Musoke, 2016)	Low-income country	Cross-sectional	900 respondents	Uptake of cervical cancer screening and the associated factors	Knowing where the screening services are offered, knowing someone who had ever been screened and being recommended to do so by a health worker

screening services.

Community

According to the WHO recommendations on the management of cervical cancer, health promotion should be conducted through public events, media, religious communities and other civic society channels. Preventive measures include mass screening, mainly for cervical cancer using a visual inspection with acetic acid, which should be organized as a public event. Social participation may help to enhance the presence of cancer screening in low-resource settings (Anwar et al., 2018).

Organizational Factors

The organizational level includes the rules or regulations (and physician's recommendations) that may constrain or modify health behavior. Consultation/advice from the health professions was associated with cervical cancer screening service utilization. Women who had advice from their health care providers were more likely to be screened when compared to women who had not had such advice. This may be due to the information from the health care providers increasing their awareness of the disease and the advantages of the screening services (Nigussie et al., 2019). It has been shown that the non – recommendation of a pap smear test is a major reason for not doing the test. Several studies have identified physician recommendation as a major determinant and predictor of the uptake of cancer screening tests. The regular health education of women and the recommendation to undergo a pap smear screening by clinicians and other health care providers will go a long way to improving the uptake and ultimately reducing the incidence and burden of the disease (Okunowo et al., 2018).

Accessibility has also been identified as an organizational factor related to the screening uptake. The long distance to the cervical cancer screening service reduces the likelihood of women accessing screening. Women who know the location of the nearest cancer screening facility are more likely to have been screened for cervical cancer compared to those who do not (Lyimo & Beran, 2012).

CONCLUSION

The uptake of cervical cancer screening services is poor in low and middle-income countries. There is a need to strengthen the knowledge and awareness of the woman towards the cervical cancer screening services. The available evidence shows that the intrapersonal factors of knowledge about the disease and its prevention and organizational factors are the most important factors that influence the woman in low- and middle-income countries when it comes to undertaking cervical cancer screening.

CONFLICT OF INTEREST

No Conflicts of interest have been declared.

REFERENCES

Anwar, S. L., Tampubolon, G., Van Hemelrijck, M., Hutajulu, S. H., Watkins, J., & Wulaningsih, W. (2018). Determinants of cancer screening awareness and participation among Indonesian women. *BMC Cancer*, *18*(1), 1–11. https://doi.org/10.1186/s12885-018-4125-z

Bray, F., Ferlay, J., Soerjomataram, I., Siegel, R. L., Torre, L. A., & Jemal, A. (2018). Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: A Cancer Journal for Clinicians*, *68*(6), 394–424. https://doi.org/10.3322/caac.21492

Chan, D. N. S., & So, W. K. W. (2017). A Systematic Review of the Factors Influencing Ethnic Minority Women's Cervical Cancer Screening Behavior: From Intrapersonal to Policy Level. *Cancer Nursing*, *40*(6), E1–E30. https://doi.org/10.1097/NCC.0000000000000436

Donatus, L., Nina, F. K., Sama, D. J., Nkfusai, C. N., Bede, F., Shirinde, J., & Cumber, S. N. (2019). Assessing the uptake of cervical cancer screening among women aged 25-65 years in Kumbo West Health District, Cameroon. *Pan African Medical Journal*, *33*, 1–11. https://doi.org/10.11604/pamj.2019.33.106.16975

Farzaneh, E., Heydari, H., Shekarchi, A. A., & Kamran, A. (2017). Breast and cervical cancer-screening uptake among females in Ardabil, northwest Iran: A community-based study. *OncoTargets and Therapy*, *10*, 985–992. https://doi.org/10.2147/OTT.S125344

Idowu, A., Olowookere, S. A., Fagbemi, A. T., & Ogunlaja, O. A. (2016). Determinants of Cervical Cancer Screening Uptake among Women in Ilorin, North Central Nigeria: A Community-Based Study. *Journal of Cancer Epidemiology*, *2016*(Vili). https://doi.org/10.1155/2016/6469240

Islam, R. M., Billah, B., Hossain, M. N., & Oldroyd, J. (2017). Barriers to cervical cancer and breast cancer screening uptake in low-income and middle-income countries: A systematic review. *Asian Pacific Journal of Cancer Prevention*, *18*(7), 1751–1763. https://doi.org/10.22034/APJCP.2017.18.7.1751

Liebermann, E. J., VanDevanter, N., Hammer, M. J., & Fu, M. R. (2018). Social and Cultural Barriers to Women's Participation in Pap Smear Screening Programs in Low- and Middle-Income Latin American and Caribbean Countries: An Integrative Review. *Journal of Transcultural*

Nursing, *29*(6), 591–602. https://doi.org/10.1177/1043659618755424

Lyimo, F. S., & Beran, T. N. (2012). Demographic, knowledge, attitudinal, and accessibility factors associated with uptake of cervical cancer screening among women in a rural district of Tanzania: Three public policy implications. *BMC Public Health*, *12*(1), 1–8. https://doi.org/10.1186/1471-2458-12-22

Ncube, B., Bey, A., Knight, J., Bessler, P., & Jolly, P. E. (2015). Factors associated with the uptake of cervical cancer screening among women in Portland, Jamaica. *North American Journal of Medical Sciences*, *7*(3), 104–113. https://doi.org/10.4103/1947-2714.153922

Ndejjo, R., Mukama, T., Kiguli, J., & Musoke, D. (2017). Knowledge, facilitators and barriers to cervical cancer screening among women in Uganda: A qualitative study. *BMJ Open*, *7*(6), 1–8. https://doi.org/10.1136/bmjopen-2017-016282

Ndejjo, R., Mukama, T., Musabyimana, A., & Musoke, D. (2016). Uptake of cervical cancer screening and associated factors among women in rural Uganda: A cross sectional study. *PLoS ONE*, *11*(2), 1–13. https://doi.org/10.1371/journal.pone.0149696

Ndikom, C. M., & Ofi, B. A. (2012). Awareness, perception and factors affecting utilization of cervical cancer screening services among women in Ibadan, Nigeria: A qualitative study. *Reproductive Health*, *9*(1), 1–8. https://doi.org/10.1186/1742-4755-9-11

Nigussie, T., Admassu, B., & Nigussie, A. (2019). Cervical cancer screening service utilization and associated factors among age-eligible women in Jimma town using health belief model, South West Ethiopia. *BMC Women's Health*, *19*(1), 1–10. https://doi.org/10.1186/s12905-019-0826-y

Okunowo, A. A., Daramola, E. S., Soibi-Harry, A. P., Ezenwankwo, F. C., Kuku, J. O., Okunade, K. S., & Anorlu, R. I. (2018). Women's knowledge of cervical cancer and uptake of Pap smear testing and the factors influencing it in a Nigerian tertiary hospital. *Journal of Cancer Research and Practice*, *5*(3), 105–111. https://doi.org/10.1016/j.jcrpr.2018.02.001

Orang'O, E. O., Wachira, J., Asirwa, F. C., Busakhala, N., Naanyu, V., Kisuya, J., … Inui, T. (2016). Factors associated with uptake of visual inspection with acetic acid (VIA) for cervical cancer screening in western Kenya. *PLoS ONE*, *11*(6), 1–12. https://doi.org/10.1371/journal.pone.0157217

Owen, N., Heart, B., & Fisher, E. B. (2008). *AND HEALTH*.

Pyatak, E. A., Carandang, K., Vigen, C. L. P., Blanchard, J., Diaz, J., Concha-Chavez, A., … Peters, A. L. (2018). Occupational therapy intervention improves glycemic control and quality of life among young adults with diabetes: The resilient, empowered, active living with diabetes (REAL Diabetes) randomized controlled trial. *Diabetes Care*, *41*(4), 696–704. https://doi.org/10.2337/dc17-1634

Rahmawati, N. A., & Dewanti, L. (2018). Direct experience with cervical cancer patient, husband support, and self-perception as determinant factors of women's desire to take VIA screening test. *Kesmas*, *13*(1), 36–42. https://doi.org/10.21109/kesmas.v13i1.1617

Rohan, J. M., Huang, B., Pendley, J. S., Delamater, A., Dolan, L., Reeves, G., & Drotar, D. (2015). Predicting health resilience in pediatric type 1 diabetes: A test of the resilience model framework. *Journal of Pediatric Psychology*, *40*(9), 956–967. https://doi.org/10.1093/jpepsy/jsv061

Schliemann, D., Su, T. T., Paramasivam, D., Treanor, C., Dahlui, M., Loh, S. Y., & Donnelly, M. (2019). Effectiveness of Mass and Small Media Campaigns to Improve Cancer Awareness and Screening Rates in Asia: A Systematic Review. *Journal of Global Oncology*, (5), 1–20. https://doi.org/10.1200/jgo.19.00011

Steinhardt, M. A., Brown, S. A., Dubois, S. K., Harrison, L., Matthew Lehrer, H., & Jaggars, S. S. (2015). A resilience intervention in African-American adults with type 2 diabetes. *American Journal of Health Behavior*, *39*(4), 507–518. https://doi.org/10.5993/AJHB.39.4.7

Teame, H., Gebremariam, L., Kahsay, T., Berhe, K., Gebreheat, G., & Gebremariam, G. (2019). Factors affecting utilization of cervical cancer screening services among women attending public hospitals in Tigray region, Ethiopia, 2018; Case control study. *PLoS ONE*, *14*(3), 1–11. https://doi.org/10.1371/journal.pone.0213546

Tiruneh, F. N., Chuang, K. Y., Ntenda, P. A. M., & Chuang, Y. C. (2017). Individual-level and community-level determinants of cervical cancer screening among Kenyan women: A multilevel analysis of a Nationwide survey. *BMC Women's Health*, *17*(1), 1–14. https://doi.org/10.1186/s12905-017-0469-9

Touch, S., & Oh, J. K. (2018). Knowledge, attitudes, and practices toward cervical cancer prevention among women in Kampong Speu Province, Cambodia. *BMC Cancer*, *18*(1), 1–8. https://doi.org/10.1186/s12885-018-4198-8

Weng, Q., Jiang, J., Haji, F. M., Nondo, L. H., & Zhou, H. (2020). Women's knowledge of and attitudes toward cervical cancer and cervical cancer screening in Zanzibar, Tanzania: A cross-sectional study. *BMC Cancer*, *20*(1), 1–12. https://doi.org/10.1186/s12885-020-6528-x

Systematic Review

A Systematic Review: The Experience of Patient with Diabetic Foot Ulcers

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ABSTRACT

Introduction: Diabetic foot ulcers can have an impact on the individual responses related to the disease process and healing. The response depends on the perception of the disease, its severity, the environmental factors and the level of family support. The response that often occurs is the existence of fear and anxiety which is due to the stress experienced by the individual. The purpose of this study was to explore the experience of patients with diabetic foot ulcers.

Methods: This study used the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) approach. The methods used to arrange this systematic review included (1) the identification of the variables in the literature, (2) the identification of the relevant literature based on the topic and title, (3) obtaining the literature in full-text form and (4) conducting an analysis of the results from the literature. The databases used to identify suitable articles were Scopus, Google Scholar, Pubmed, ProQuest and Ebscohost.

Results: Based on the 15 articles reviewed, the results explains that the majority of patients who experience DM with the complication of diabetic ulcers experience stress, depression and anxiety. They also have a financial burden, feel helplessness, blame themselves and feel that there is uncertainty their life. They need support from their family and wider social support.

Conclusion: However, from the experience of the patients with diabetic foot ulcers, they must be able to adapt to a limited life. They must also have a good coping style and an adaptive response in order to survive and heal their diabetic ulcers.

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INTRODUCTION

Diabetic foot ulcers can have an impact on the individual responses related to the disease process and healing. The response depends on the perception of the disease, the disease severity and the environmental factors and family support. The response that often occurs is the existence of fear and anxiety which is due to the stress experienced by the individual (Vedhara et al., 2010). The slow process of wound healing in diabetes mellitus patients can increase the risk of wound complications which will have an impact on the duration of wound healing. Complications in the form of diabetic ulcers can have an impact on the individual responses related to the disease process and healing. All of these aspects make the patient feel frustrated, dissatisfied, insecure, fearful, helpless and uncontrolled. Individuals with injuries feel unable to carry out their daily activities, and they often consider themselves unable to play their role in society (De Almeida, Salomé, Dutra, & Ferreira, 2014).

Diabetic ulcer patients require several weeks or even months to heal. Diabetic foot ulcers that cannot be cured are able to become infected, gangrenous, and even lead to amputations. Poor healing in patients with diabetic ulcers will create a burden for the patients including morbidity, distress and the disruption of their functional abilities which will ultimately increase the costs involved due to the
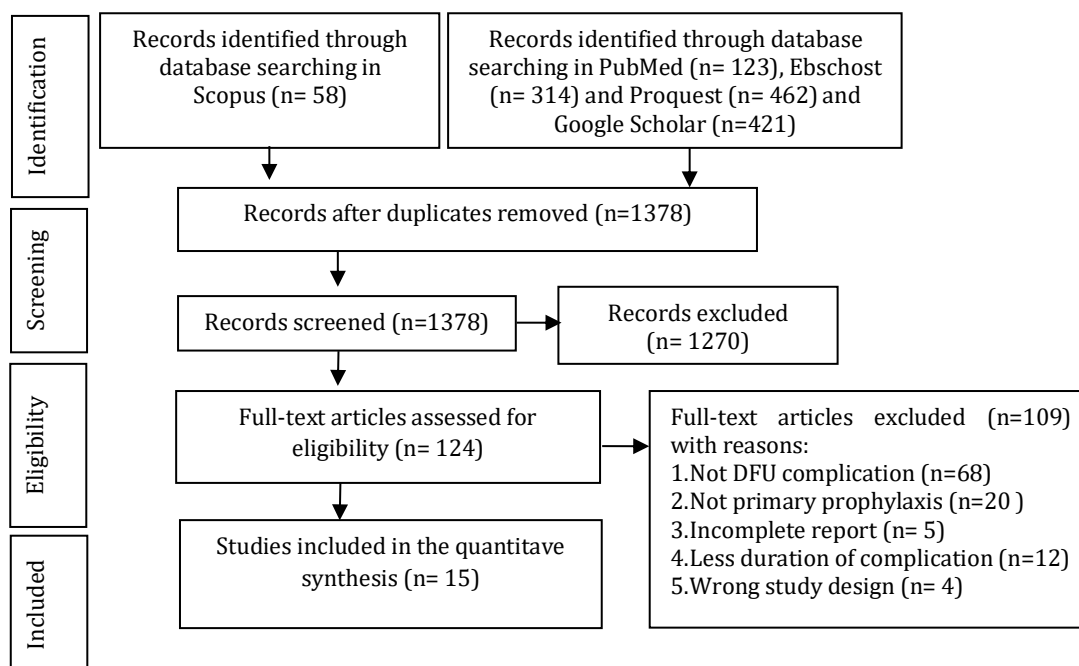
Figure 1. Article Selection Process

prolonged care and treatment. This can trigger increased stress levels in the patients with diabetic ulcers (Vedhara et al., 2010). Each patient builds his experience of the disease which includes both emotional aspects and cognitive aspects, which in turn will determine the coping strategies used. The right coping strategy plays a very important role in the physical and psychological health of the patient(Siersma et al., 2017).

Diabetic ulcer injuries often affect quality of life, including marked limitations in the activities of daily living (ADL) due to the pain, edema, fatigue and large dressing that makes simple activities such as changing clothes and bathing frustrating and unable to be done easily. Diabetic ulcers can interfere with an individual's social life, household chores, leisure activities and mobility(Siersma et al., 2017). A research study conducted by Meriç *et al.* in 2019 about the experience of patients with diabetic foot ulcers explained that most of the patients were afraid of losing their feet and that they had difficulty coping with the situation. The patients expected the health professionals to understand the difficulties that they were experiencing. Another research conducted by Delea *et al.*, 2015 about the management of diabetic foot disease and amputation in the Irish health system explained that they need supportive interactions with the health professionals according to their differing levels of education and information. There was also the financial cost of the foot complications, the geographical disparities in terms of access to services and supplies, their medical card being a lifeline, the responsibilities of the health care system, the wider social circumstances complicating and competing with the illness process, the importance of emotional support during treatment and the necessity for early education and information to consider.

Diabetic foot ulcers are a frequent complication of diabetes mellitus with subsequent disturbances in the daily life of the patients. The co-existence of depression and anxiety among diabetic foot patients is a common phenomenon and the role of each of them in perpetuating the other is highlighted in the literature. Our study aimed to determine the prevalence of anxiety and depression and to examine the associated risk factors among diabetic foot patients. Depression and anxiety are more common in DM patients with diabetic ulcer complications compared with DM patients without complications. This shows that they experience ineffective psychosocial adaptation(Ahmad, Abujbara, Jaddou, Younes, & Ajlouni, 2018). This is due to the effect of the duration of illness experienced or due to the treatment not healing DM and causing complications. The longer the healing that the diabetes mellitus disease takes and in addition to the duration of the treatment of the ulcer wounds, the more that it will further increase the cost of care, the disruption of the body image, impaired function, the role of the family and depression. The aim of this systematic review was to explore the experience of patients with diabetic foot ulcers(Delea et al., 2015).

MATERIALS AND METHODS

Strategy for searching studies

Articles published in English were searched for on Scopus (medical and nursing subject category), Google Scholar, Pubmed, ProQuest and Ebscohost. The relevant articles were searched for from December 20th 2019 to February 28th 2020. The article search used the keywords "diabetic foot ulcers, experience, stress, anxiety". When searching for the articles, "AND" was also used. The methods used in arranging this systematic review were (1) the identification of the variable in the literature, (2) the identification of the relevant literature based on the

topic and title, (3) obtaining the literature in a full-text form, and (4) the analysis of the results from the experience of the literature.

Study selection

A systematic review research design resulting from the latest articles over the last 10 years was used. This study used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) approach. All of the studies found related to the experience of patients with diabetic foot ulcers only. The search was focused on the titles, abstracts and keywords. The inclusion criteria in the study were 1) adult humans ≥ 30 years of age diagnosed with diabetic foot ulcers; 2) the duration of ulcers was for more than 3 years and 3) the study design was qualitative research. Studies were excluded if the studies involved diabetes mellitus with the retinopathy complication, which does not have enough strength to use to detect a significant relationship. The publications were limited to between 2009-2020 (Figure.1 Article Selection Process).

Ethical issues considered when preparing the manuscript of the systematic reviews were following 1) avoiding redundant or duplicated articles among the publications; 2) avoiding plagiarism; 3) the transparency of the screening of the articles, the process of analysis and the evaluation; 4) ensuring accuracy and 5) flagging suspected plagiarism or fraudulent research.

RESULTS

Strategy for Searching Studies

Diabetic ulcer complications can have an impact on the individual responses related to the disease process and healing. The response depends on the perception of the disease, the severity of the disease and the environmental and support factors. The response that often occurs is the existence of fear and anxiety due to the stress experienced by the

No	Title, Authors, & Time	Variable	Design	Instrument	Main Result
1	It is not [a] diabetic foot: it is my foot ((Meriç et al., 2019))	Diabetic foot ulcers, experience	Qualitative research	Patient interviews	Most of the patients were afraid of losing their feet and they had difficulty coping with the situation. The patients expected the health professionals to understand the difficulties they were experiencing. The need to better understand the needs and experiences of the patients.
2	The psychosocial responses and coping strategies of diabetes mellitus type 2 patients of the Ambon culture(Rayanti et al., 2016)	Psychosocial responses and coping strategies	Qualitative and descriptive using the case study approach	Observation and in-depth interviews.	The participants' psychosocial responses included resilience, optimism and social support from their family and close relatives, low self-esteem, and anxiety. To adapt to their condition, the male participants tended to use problem-focused coping while the female participants used emotion-focused coping. The factors that influenced the coping strategies were diabetes severity, the participant's individual characteristics and the environment (culture and social support). They believe in traditional medicine such as the Africa leaf, noni fruit, the kalabasa leaf and the Alifuru leaf, and that the aforementioned traditional cures are able to reduce their blood glucose.

3	Exploring the factors that contribute to the delay in seeking help with diabetes-related foot problems: a preliminary qualitative study using Interpretative Phenomenological Analysis(Chithambo & Forbes, 2015)	Factors that contribute to a delay in seeking help and diabetes-related foot problems	Qualitative: interpretative Phenomenological Analysis	In-depth interviews	The level of prior foot care information, awareness of the foot problem, the ability to perform footcare behaviors, ulcer presentation and risk perception, competing priorities, the use of self-management strategies for the foot problem, the presence of specific help-seeking triggers, comorbid conditions and concurrent illness and delayed secondary referral
4	Management of diabetic foot disease and amputation in the Irish health system: a qualitative study of patients' attitudes and experiences with health services(Delea et al., 2015)	Management, diabetic foot disease, amputation/	Qualitative	In-depth interviews	Need for supportive interaction with health professionals, different levels of education and information, financial cost of foot complications, geographical disparities in terms of access to services and supplies, medical card as a lifeline, 5 responsibilities of the health care system, wider social circumstances complicating and competing with the illness process, the importance of emotional support during treatment and the necessity of early education and information
5	Premorbid risk perception, lifestyle, adherence and coping strategies of people with diabetes mellitus: A phenomenological study in the Brong Ahafo Region of Ghana ((Tabong et al., 2018))	Premorbid risk perception, lifestyle, and the coping strategies of people with diabetes mellitus: A phenomenological study	Qualitative	In-depth interviews and NVivo 11	The respondents believed that diabetes was a condition for the aged and rich. This served as a premorbid risk attenuator. The majority of them engaged in diabetes-related high risk behaviors such as a lack of exercise, a sedentary lifestyle and unhealthy eating despite their foreknowledge about the role of lifestyle in diabetes pathogenesis. We also found that the patients used moringa, noni, prekese and garlic concurrently with orthodox medications
6	Conditions for success in introducing telemedicine in diabetes foot care: a qualitative inquiry(Kolltveit et al., 2017)	Conditions, telemedicine, diabetes foot care	Qualitative	In-depth interviews	User-friendly technology and training, a telemedicine champion, committed and responsible leaders, effective communication channels at the organizational level

7	Patients' Experience of therapeutic footwear whilst living at risk of neuropathic diabetic foot ulceration: an interpretative phenomenological analysis (IPA) (Paton et al., 2014)	Patients' Experience, therapeutic footwear, neuropathic diabetic foot ulceration	Qualitative: an interpretative phenomenological analysis (IPA)	In-depth interviews	The self-perception dilemma, adherence response, reflective adaption, reality appraisal
8	Does Physiological Stress Slowdown Wound Healing in Patients With Diabetes?(Razjouyan et al., 2017)	Physiological Stress, Wound Healing, Diabetes	Qualitative	In-depth interviews	This study confirms an association between stress/vagal tone and wound healing in patients with DFUs. In particular, it highlights the importance of vagal tone (relaxation) when expediting wound healing. It also demonstrates the feasibility of assessing physiological stress responses using wearable technology in an outpatient clinic during routine clinic visits.
9	Burden of Illness of Diabetic Peripheral Neuropathic Pain: A Qualitative Study(Brod, Pohlman, Blum, Ramasamy, & Carson, 2015)	Burden of Illness, Diabetic Peripheral Neuropathic Pain	Qualitative	In-depth interviews, observation	Physical functioning, daily life, social/psychological
10	The experiences of people with diabetes-related lower limb amputation at the Komfo Anokye Teaching Hospital (KATH) in Ghana(Amoah et al., 2018)	Experiences, diabetes, lower limb amputation, Hospital	Qualitative	In-depth interviews	Physical experiences, changes in lifestyle, coping strategies, psychological/emotional experiences, economic experiences
11	Patients' perception of using telehealth for type 2 diabetes management: a phenomenological study(Lee, Greenfield, & Pappas, 2018)	Patients' perception, telehealth, type 2 diabetes, management	Qualitative	In-depth interviews	Technology considerations, service perceptions, empowerment
12	Coping style and depression influence the healing of diabetic foot ulcers(Vedhara et al., 2010)	Coping style, depression influence, healing, diabetic foot ulcers	Observational and mechanistic evidence	In-depth interviews	For this prospective observational study, we recruited 93 (68 men; mean age 60 years) patients with neuropathic or neuroischaemic diabetic foot ulcers from specialist podiatry clinics in secondary care. The clinical and demographic determinants of healing, psychological distress, coping, salivary cortisol, MMP2 and MMP9 were assessed at baseline.

				The ulcers were assessed at baseline and at 6, 12 and 24 weeks post-baseline. The primary outcome was ulcer status at 24 weeks, i.e. healed vs not healed. Results: After controlling for the clinical and demographic determinants of healing, ulcer healing at 24 weeks was predicted by confrontation coping but not by depression or anxiety. The patients with unhealed ulcers exhibited greater confrontational coping.
13	Patients' experiences of support for learning to live with diabetes to promote health and well-being: A lifeworld phenomenological study(Johansson, ÖSterberg, Leksell, & Berglund, 2016)	Patients' experiences, support for learning, diabetes, promotion, health, well-being	Qualitative	In-depth interviews	Responsibility creating curiosity and willpower, openness enabling support, technology verifying their bodily feelings, a permissive climate providing for participation and exchanging experiences with others
14	When a diabetic foot ulcer results in amputation: A qualitative study of the lived experience of 15 patients(Foster & Lauver, 2014)				Financial burden, powerlessness, social support, placing blame, and uncertainty.
15	An exploratory phenomenological study exploring the experiences of people with systemic disease who have undergone lower limb amputation and its impact on their psychological well-being(Washington & Williams, 2016)		Qualitative: an explanatory model	In-depth interviews	Being pre-conditioned, adapting to a restricted life, ability to adapt, need for support versus independence and relationships with others

adaptation when meeting challenges. Autonomic responses involved in the modulation of physiological stress include the activation of the sympathetic and parasympathetic nervous system which work together to keep the body in a state of homeostasis(De Almeida et al., 2014). During tense events, the sympathetic nervous system dominates, producing fight-or-flight responses. However, the body cannot maintain this state for a long time. The parasympathetic system returns the physiological condition of the body to a rested and normal state. Although sympathetic physiological responses are very important to protect the body and adapt to stressors, prolonged exposure to stress, which is referred to as episodic acute stress, can have adverse effects on psychological and physiological health and

it can also affect the wound healing process(Razjouyan et al., 2017).
Wound healing is a complex and fragile process. Stress can interfere or lead to the formation of chronic wounds that do not heal in DFU patients. Stress interferes with the healing process of wounds, mainly by mediating the hypothalamic-pituitary-adrenal and sympathetic-adrenal medullary axis and psychological responses, encouraging unhealthy behaviors such as a sedentary lifestyle, smoking and so on. Several studies have confirmed the relationship between delayed wound healing and stress by measuring the physiological stress conditions(Razjouyan et al., 2017).
The participants' psychosocial responses included resilience, optimism and social support from their

family and close relatives, low self-esteem and anxiety. To adapt to their condition, the male participants tended to use problem-focused coping while the female participants used emotion-focused coping. The factors that influenced coping strategies the most was the diabetes severity, the participant's individual characteristics and the environment (cultural and social support). They believe in traditional medicine such as the Africa leaf, noni fruit, kalabasa leaf and Alifuru leaf and that the aforementioned traditional cures are able to reduce their blood glucose(Rayanti, Wariunsora, Soegijono, Kristen, & Wacana, 2016). From this study, it is illustrated that the individual response when experiencing diabetic foot ulcers are also influenced by gender, culture and their beliefs.

Patient Perception

Diabetes mellitus patients vary in their perception of their quality of life and in the coping styles used when dealing with daily stress. Coping in DM patients is a continuous process and it is a major factor influencing a patient's assessment of the disease, the ability to perform adaptive tasks and the ability to learn and use skills to overcome the problems of the disease. Cognitive evaluation or an evaluation of the meaning / significance of chronic illness is important and it is an influential part of the patient's adjustment to the disease(Vedhara et al., 2010).

The self-perception dilemma is about resolving the balance of risk experienced by people with diabetes and neuropathy day to day, such as between choosing to wear footwear to look and feel normal and choosing footwear to protect their feet from foot ulceration(Paton, Roberts, Bruce, & Marsden, 2014). Reflective adaptive refers to the modification and individualization of a set of values about footwear usage created in the minds of people with diabetes and neuropathy. Adherence response; this refers to the realignment of footwear choice with personal values to reinforce the decision not to change behavior or to bring about increased footwear adherence with or without appearance management. Reality appraisal refers to a here and now appraisal of the personal benefits of footwear choice on their emotional and physical well-being with additional considerations related to the preservation of therapeutic footwear. The conclusion is that for some people living at risk of diabetic neuropathic foot ulceration, the decision whether or not to wear therapeutic footwear is driven by the individual 'here and now' risks and benefits, of footwear choice on their emotional and physical well-being in a given social context(Paton et al., 2014).

From the 15 studies as the evidence base, the majority of the research designs were qualitative with 14 of them using a phenomenological approach. This explains the description of the coping mechanisms, anxiety and the psychological responses of the diabetic ulcer patients. From the results of the several studies analyzed, the majority of the patients who have DM with the complication of diabetic ulcers experience stress, depression, and anxiety. However, one of the 15 studies on coping styles and depression affecting the healing of

diabetic ulcers stated that the healing of diabetic ulcers is determined by the coping mechanisms involved and not because of anxiety and depression. This proves that the individual coping mechanism also determines the compliance process concerning the treatment of diabetic ulcers.

DISCUSSION

Most of the patients were afraid of losing their feet and they had difficulty in coping with the situation. The patients expected the health professionals to understand the difficulties that they were experiencing. They should better understand the needs and experiences of the patients they are treating. The review of the literature shows that the literature itself has mostly focused on medical issues such as the causes and management of DFUs rather than the patient experience of having a DFU. However, as having a DFU directly affects a patient's QoL and their psychosocial condition, treatment should be tailored to the patient, based on their level of acceptance of the disease and adherence to the treatment.

A research study conducted by Tabong *et al.*in2018 explained that the respondents believed that diabetes was a condition for the aged and rich. This served as a premorbid risk attenuator. The majority of them engaged in diabetes-related high risk behaviors such as a lack of exercise, a sedentary lifestyle and unhealthy eating despite their foreknowledge about the role of lifestyle in diabetes pathogenesis. We also found that the patients used moringa, noni, prekese, and garlic concurrently with orthodox medications. Diabetic patients had a low premorbid perception of the risk and they engaged in diabetes-related risky behaviors. Diabetic patients face challenges adhering to lifestyle changes and they use both biomedical and local remedies in the management of their condition. Psychosocial support is necessary to enhance their level of coping with this condition.

Another research conducted by Paton *et al.* in2014 spoke about the patients' experience of therapeutic footwear whilst living at risk of neuropathic diabetic foot ulceration. They explained that there are several perceptions such as the self-perception dilemma, adherence response, reflective adaption and reality appraisal (Paton et al., 2014). Besides that, another study conducted by Chithambo in 2015 about exploring the factors that contribute to a delay in seeking help with diabetes-related foot problems said that the level of prior foot care information, the ability to perform foot care behaviors, ulcer presentation and risk perception competing for priority, the use of self-management strategies for the foot problem, the presence of specific help-seeking triggering comorbid conditions and concurrent illness and delayed secondary referrals all played a part(Chithambo & Forbes, 2015).

Limitation of the Study

This study is subject to some limitations. Because the systematic review process integrates the interpretations of the findings of different researchers, it relies heavily on the quality of the researchers' interpretations. Thus the limitations of the systematic review are affected by the characteristics of the original studies. Similarly, common speech is used to describe the experience connected to the diabetic foot ulcers. Without a standard language to articulate the experience of diabetic foot ulcers, the contrasts between the similar experiences in and throughout the study lack accuracy.

CONCLUSION

From the results of the studies analyzed, the majority of patients who have DM with the complication of diabetic ulcers experience stress, depression and anxiety. They need support from their family and social support. They also have a financial burden and feel helplessness, blame, and uncertainty in their life However, one of the 15 studies on coping styles and depression affecting the healing of diabetic ulcers stated that the healing of diabetic ulcers is determined by coping confrontation or coping mechanisms, not anxiety and/or depression. This proves that the individual coping mechanism also determines the compliance process regarding the treatment of diabetic ulcers. The patients with diabetic foot ulcers must be able to adapt to a limited life. They must also have a good coping style and adaptive response to survive and heal their diabetic ulcers.

By knowing some of the experiences of patients with diabetic foot ulcers, it is expected that all health workers and nurses should provide comprehensive nursing care not only from the biological aspect but also from the physiological, social, cultural and spiritual aspects as well. Providing comprehensive services to the patients with diabetic foot ulcers not only can improve their quality of life, but it can also improve their coping style and adaptive response. Future researchers are expected to make this systematic review study a reference when examining the prevention of depression and anxiety in DM patients with complications.

CONFLICT OF INTEREST

No Conflicts of interest have been declared.

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REFERENCES

Ahmad, A., Abujbara, M., Jaddou, H., Younes, N. A., & Ajlouni, K. (2018). Anxiety and Depression Among Adult Patients With Diabetic Foot: Prevalence and Associated Factors. *Journal of Clinical Medicine Research*, *10*(5), 411–418. https://doi.org/10.14740/jocmr3352w

Amoah, V. M. K., Anokye, R., Acheampong, E., Dadson, H. R., Osei, M., & Nadutey, A. (2018). The experiences of people with diabetes-related lower limb amputation at the Komfo Anokye Teaching Hospital (KATH) in Ghana. *BMC Research Notes*, *11*(1), 1–5. https://doi.org/10.1186/s13104-018-3176-1

Brod, M., Pohlman, B., Blum, S. I., Ramasamy, A., & Carson, R. (2015). Burden of Illness of Diabetic Peripheral Neuropathic Pain: A Qualitative Study. *Patient*, *8*(4), 339–348. https://doi.org/10.1007/s40271-014-0093-9

Chithambo, T., & Forbes, A. (2015). Exploring factors that contribute to delay in seeking help with diabetes related foot problems: a preliminary qualitative study using Interpretative Phenomenological Analysis. *International Diabetes Nursing*, *12*(1), 20–26. https://doi.org/10.1179/2057331615Z.000000 0006

De Almeida, S. A., Salomé, G. M., Dutra, R. A. A., & Ferreira, L. M. (2014). Feelings of powerlessness in individuals with either venous or diabetic foot ulcers. *Journal of Tissue Viability*, *23*(3), 109–114. https://doi.org/10.1016/j.jtv.2014.04.005

Delea, S., Buckley, C., Hanrahan, A., McGreal, G., Desmond, D., & McHugh, S. (2015). Management of diabetic foot disease and amputation in the Irish health system: A qualitative study of patients' attitudes and experiences with health services. *BMC Health Services Research*, *15*(1), 1–10. https://doi.org/10.1186/s12913-015-0926-9

Foster, D., & Lauver, L. S. (2014). When a diabetic foot ulcer results in amputation: A qualitative study of the lived experience of 15 patients. *Ostomy Wound Management*, *60*(11), 16–22.

Johansson, K., ÖSterberg, S. A., Leksell, J., & Berglund, M. (2016). Patients' experiences of support for learning to live with diabetes to promote health and well-being: A lifeworld phenomenological study. *International Journal of Qualitative Studies on Health and Well-Being*, *11*(June 2017). https://doi.org/10.3402/qhw.v11.31330

Kolltveit, B. C. H., Gjengedal, E., Graue, M., Iversen, M. M., Thorne, S., & Kirkevold, M. (2017). Conditions for success in introducing telemedicine in diabetes foot care: A qualitative inquiry. *BMC Nursing*, *16*(1), 1–10. https://doi.org/10.1186/s12912-017-0201-y

Lee, P. A., Greenfield, G., & Pappas, Y. (2018). Patients' perception of using telehealth for type 2 diabetes management: A phenomenological study. *BMC Health Services Research*, *18*(1), 1–9. https://doi.org/10.1186/s12913-018-3353-x

Meriç, M., Ergün, G., Meriç, C., Demirci, İ., & Azal, Ö. (2019). It is not diabetic foot: it is my foot. *Journal*

of Wound Care, *28*(1), 30–37. https://doi.org/10.12968/jowc.2019.28.1.30

Paton, J. S., Roberts, A., Bruce, G. K., & Marsden, J. (2014). Patients' Experience of therapeutic footwear whilst living at risk of neuropathic diabetic foot ulceration: An interpretative phenomenological analysis (IPA). *Journal of Foot and Ankle Research*, *7*(1), 1–9. https://doi.org/10.1186/1757-1146-7-16

Rayanti, R. E., Wariunsora, N. S., Soegijono, S. P., Kristen, U., & Wacana, S. (2016). *The psychosocial responses and coping strategies of diabetes mellitus type 2 patients of the Ambon culture dengan budaya Ambon*. 389–399.

Razjouyan, J., Grewal, G. S., Talal, T. K., Armstrong, D. G., Mills, J. L., & Najafi, B. (2017). Does Physiological Stress Slow Down Wound Healing in Patients with Diabetes? *Journal of Diabetes Science and Technology*, *11*(4), 685–692. https://doi.org/10.1177/1932296817705397

Siersma, V., Thorsen, H., Holstein, P. E., Kars, M., Apelqvist, J., Jude, E. B., … Schaper, N. C. (2017). Diabetic complications do not hamper improvement of health-related quality of life over the course of treatment of diabetic foot ulcers – the Eurodiale study. *Journal of Diabetes and Its Complications*, *31*(7), 1145–1151. https://doi.org/10.1016/j.jdiacomp.2017.04.008

Tabong, P. T. N., Bawontuo, V., Dumah, D. N., Kyilleh, J. M., & Yempabe, T. (2018). Premorbid risk perception, lifestyle, adherence and coping strategies of people with diabetes mellitus: A phenomenological study in the Brong Ahafo Region of Ghana. *PLoS ONE*, *13*(6), 1–19. https://doi.org/10.1371/journal.pone.0198915

Vedhara, K., Miles, J. N. V., Wetherell, M. A., Dawe, K., Searle, A., Tallon, D., … Campbell, R. (2010). Coping style and depression influence the healing of diabetic foot ulcers: Observational and mechanistic evidence. *Diabetologia*, *53*(8), 1590–1598. https://doi.org/10.1007/s00125-010-1743-7

Washington, E. D., & Williams, A. E. (2016). An exploratory phenomenological study exploring the experiences of people with systemic disease who have undergone lower limb amputation and its impact on their psychological well-being. *Prosthetics and Orthotics International*, *40*(1), 44–50. https://doi.org/10.1177/0309364614556838

Jurnal Ners

Systematic Review

A Systematic Review of Foot Exercises with Group Support to Improve the Foot Health of Diabetes Mellitus Patients

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ABSTRACT

Introduction: Foot problems are a process and complication in patients with diabetes mellitus (DM). Foot complications can be prevented by routine foot exercises. Group support is needed to increase the routine of foot exercise. The effects of foot exercise can be seen by measuring the Ankle Brachial Pressure Index and foot sensation. The objective of this systematic review was to identify the prevention of DM foot complications in an easy way so then he patient can do it independently.

Methods: The method used in this study was a systematic review focused on 2015 – 2019 using the PRISMA method. The literature was obtained from Scopus, Science Direct and Proquest. The results found 25 items of literature on foot exercise which was reduced to 4 studies on preventing damage to the feet of DM patients through routine foot exercise. The literature of this study is supported by 3 other studies that state that foot health can also be used to examine the foot's blood circulation status and sensation.

Results: These results have been presented concerning 7 studies regarding special group support in the form of exercise therapy for patients with DM. This study explains the prevention of foot complications through foot exercise. Group support is needed provide motivation to conduct routine foot exercise.

Conclusion: Foot exercise can accelerate the blood circulation as can be seen by the Ankle Brachial Pressure Index score and the increase in the neurological system of the foot through foot sensation status.

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INTRODUCTION

A group of problems that is often found in patients with diabetes mellitus (DM) is foot problems. This problem is a form of microvascular complication.(Shaw & Cummings, 2012) The foot status points to consider include circulatory status and neurological status.(Ji, Bai, Sun, Ming, & Chen, 2015) Upon observing the world data, the number of DM patients in the world totals 123 million people and it is estimated that the number will increase by 40% in 2045. DM patients recorded with foot complications make up 60% and 20% of them also experience complications in the form of foot infections.(IDF, 2017) In Indonesia, DM patients have increased by a percentage of 2.4%, while in 2011, it was 8.5%. In 2015, it was 10.9%.(Riskesdas, 2018)

The basis of the management of DM therapy is divided into 2, namely pharmacological and nonpharmacological therapy. In this discussion, the patient can be directed to the therapies that can be done independently at home. Exercise therapy is an option. The exercise therapy that can have a direct impact on foot problems as it in the form of foot exercise.(Sheehan & Ulchaker, 2011; Taddei et al., 2018) Foot exercises are a series of movements that are arranged systematically that can provide support to improve the diabetic's foot problems.(Taddei et al., 2018) The benefits of routine foot exercise include improving blood circulation, increasing muscle

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┌─────────────────────────────────────────────────────────────────────┐
│        Search the literature for journals from Science Direct,         │
│                      Proquest and Scopus.                              │
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                                 │
                                 ▼
┌─────────────────────────────────────────────────────────────────────┐
│  Keywords used to obtain the journals include foot exercise, diabetes  │
│   foot complications, diabetes foot prevention, health education       │
│         delivery techniques, and group support therapy.               │
└─────────────────────────────────────────────────────────────────────┘
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┌─────────────────────────────────────────────────────────────────────┐
│  Selecting the journal articles using the title, abstract, study       │
│  design and inclusion and exclusion criteria                          │
│  Inclusion criteria:                                                   │
│  1.  Journal of actual research results                               │
│  2.  Journal published in the last 5 years (2015-2019)                │
│  3.  The population or study sample consists of DM patients            │
│  4.  The interventions described in the journal are preventive         │
│      therapies to treat diabetic foot complications.                   │
│  Exclusion criteria:                                                   │
│  1.  Journal in the form of a systematic review or article review      │
│  2.  Interventions using tools and health workers                      │
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│  The journals obtained and collected were then extracted from          │
│  including: the type of research carried out, the intervention, the    │
│  duration of the intervention, the description of the intervention,    │
│  the doses of the intervention, and explained about the groups in      │
│  the study. The journals taken had to meet the inclusion criteria      │
│  by at least 50%.                                                      │
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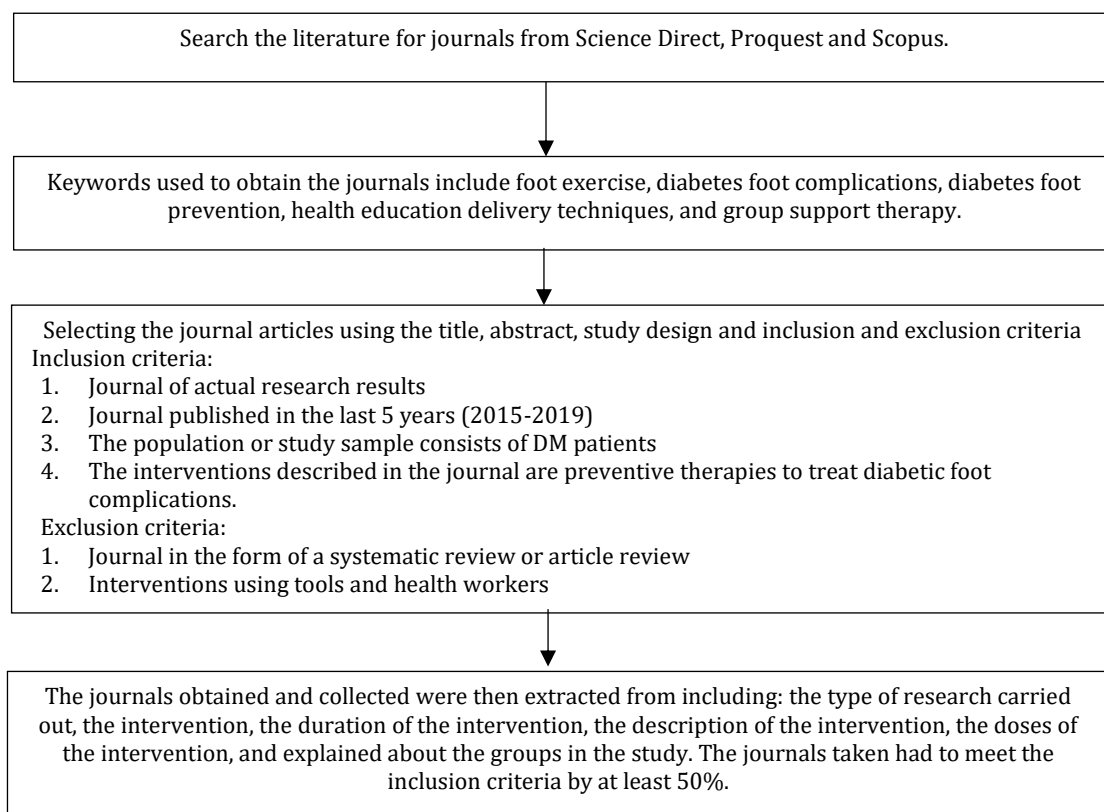
Diagram 1. Method of the systematic review

strength, improving neurological status, and preventing diabetic foot complications.(Ji et al., 2015) These benefits can be seen by measuring the Ankle Brachial Index to determine the status of the blood circulation, while the neurological status can be seen by assessing the foot sensation.(Shaw & Cummings, 2012; Watkins, 2016)

The techniques used for providing foot exercise education also need attention. Recommendations from a variety of literature are used to mobilize support from the fellow sufferers of DM. This technique is called group support. Group support has been proven to increase understanding and participation when carrying out several activities including foot exercises.(Due-christensen, Hommel, & Ridderstråle, 2016; Shomaker et al., 2017) Therefore in this article, the review discusses foot exercises and group support based on the results of the previous studies. The objective of the systematic review was to identify techniques used to prevent DM foot complications in an easy manner in a way that the patient can do independently.

MATERIALS AND METHODS

Making this article review used the PRISMA method.

Strategy for searching studies

The data was obtained using electronic media to access international journals. The data search was conducted from August 2019 to February 2020. The journal databases used in this article review were Scopus, Science Direct and Proquest. Keywords used to obtain the journals included foot exercise, diabetes foot complications, diabetes foot prevention, health education delivery techniques, and group support therapy.

Study selection

When selecting the journal articles, the title and abstracts of the articles found were used. The design of the article used referred to the actual research if it was not in the form of a systematic review or article review. The PRISMA method recommends using inclusion and exclusion criteria. The inclusion criteria compiled included the following. 1. A journal with actual research results. 2. A journal published in the last 5 years (2015-2019). 3. The population or study sample consists of DM patients. 4. The interventions described in the journal are preventive therapies for diabetic foot complications. The exclusion criteria included 1. journals in the form of a systematic review or article review and 2. interventions using either tools and/or health workers.

Data Extraction and Appropriate Quality

Assessment Data extraction was done by discussing the compilers of the article. The journals were obtained and collected and then their information was then extracted including the type of research carried out, the intervention, the duration of the intervention, the description of the intervention, the doses of the intervention, and explaining about the involved groups in the study. A proper quality assessment of the articles or journals was done by giving a score based on the inclusion criteria that had

Table 1. Journal Search Results on The Topic Foot Exercise and Group Support for Diabetes Mellitus Patients

Title, Author and Year of the Journal	Types of Research	Explanation of the Research Results
(Ji et al., 2015)	Eksperimental	Foot exercise combined with music can significantly (p> 0.05) improve the adherence to foot exercise behavior. This increase can improve blood circulation in the body.
(Taddei et al., 2018)	Randomized Control Trial	The results obtained from the evaluation after 8 weeks of a foot exercise intervention include the incidence of foot injury lessened by 28% and the functions of the feet increased by 97%. Biomedical details also showed an improvement.
(Henni et al., 2018)	Restrospective Analysis	Walking exercises done by DM patients can improve the value of their Ankle Brachial Index (ABI) score by an average of >0.9 and it can also reduce the risk of PAD (peripheral arterial disease).
(Alqahtani et al., 2018)	Cross-sectional Study	Exercise can increase the value of ABI according to the results of the analysis (p = 0.04).
(Takahara, Fujiwara, Katakami, & Sakamoto, 2014)	Restrospective Analysis	The risk factors that can affect the reduction in ABI and TBI include age, the duration of DM and BMI as proven by the results of significance being p <0.05.
(Shomaker et al., 2017)	Randomized Control Trial	Interventions given in the form of group therapy can increase attendance, reduce depression and stress, and stabilize blood sugar.
(Due-christensen et al., 2016)	Pilot Study	Group interventions can significantly improve HbA1c (p = 0.0001), and fellow DM patients can exchange their experiences.
(Dadgostar, Firouzinezhad, Ansari, & Younespour, 2016)	Randomized Clinical Trial	Exercise interventions in groups carried out for 6 weeks can reduce body fat, improve the physical health of DM patients, and for 12 weeks, it can significantly reduce HbA1c (p <0.05).
(Vangeepuram, Carmona, Arniella, Horowitz, & Burnet, 2015)	Pilot Study	Focus group discussions can increase the patient's understanding when providing education, especially concerning the prevention of diabetes and other health problems.
(Hasneli & Amir, 2019)	QuasyEksperimental	The giving of an Apiyu massage intervention can improve the sensitivity of both the right and left legs (p = 0.011). It can also significantly reduce the blood sugar level (p = 0.001).
(Alonso-domínguez, Recio-rodríguez, & Patino-alonso, 2019)	Randomized Control Trial	Exercise interventions in DM patients can reduce stiffness in the foot (p> 0.05) according to multiple parameters (CAVI / Cardio ankle vascular index and lower extremity pulse pressure). Men get more influence than women.
(Mohammad Ali Morowatisharifabad, Abdolkarimi, Asadpour, & Fathollahi, 2019)	Deskriptive Study	Group support can increase the DM patient's compliance with exercise and physical activity by 1.17 times.
(Juul, Rowlands, & Maindal, 2018)	Cross-sectional Study	Social motivation can be an important form of support when dieting, and in physical activity adherence, especially for DM patients.
(Mouslech et al., 2018)	QuasyEksperimental	Group-based education programs can significantly influence the reduction of HbA1c, decreasing the incidence rate of hyperglycemia, increasing adherence, and changing habits for the better.
(Rebecca et al., 2018)	QuasyEksperimental	The provision of diabetes mellitus care services significantly increases awareness in relation to the care and exercise connected to physical activity.

been prepared. If it met the criteria then it was given a value of one (1). If it did not meet the criteria then it was given a value of zero (0).

RESULTS

The results obtained from the search for research journals in Scopus, Science Direct and Proquest using the keywords 'foot exercises, diabetic foot complications, diabetes foot prevention, health education delivery techniques, and group support therapy' resulted in hundreds of journals. This was narrowed down by adding the criteria of being published in the last 5 years (2015-2019). After

being selected, there were only 15 journals. An explanation of each journal is displayed in Table 1.

DISCUSSION

Prevention of Diabetes Mellitus Complication

The complications of diabetes mellitus are divided into 2 major groups, namely acute complications and chronic complications.(Shaw & Cummings, 2012) Chronic complications occur over a long period of time (> 6 months) and they are not treated appropriately. Chronic complications come in 2 types, microvascular and macrovascular. Microvascular

complications are the cause of new disorders such as neuropathy, retinopathy, nephropathy and diabetic foot ulcers. Diabetic foot ulcers are often found and are clearly visible where the DM patients have disturbances on their foot. Although not always shaped like wounds, these patients are at a high risk of suffering from injuries to the feet. An injury to the feet of DM patients, if not treated properly, can lead to amputation being performed.(Scobie & Samaras, 2014; Shaw & Cummings, 2012) An explanation of the complications of DM is necessary to better undertake effective measures to prevent these complications. A limitation of the found literature was that no-one discussed the complications of diabetes. Rather, they combine the various complications that can arise.

From the journals obtained and examined according to the theme, the articles previously used were screened according to the inclusion and exclusion criteria. Psychological therapy such as Cancer and Living Meaningfully (CALM) intervention can decrease depression, anxiety, and death-related distress, which can improve the quality of life.

Foot Exercise

Handling DM can be done through physical exercise. Physical exercise can balance food intake and body energy production. Glucose buildup in the body, which is related to the blood circulation, can worsen the condition of DM patients. Therefore it is necessary to schedule regular exercise for DM patients. An easy and lightweight exercise for DM patients is foot exercise. Foot exercise refers to a series of movements arranged systematically focused on the foot for DM patients.(Taddei et al., 2018) Foot exercises can be done routinely 3-4 times a week for 30 minutes.(Perkeni, 2012) Foot exercises have benefits that include increasing the blood circulation, increasing the leg muscle strength, improving foot sensitivity, and preventing complications from diabetic foot ulcers.(Ji et al., 2015) The research that has been done on DM foot exercises explains that foot exercises are an alternative to prevent complications, especially diabetic foot ulcers. Increased blood circulation is assessed by measuring the ankle brachial index parameters and the improved foot sensitivity by assessed by measuring the level of foot sensation or foot response.(Ji et al., 2015; Taddei et al., 2018) The limitation of the literature was that many discussed diabetes exercises instead of foot exercises specifically.

Group Exercise

Group support can be interpreted as information given either verbally or nonverbally from the closest person to the patient.(Rockville, 2015) Group support can also provide motivation shared among people with the same conditions.(Dadgostar et al., 2016) Support comes in 4 forms: emotional, appreciation, instrumental and informative.(Corcoran & Roberts, 2015) Optimal support can be provided by fulfilling all 4 forms of support. However, only 1 form of support can be given and it can still be interpreted as providing support.(Rockville, 2015) Health interventions with the group support method, especially among DM patients, have been shown to have a positive impact. The most dominant positive impact is improving the adherence to therapy, especially concerning foot exercises. It also can reduce anxiety and control their blood glucose levels. (Dadgostar et al., 2016; Due-christensen et al., 2016; M. A Morowatisharifabad, Abdolkarimi, Asadpour, Fathollahi, & Balaee, 2019; Shomaker et al., 2017) The limitation is that the found literature did not explained the form of group support in detail.

CONCLUSION

Diabetes mellitus is a condition that is a chronic disorder in the body of the sufferer. DM has the potential for complications. A complication that is often seen is foot problems. Foot complications can be prevented by doing proper and easy foot exercises. Foot exercises can have an optimal affect if done routinely 3-4 times a week. The foot exercise needs to be understood correctly by the DM patients. To improve patient understanding, the method of delivering the material must be appropriate. The method that has proven to be effective in terms of increasing understanding is group support or a group approach to therapy. Group interventions can be carried out with the closest people to the patient and fellow DM patients to allow them to share their experiences and information. From the above description, DM patients need to do foot exercises regularly and they need to be given an understanding of the exercise by applying the group intervention / group support method. Group support can be increase their adherence to therapy especially foot exercise.

CONFLICT OF INTEREST

No Conflicts of interest have been declared.

REFERENCES

Alonso-domínguez, R., Recio-rodríguez, J. I., & Patino-alonso, M. C. (2019). *Acute effect of healthy walking on arterial stiffness in patients with type 2*

diabetes and differences by age and sex : a pre-post intervention study. 1–9.

Alqahtani, K. M., Bhangoo, M., Vaida, F., Denenberg, J. O., Allison, M. A., & Criqui, M. H. (2018). Predictors of Change in the Ankle Brachial Index with Exercise. European Journal of Vascular & Endovascular Surgery, 55(3), 399–404. https://doi.org/10.1016/j.ejvs.2017.12.004

Corcoran, K., & Roberts, A. R. (2015). Social Workers' Desk Referenceq (3rd ed.). Oxford University Press.

Dadgostar, H., Firouzinezhad, S., Ansari, M., & Younespour, S. (2016). Supervised group-exercise therapy versus home-based exercise therapy : Their effects on Quality of Life and cardiovascular risk factors in women with type 2 diabetes. Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 1–7. https://doi.org/10.1016/j.dsx.2016.01.016

Due-christensen, M., Hommel, E., & Ridderstråle, M. (2016). Potential positive impact of group-based diabetes dialogue meetings on diabetes distress and glucose control in people with type 1 diabetes. Patient Education and Counseling, 6–11. https://doi.org/10.1016/j.pec.2016.07.023

Hasneli, Y., & Amir, Y. (2019). Identification and analysis of foot sensitivity and blood glucose levels post Apiyu massage ✿. Enfermería Clínica, (xx), 9–12. https://doi.org/10.1016/j.enfcli.2018.11.009

Henni, S., Ammi, M., Gourdier, A., Signolet, I., Colas-ribas, C., Picquet, J., & Abraham, P. (2018). Ankle Brachial Index is Equally Predictive of Exercise-induced Limb Ischemia in Diabetec and Non-diabetic Patients with Walking Limitation. #pagerange#. https://doi.org/10.1016/j.jdiacomp.2018.03.011

IDF. (2017). Diabetes Atlas. South-East Asia: International Diabetes Federation.

Ji, L., Bai, J. J., Sun, J., Ming, Y., & Chen, L. R. (2015). Effect of combining music media therapy with lower extremity exercise on elderly patients with diabetes mellitus. International Journal of Nursing Sciences, 2(3), 243–247. https://doi.org/10.1016/j.ijnss.2015.07.008

Juul, L., Rowlands, G., & Maindal, H. T. (2018). Relationships between health literacy, motivation and diet and physical activity in people with type 2 diabetes participating in peer-led support groups. Primary Care Diabetes, 12(4), 331–337. https://doi.org/10.1016/j.pcd.2018.02.005

Morowatisharifabad, M. A, Abdolkarimi, M., Asadpour, M., Fathollahi, M. S., & Balaee, P. (2019). Study On Social Support for Exercise and Its Impact on The Level of Physical Activity of Patients with Type 2 Diabetes. Journal of Medical Sciences, 1(7), 143–147.

Morowatisharifabad, Mohammad Ali, Abdolkarimi, M., Asadpour, M., & Fathollahi, M. S. (2019). Study On Social Support for Exercise And Its Impact on the Level of Physical Activity of Patients with Type 2 Diabetes. 7(1), 143–147.

Mouslech, Z., Somali, M., Sarantis, L., Christos, D., Alexandra, C., Maria, P., … Hatzitolios, A. I. (2018). Significant effect of group education in patients with diabetes type 1.

Perkeni. (2012). Konsensus Pengelolaan dan Pencegahan Diabetes Melitus Tipe 2 di Indonesia. Jakarta: PERKENI.

Rebecca, A., Dyck, A., Kleinman, N. J., Funk, D. R., Yeung, R. O., Senior, P., & Yardley, J. E. (2018). We Can Work (It) Out Together: Boot Camp for Type 1 Diabetes Patients and Providers Improves Exercise Self-Efficacy. Canadian Journal of Diabetes. https://doi.org/10.1016/j.jcjd.2018.02.006

Riskesdas. (2018). Riset Kesehatan Dasar RISKESDAS 2018. Jakarta: Balitbang Kemenkes RI.

Rockville. (2015). Substance abuse treatment: Group therapy. Substance Abuse and Mental Health Services Administration.

Scobie, I. N., & Samaras, K. (2014). Fast Facts: Diabetes Mellitus (5th ed.). Health Press Limited.

Shaw, K. M., & Cummings, M. H. (2012). Diabetes Chronic Complications. John Wiley & Sons, Incorporated.

Sheehan, J. P., & Ulchaker, M. M. (2011). Obesity and Type 2 Diabetes Mellitus : Obesity and Type 2 Diabetes Mellitus. Oxford University Press USA - OSO.

Shomaker, A. L. B., Bruggink, S., Pivarunas, B., Skoranski, A., Foss, J., Dalager, S., … Bell, C. (2017). Pilot randomized controlled trial of a mindfulness-based group intervention in adolescent girls at risk for type 2 diabetes with depressive symptoms. Complementary Therapies in Medicine. https://doi.org/10.1016/j.ctim.2017.04.003

Taddei, U. T., Matias, A. B., Ribeiro, F. I. A., Inoue, R. S., Bus, S. A., & Sacco, I. C. N. (2018). Effects of a therapeutic foot exercise program on injury incidence, foot functionality and biomechanics in long-distance runners: Feasibility study for a randomized controlled trial. Physical Therapy in Sport. https://doi.org/10.1016/j.ptsp.2018.10.015

Takahara, M., Fujiwara, Y., Katakami, N., & Sakamoto, F. (2014). Shared and additional risk factors for decrease of toe-brachial index compared to ankle-brachial index in Japanese patients with diabetes mellitus. Atherosclerosis, 235(1), 76–80. https://doi.org/10.1016/j.atherosclerosis.2014.04.014

Vangeepuram, N., Carmona, J., Arniella, G., Horowitz, C. R., & Burnet, D. (2015). Use of Focus Groups to Inform a Youth Diabetes Prevention Model. Journal of Nutrition Education and Behavior, 47(6), 532-539.e1. https://doi.org/10.1016/j.jneb.2015.08.006

Watkins, L. (2016). *Watkins' Manual of Foot and Ankle Medicine and Surgery* (4th ed.). Wolters Kluwer Health.

Systematic Review

A Systematic Review of the Effect of Social Support on Post-Traumatic Stress Disorder in Post-Earthquake Adolescents

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ABSTRACT

Introduction: Earthquakes can cause mental health disorders in adolescents, one of which is post-traumatic stress disorder (PTSD). The present study aimed to assess the effect of social support on post-traumatic stress disorder in adolescents after an earthquake.

Methods: The study was a systematic review with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) approach. Articles were searched for using the Scopus, ScienceDirect, ProQuest, EBSCO and SAGE databases before classifying them into 3 categories: prevalence, risk factors, social support, and post-traumatic stress disorder. The inclusion criteria regarding the literature were documents that were original; where the source was from a journal; where the article was written in English and where the full text was available. The age of the subjects in the articles was determined to be in the range of 10-20 years old. The publication time limit was 2015 to 2020. We identified 264 articles, of which 14 were considered to be relevant for this systematic review.

Results: Adolescents who experienced an earthquake were found to demonstrate a high prevalence of post-traumatic stress disorder with the proportion in girls being higher than boys. Showing social support has a significant effect on PTSD after an earthquake. The earthquake-related factors that were the most strongly associated with probable PTSD were feeling scared of dying and exposure to an earthquake.

Conclusion: Social support and the prevalence rates of PTSD should be observed in more detail. These results indicate that it is important to provide and strengthen the social support available to reduce the risk and severity of post-traumatic stress disorder after an earthquake among adolescents.

INTRODUCTION

Earthquakes can have a tremendous impact on all aspects of the lives of disaster victims, both physical and psychological. Earthquakes are among the most destructive and frequent natural experience emergency problems. They cause physical damage due to the earthquake itself but also mental health problems such as anxiety, stress (pressure), depression (moodiness) and trauma. The combined incidence of PTSD after earthquakes was reported to be 23.66% in a recent meta-analysis (Dai et al., 2016), indicating that earthquakes cause tremendous

psychological stress for the survivors (Liang, Cheng, Ruzek, & Liu, 2019).

Research has consistently demonstrated that post-traumatic stress disorder (PTSD) may be one of the most prevalent disorders (psychopathological problems) following a natural disaster (Zhou, Wu, Zhen, Wang, & Tian, 2018). Post-Traumatic Stress Disorder (PTSD) is a common psychiatric problem that is a result of an event or events that are so painful or stressful that they pose an exceptional threat to someone's life.

The individual may develop a variety of symptoms, including re-experiencing the aspects of the traumatic event, feelings of helplessness, intense fear, frightening dreams, or avoidance of the source of trauma (Marthoenis, Ilyas, Sofyan, & Schouler-Ocak, 2019).For example, followed 203 adolescent survivors at 6 and 12 months after the earthquake and reported the PTSD prevalence rates of 21.2% and 19.2%, respectively (Fan, Long, Zhou, Zheng, & Liu, 2015).

Social support has been shown to have the potential to reduce stress, depression and enhance health, thus it is understood to be a protective factor for individuals experiencing trauma (Evans, Steel, & DiLillo, 2013). In particular, the beneficial effects of social support can reduce the likelihood of developing post-traumatic stress disorder (PTSD) after exposure to traumatic events.

According to the cognitive model of PTSD (Ehlers & Clark, 2000), social support can influence the cognitive and emotional reactions in the aftermath of the trauma. For example, social support can facilitate the opportunity for the therapeutic reliving of the trauma by talking with their family and friends about it and receiving supportive feedback. This may reduce the negative views about the meaning of the trauma (Pinto et al., 2017).

Most researchers agree that the structural and functional aspects of social support are different phenomena and should be studied separately (Jia, Ying, Zhou, Wu, & Lin, 2015). Studies have identified the various magnitudes of the relationships between structural social support and PTG. These differences are to some extent based on the different support sources involved (e.g. family support, teacher support and peer support). Two meta-analysis studies also revealed that structural social support was the strongest predictor of PTSD, yielding effect sizes of. 40 and. 28 respectively (Jia et al., 2015).

In the past decade, many studies have focused on PTSD in the aftermath of earthquakes but few have examined the effects of social support on PTSD after the earthquake itself. The objective of this review was to systematically assess the effect of social support on post-traumatic stress disorder in post-earthquake adolescents. Below we have reviewed the body of research literature generated post-earthquake, focusing on prevalence, social support, post-traumatic stress disorder and the risk factors associated with probable PTSD.

MATERIALS AND METHODS

The literature search was performed using 5 databases: Scopus, ScienceDirect, ProQuest, EBSCO and SAGE. The articles were published from 2015 to 2020. There were no restrictions on the month and date otherwise. The search terms were developed following initial scoping searches of the literature. The final search terms were based on the key elements of the review: (1) "social support" AND (2) stress disorder post-traumatic AND (3) earthquake
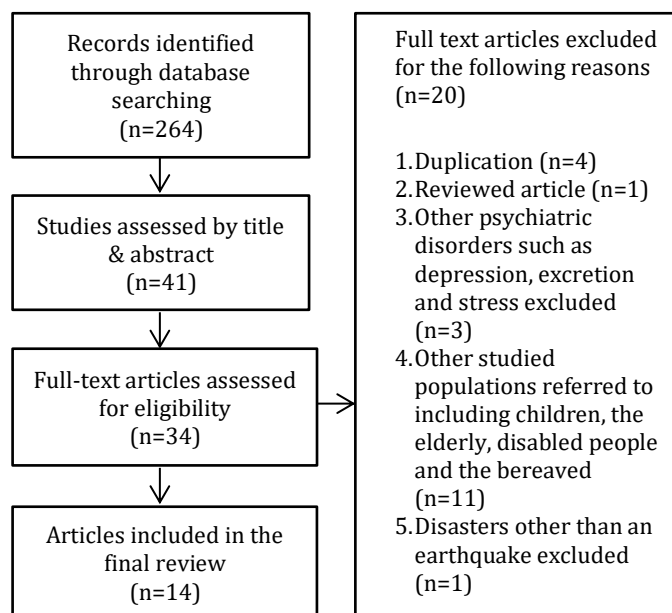

Figure 1. PRISMA Flow Diagram

AND (4) adolescent. The initial search generated a total of 1,481 articles.

We next limited the articles according to the topics that we wanted to discuss in this review. The abstracts of the identified articles, followed by the full text of the articles, were reviewed against the inclusion criteria where the population was aged 10-20 years (adolescents), it was a research article, the population had experienced or was experiencing post-traumatic stress disorder and they had experienced an earthquake. The exclusion criteria were duplication, a review article, referring to other psychiatric disorders such as depression, stress exclusion, mentioning other populations like children, the elderly, disabled people, the bereaved or focused on disasters other than earthquakes.

Studies that focused on other psychiatric disorders (e.g., depression, generalized anxiety disorder, stress) were excluded from this review. In addition, some studies were excluded that focused on special populations such as the elderly, children, the disabled or a person who had lost their family (bereaved).

RESULTS

Literature Search Result

Figure 1 provides an overview of the study selection process. Based on the key word searches, 246 titles were retrieved. Screening was conducted and there were 41 publications from 5 databases (Scopus, Science Direct, ProQuest, EBSCO and SAGE) classified as relevant. These were assessed according to their title and abstract before then being rescreened once the full-text version was obtained. Following this, 34 studies were then checked against the inclusion and exclusion criteria. In total, 14 studies met the predefined inclusion criteria and were thus included for further analysis.

Table 1. Design, measures and outcomes

Author/Year	Design	Population	Instrument(s)	Outcome
(Xu, Wang, & Tang, 2018)	Cross-sectional	3.851 respondents	The questionnaire had two parts. The first elicited information about their basic demographic data: age, gender, hometown, school and grades. The second part was the Earthquake Experience Scale, the Adolescent Self- Rating Life Events Checklist (Chinese-language version) and the Children's Revised Impact of Event Scale (CRIES-13).	The probable PTSD prevalence was 14.1% among all of the respondents (n = 3851). It was 15.9% among those who had been exposed to the 2008 and 2013 earthquakes (n = 2342) and it was 11.3% among those who had experienced only the 2013 earthquake (n = 1509).
(Zhou, Wu, & Zhen, 2017)	Longitudinal	397 respondents	Trauma exposure questionnaire, Social support questionnaire, Self-esteem Scale, State Hope Scale (SHS), Post-Traumatic Growth Inventory (PTGI) and the PTSD checklist for DSM-5.	Social support directly and negatively predicted PTSD and positively predicted PTG. Moreover, social support negatively predicted PTSD via self-esteem and positively predicted PTG via hope.
(S. Liu et al., 2019)	Cross-sectional	1.976 respondents	Questionnaire on the socio-demographic characteristics, the School Adaptation Scale (ASAS) and the PTSD Checklist.	A total of 30.7% of Tibetan adolescents had poor school adaptation and 19.5% were estimated as having probable PTSD.
(B. Du et al., 2018)	Cross-sectional	4.118 respondents	Questionnaire on demographic information, questionnaire on seismic exposure, the PTSD Checklist-Civilian Version (PCL-C) questionnaire, the Post-traumatic Growth Inventory (PTGI), the Perceived Social Support Scale (PSSS) and a Simple Coping Style Questionnaire (SCSQ).	The rate of PTSD is 1.9% in the generally affected area and 2.7% in the severely affected disaster area. There is no significant difference between the two differently affected areas.
(D. Liu, Fu, Jing, & Chen, 2016)	Bivariate logistic regression analysis	4.072 respondents	PTSD Checklist-Civilian version, The Internality, Powerful Others, the Chance Scale and The Coping Style Scale	The prevalence rate of probable PTSD was 17.8%. The predicting factors for PTSD were found to be aged 14 or older, being a senior student, being monitored, being buried/injured, having a family member who had died or had a limb amputated, severe property loss, had witnessed death, had negative coping skills, and had power over another's locus of control.
(Marthoenis et al., 2019)	Cross-sectional	321 respondents	The Patient Health Questionnaire (PHQ), the Generalized Anxiety Disorder (GAD-7) questionnaire and the Disaster Impact Questionnaire (DIQ)	Approximately 58.3%, 16.8% and 32.1% of adolescents reported the clinical symptoms of PTSD, depression and anxiety, respectively. The associations and comorbidity between PTSD, depression and anxiety were found to be statistically significant (p=0.001).
(Fan et al., 2015)	Multivariate logistic regression	1.573 respondents	Post-traumatic Stress Disorder Self-Rating Scale (PTSD-SS), the Adolescent Self-Rating Life Events Checklist, the Social Support Rate Scale and the Simplified Coping Style Questionnaire.	The PTSD prevalence rates at 6, 12, 18 and 24 months were 21.0, 23.3, 13.5 and 14.7%, respectively. Five PTSD symptom trajectories were observed: resistance (65.3% of the sample), recovery (20.0%), relapsing/remitting (3.3%), delayed dysfunction (4.2%) and chronic dysfunction (7.2%)

(Zhou et al., 2018)	Little's Missing Complete at Random test	391 respondents	Trauma exposure questionnaire and the 17-item Child PTSD Symptom Scale (CPSS).	Three latent PTSD trajectories were found in adolescents: moderate-stable (81.6%), decreasing (8.7%) and increasing trajectories (9.7%).
(N. Du, Zhou, SiTu, Zhu, & Huang, 2019)	ANOVA	330 respondents	Demographic questionnaire, Children's Revised Impact of Event Scale (CRIES) and the Depression Self-Rating Scale for Children (DSRSC).	The prevalence of probable PTSD in different stages was 42.2%, 20.1%, 30.3% and 11.2%. The sub-symptoms of PTSD of intrusion and arousal tended to decrease after the 1st year, followed by a rebound in the 2nd year before dropping again in the 3rd year.
(Li et al., 2019)	ANOVA	13.438 respondents	UCLA PTSD Reaction Index for Children and the Self-Report Dysexecutive Questionnaire.	A 4-class parallel model was found to best describe the latent PTSD symptom profiles and executive dysfunction. Individuals in the higher symptom groups showed more trauma exposure and a lower quality of life.
(Ge, Li, Yuan, Zhang, & Zhang, 2020)	A machine learning approach (XGBoost) and cross-validation	2.099 respondents	Socio-demographic information and earthquake-related experience, self-constructed sleep questionnaire, self-constructed emotional state questionnaire, self-constructed questionnaire, self-constructed everyday functioning questionnaire and the Children's Revised Impact of Event Scale (CRIES).	Any combination type predicted young survivors with probable PTSD with the prediction accuracies ranging between 66% -80% ($p < 0.05$). In particular, the combination of earthquake experience, everyday functioning, somatic symptoms and sleeping correctly was predicted in 683 out of 802 cases of probable PTSD, translating to a classical accuracy of 74.476% (85.156% sensitivity and 60.366% specificity). This is an area under the curve of 0.80. The most relevant variables (e.g. age, sex, property loss and a sedentary lifestyle) were revealed in the present study.
(Eray, Uçar, & Murat, 2017)	ANOVA	434 respondents	The Child Post-traumatic Stress Disorder (PTSD) - Reaction index, the Brief Symptom Inventory (BSI) and the Perceived Social Support Scale - Revised.	There was a significant difference in the PTSD scores between the earthquake and control groups. There was also a significant difference in the BSI scores between the groups. The participants who had witnessed the death or injury of a family member or friend had significantly higher PTSD scores than the others.
(Cheng, Liang, Zhou, Eli, & Liu, 2019)	Longitudinal	304 respondents	The Acute Stress Disorder Scale (ASDS) and the Post-traumatic Stress Disorder Reaction Index for DSM-IV (UCLA PTSD-RI)	Four trajectories of PTSD symptoms were found, namely resilience (53.8%), low symptoms (32.6%), recovery (7.0%) and chronic dysfunction (6.6%).
(Zhou, Wu, & Zhen, 2016)	Descriptive analyses and correlations	315 respondents	Trauma exposure, social support and emotional regulation, as well as the Child PTSD Symptom Scale and the Post-traumatic Growth Inventory.	Social support had a significant direct association with PTG but not with PTSD. Social support had a negative indirect prediction related to PTSD and a positive indirect prediction related to PTG through cognitive reappraisal.

General Characteristics

Table 1 presents an overview of all of the included studies and the extracted main data. The earliest article was published in March 2015 and the latest in November 2019. This systematic review obtained 14 selected articles from China, Turkey and Indonesia. The sample size ranged from n=304 to n= 13,438. All of the selected studies provided data indicating that

the participants were aged 10 to 20 years old. The study periods varied from 1 year to 8 years.

The review results show that social support has a significant effect on PTSD after an earthquake. The assessment of whether there was an increase in PTSD included 1) age, 2) sex, 3) property loss and 4) a sedentary lifestyle. Table 2 shows that the most common design used in the studies assessed was cross-sectional, in addition to ANOVA, longitudinal and others. The most commonly used measurement instrument was a questionnaire.

Prevalence has been defined as the percentage of old and new cases of a disease in the general population at a given time. Incidence has been defined as the frequency of new cases of a disease in a certain range of people within a certain period of time (Liang et al., 2019). Three months after the earthquake in Lushan, the prevalence rate of probable PTSD was 38.2% among children and adolescents. Eight years after the Wenchuan earthquake, the PTSD rate was 1.9% in the generally affected area and 2.7% in the severely affected disaster area. Two and a half years after the earthquake in Ya'an, social support was a significant negative predictor of PTSD but a positive predictor of post-traumatic growth (PTG). There was a significant and positive association between PTSD and post-traumatic growth, and it was also found that the proportion of girls with PTSD was significantly higher than the proportion of boys.

The risk factors associated with probable PTSD are descriptive such as the feeling that the individual is going to die, being trapped during the earthquake, being injured in the earthquake, having parents or relatives who were injured, witnessing someone being trapped, witnessing someone become injured, having a relative who died, witnessing death, having a destroyed house and losing property

DISCUSSION

In general, there are a small number of studies providing evidence on how social support has an effect on post-traumatic stress disorder in adolescents. Natural disasters, such as earthquakes, cause mental disorders and affect a large number of people in the world. The 2015 Barpak earthquake in Nepal was a cataclysmic disaster and it had a heart-rending impact on many survivors. Nine months after the disaster, the affected peoples are yet to recover (Dahal, Kumar, & Thapa, 2018). However, previous research still shows the rate of PTSD as only 1.9% in the generally affected area and 2.7% in the severely affected disaster area 8 years after the earthquake (B. Du et al., 2018). In this study, the review shows that the prevalence of PTSD is still high even though several years have passed.

The prevalence rate of probable PTSD among young survivors at 3 months following the Lushan earthquake was 38.2%, indicating that probable PTSD symptoms are common among children and adolescents following an earthquake exposure. A study summarized 12 cross-sectional studies and found that the prevalence rates for PTSD in children and adolescents who experienced an earthquake ranged between 4.5 - 95%. Additionally, the findings indicated that after controlling for age and gender, the trauma exposure differentiated between the significantly distinct PTSD trajectories.

In this systematic review, our study found females have a greater risk of probable PTSD. This is consistent across several studies. In fact, females are more likely than males to develop PTSD after trauma exposure. Many factors may explain this gender bias, such as the differences in terms of physical structure, social status, family role and problem solving and fantasy-coping styles.

Exposure to traumatic disaster-related experiences is one of the most important factors in the development of psychiatric symptoms. Consistent with this, we found that each earthquake-related exposure led to a higher probable PTSD risk and with each previous exposure, the prior trauma events are important contributors to the increased PTSD risk. Subjective fear and self-perceived exposure to trauma contribute to PTSD prevalence, even in earthquakes of a relatively low magnitude. Experiencing the death of relatives, lost property, and being injured or trapped in the earthquake were the risk factors for probable PTSD.

Some studies also discuss social support in relation to predicting Post-Traumatic Stress Disorder (PTSD) and Post-Traumatic Growth (PTG). Here, support positively predicts PTG but negatively predicts PTSD. These results also support the main effect and hypothesis of social support and indicate that social support can play a positive role in mental health among adolescents, regardless of the amount of stress that an individual has experienced. Social support tends to result in the experience of feeling accepted and belonging. This can promote a positive appraisal of the self and ultimately help to reduce the severity of PTSD.

Social support is the content of relationships that can be categorized into four types of protection or supportive action, namely emotional support (empathy support, love, trust, and attention), instrumental assistance, information support which is the provision of suggestions and information that can be used by someone to overcome problems and suggestions that are useful for self-evaluation. In other words, constructive feedback and affirmation.

A previous study suggested that perceived high social support can increase the adolescents' feelings of safety and belonging. This can help the adolescents to share their traumatic experiences freely with their supporters which can increase the probability of a cognitive reappraisal of the trauma and emotion. Social support could also indirectly lessen the severity of the PTSD through decreasing expressive suppression. In a setting with high social support, people are more likely to expose their emotions to others and vent negative feelings. In turn, the probability of expressive suppression is reduced (Zhou et al., 2016).

Clinical efforts should focus on the improvement of social support. For example, school psychologists or parents can provide emotional and material support for the adolescents and work to foster a supportive environment. Additionally, helping the adolescents to build their self-esteem and encouraging them to form more positive attitude towards the traumatic event as well as their post-traumatic emotions may mitigate the negative effects after trauma. It can also contribute to positive traumatic growth.

CONCLUSION

This systematic review has identified the research on social support for post-traumatic stress disorder and found that it is still limited. There is not yet enough information on how social support affects PTSD in adolescents. This must be observed in more detail. The decline in the rate of PTSD prevalence was rapid soon after the earthquake but it slowed down as time passed. This observation indicates that most of the victims suffering from PTSD gradually recover during the early stages while the remaining victims take longer and might have more difficulty recovering from PTSD. These studies enrich the understanding of the risk factors of PTSD in various countries that have experienced earthquakes and it can provide useful knowledge related to identifying the risk factors for PTSD in adolescents.

CONFLICT OF INTEREST

No Conflicts of interest have been declared.

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REFERENCES

Cheng, J., Liang, Y. M., Zhou, Y. Y., Eli, B., & Liu, Z. K. (2019). Trajectories of PTSD symptoms among children who survived the Lushan earthquake: A four-year longitudinal study. *Journal of Affective Disorders*, *252*(March), 421–427. https://doi.org/10.1016/j.jad.2019.04.047

Dahal, H. R., Kumar, S., & Thapa, D. K. (2018). Prevalence and risk factors of post-traumatic stress disorders among the survivors of 2015 Nepal earthquake, in Dhading, Nepal. *Sleep and Hypnosis*, *20*(2), 128–139. https://doi.org/10.5350/Sleep.Hypn.2017.19.0145

Du, B., Ma, X., Ou, X., Jin, Y., Ren, P., & Li, J. (2018). The prevalence of posttraumatic stress in adolescents eight years after the Wenchuan earthquake. *Psychiatry Research*, *262*, 262–269. https://doi.org/10.1016/j.psychres.2018.02.019

Du, N., Zhou, P., SiTu, M. jing, Zhu, C. zhen, & Huang, Y. (2019). Post-traumatic stress disorder and depression symptoms of adolescents survived from a seriously-hit area in China: A 3-year follow-up study. *Psychiatry Research*, *273*(January), 288–295. https://doi.org/10.1016/j.psychres.2019.01.063

Ehlers, A., & Clark, D. M. (2000). A cognitive model of posttraumatic stress disorder. *Behaviour Research and Therapy*, *38*(4), 319–345. https://doi.org/10.1016/S0005-7967(99)00123-0

Eray, Ş., Uçar, H. N., & Murat, D. (2017). The effects of relocation and social support on long-term outcomes of adolescents following a major earthquake: A controlled study from Turkey. *International Journal of Disaster Risk Reduction*, *24*(June), 46–51. https://doi.org/10.1016/j.ijdrr.2017.05.026

Evans, S. E., Steel, A. L., & DiLillo, D. (2013). Child maltreatment severity and adult trauma symptoms: Does perceived social support play a buffering role? *Child Abuse and Neglect*, *37*(11), 934–943. https://doi.org/10.1016/j.chiabu.2013.03.005

Fan, F., Long, K., Zhou, Y., Zheng, Y., & Liu, X. (2015). Longitudinal trajectories of post-traumatic stress disorder symptoms among adolescents after the Wenchuan earthquake in China. *Psychological Medicine*, *45*(13), 2885–2896. https://doi.org/10.1017/S0033291715000884

Ge, F., Li, Y., Yuan, M., Zhang, J., & Zhang, W. (2020). Identifying predictors of probable posttraumatic stress disorder in children and adolescents with earthquake exposure: A longitudinal study using a machine learning approach. *Journal of Affective Disorders*, *264*(January 2019), 483–493. https://doi.org/10.1016/j.jad.2019.11.079

Jia, X., Ying, L., Zhou, X., Wu, X., & Lin, C. (2015). The effects of extraversion, social support on the posttraumatic stress disorder and posttraumatic growth of adolescent survivors of the Wenchuan earthquake. *PLoS ONE*, *10*(3), 1–13. https://doi.org/10.1371/journal.pone.0121480

Li, G., Wang, L., Cao, C., Fang, R., Cao, X., Chen, C., … Hall, B. J. (2019). Posttraumatic Stress Disorder and executive dysfunction among children and adolescents: A Latent Profile Analysis. *International Journal of Clinical and Health Psychology*, *19*(3), 228–236. https://doi.org/10.1016/j.ijchp.2019.07.001

Liang, Y., Cheng, J., Ruzek, J. I., & Liu, Z. (2019). Posttraumatic stress disorder following the 2008 Wenchuan earthquake: A 10-year systematic review among highly exposed populations in China. *Journal of Affective Disorders*, *243*(August 2018), 327–339. https://doi.org/10.1016/j.jad.2018.09.047

Liu, D., Fu, L., Jing, Z., & Chen, C. (2016). Post-Traumatic Stress Disorder and It's Predictors Among Tibetan Adolescents 3 Years After the High-Altitude Earthquake in China. *Archives of*

Psychiatric Nursing, *30*(5), 593–599. https://doi.org/10.1016/j.apnu.2016.01.005

Liu, S., Lu, L., Bai, Z. Z., Su, M., Qi, Z. Q., Zhang, S. Y., … Lii, K. (2019). Post-traumatic stress and school adaptation in adolescent survivors five years after the 2010 Yushu earthquake in China. *International Journal of Environmental Research and Public Health*, *16*(21), 1–11. https://doi.org/10.3390/ijerph16214167

Marthoenis, M., Ilyas, A., Sofyan, H., & Schouler-Ocak, M. (2019). Prevalence, comorbidity and predictors of post-traumatic stress disorder, depression, and anxiety in adolescents following an earthquake. *Asian Journal of Psychiatry*, *43*(May), 154–159. https://doi.org/10.1016/j.ajp.2019.05.030

Pinto, R. J., Morgado, D., Reis, S., Monteiro, R., Levendosky, A., & Jongenelen, I. (2017). When social support is not enough: Trauma and PTSD symptoms in a risk-sample of adolescents. *Child Abuse and Neglect*, *72*(February), 110–119. https://doi.org/10.1016/j.chiabu.2017.07.017

Xu, J., Wang, Y., & Tang, W. (2018). Posttraumatic stress disorder in Longmenshan adolescents at three years after the 2013 Lushan earthquake. *General Hospital Psychiatry*, *54*(24), 45–51. https://doi.org/10.1016/j.genhosppsych.2018.05.009

Zhou, X., Wu, X., & Zhen, R. (2016). Understanding the Relationship Between Social Support and Posttraumatic Stress Disorder / Posttraumatic Growth Among Adolescents Afte. *Psychological Trauma: Theory, Research, Practice, and Policy*, *16*.

Zhou, X., Wu, X., & Zhen, R. (2017). Self-esteem and hope mediate the relations between social support and post-traumatic stress disorder and growth in adolescents following the Ya'an earthquake. *Anxiety, Stress and Coping*, *31*(1), 32–45. https://doi.org/10.1080/10615806.2017.1374376

Zhou, X., Wu, X., Zhen, R., Wang, W., & Tian, Y. (2018). Trajectories of posttraumatic stress disorders among adolescents in the area worst-hit by the Wenchuan earthquake. *Journal of Affective Disorders*, *235*(March), 303–307. https://doi.org/10.1016/j.jad.2018.04.032