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**Significance of Fostering the Mental Health of Patients with Diabetes through Critical Time Intervention**

Mental Health of Patients with Diabetes and CTI

Chiedu Eseadi, Amos Nnaemeka Amedu, Henry Egi Aloh

**Abstract**

**BACKGROUND**

Critical Time Intervention (CTI) is an evidence-based model of practice that is time-limited and aims to activate support for most susceptible individuals during a transition period.

**AIM**

To examine the significance of fostering the mental health of diabetes patients through CTI using a scoping review methodology.

**METHODS**

As part of the scoping review process, we have followed the guidelines established by the Joanna Briggs Institute (JBI). The search databases were Google Scholar, PubMed, Scopus, PsycINFO, Reference Citation Analysis, and Cochrane Library. From these databases, 77 articles were retrieved with the aid of carefully selected search terms. However, 19 studies were selected after two reviewers had appraised the full texts to ensure that they are all eligible for inclusion while 54 papers were excluded.

## RESULTS

This study revealed that diabetic patients who had experienced homelessness were at higher risk of being diagnosed with mental illness and that social support services are impactful in the management of the comorbidity of diabetes and mental health problems. In addition, this review reveals that CTI is impactful in enhancing the mental health of homeless patients during the transitional period from the hospital through social support services.

## CONCLUSION

CTI is a promising intervention for alleviating mental health symptoms in homeless patients. More empirical studies are needed across the globe, involving both hospitalized and community-based patients, to determine how clinically effectively CTI is managing the mental health of diabetics.

**Key Words:** Critical Time intervention; Diabetes; Mental illness; Patients

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**Core Tip:** The evidence suggests diabetic patients who had experienced homelessness were at higher risk of being diagnosed with mental illness and that social support services are impactful in the management of the comorbidity of diabetes and mental health problems. Studies on the effectiveness of CTI among patients with diabetes are limited. Available studies showed that CTI is a promising intervention for alleviating mental health symptoms in homeless patients.

## INTRODUCTION

Diabetes can cause other health problems and complications, both physically and psychologically. Diabetes is a persistent disorder of metabolism that has become a

major health concern worldwide. Diabetes is characterized by absolute deficits in insulin secretion, chronic hyperglycemia, and abnormal carbohydrate, lipid, and protein metabolism<sup>[1]</sup>. Glucose levels in the blood are elevated in people with diabetes<sup>[2]</sup>. In the literature, diabetes have been classified into four types; Type 1 diabetes (T1D), Type 2 diabetes (T2D), gestational diabetes (GD), and other diabetes associated with certain specific conditions such as pathologies or disorder<sup>[3],[4]</sup>. T1D is insulin-dependent diabetes which constitutes 5-10% of all diabetic cases. T1D is an autoimmune disorder distinguished by T-cell-mediated degeneration of pancreatic  $\beta$ -cells, ultimately resulting in insulin depletion and ultimately hyperglycemia<sup>[5]</sup>. The pathogenesis of T1D is found to be influenced by both genetic and environmental factors and pancreatic  $\beta$ -cell-specific autoimmunity development rate is rapid in infants and children. T2D is a non-insulin-dependent diabetes which constitutes about 90 – 95% of diabetes cases. The feature of T2D is abnormality of insulin,  $\beta$ -cell dysfunction and insulin resistance.<sup>[6]</sup> T2D is often undiagnosed because it progresses very slowly asymptotically over years till the appearance of classic symptoms connected with severe hyperglycemia like weight loss, growth impairment, polyuria, and polydipsia at the advanced stage. The pathogenesis of this T2D is complex and involves multiple unknown and known features such as the combination of genetic predispositions and strong environmental influences. T2D is prevalent among older age and linked to obesity, inactivity, adoption of modern lifestyles, and family history of diabetes<sup>[3]</sup>. Gestational Diabetes (GD) is a type of diabetes linked to pregnancy diagnosed between second and third trimesters excluding undetected T2D. Furthermore, GD is characterized by increase in blood glucose levels till diabetes at the third trimester of pregnancy. Ninety percent (90%) of diabetes and its complications at such period are attributed to GD which its prevalence varies from 1% to 14%<sup>[7]</sup>. The risk of GD is linked with older age, previous pregnancy with big babies, obesity, and history of impaired glucose tolerance and has high likelihood of lifetime risk of developing T2D<sup>[3]</sup>. Other types of diabetes associated peculiar conditions such as pathologies or many disorders are those emanating

from monogenic defects in  $\beta$ -cell function,<sup>2</sup> genetic abnormalities in insulin action, exocrine pancreatic pathologies among other conditions<sup>[8]</sup>.

Diabetic patients may feel insecure in terms of their mental health. As a result, they check their blood glucose excessively, worry about complications, and constantly monitor their personal and work lives. When diabetes and mental illness coexist, the prognosis is often poor<sup>[9]</sup>. Complex interventions are often required for chronic and comorbid illnesses. Medications are in most cases less effective at treating all facets of diabetes and mental illness together<sup>[10]</sup>. As a chronic disease, it can impair daily function and mobility, which is more prevalent in homeless people than in homeowners<sup>[11]</sup>. Having diabetes can be physically and emotionally difficult, both for those with the disease and their families. As a result, people living with it must manage the disease continuously.

There are a number of mental health issues, such as anxiety and depression, which can affect diabetic patients. Diabetes has been linked to mental health complications, such as psychotic disorders and complications peculiar to diabetic patients<sup>[12]</sup>. A number of terms were also utilized to describe the mental health problems connected with diabetes. For example, “diabetes distress” describes the negative emotions experienced by people with diabetes, as well as the burden of managing it, which explains the feelings of despair<sup>3</sup> and emotional turmoil that are specifically related to diabetes, particularly the need for continued monitoring and care, ongoing concerns regarding complications, and the potential for professional and personal relationships to be eroded<sup>[13]</sup>. A condition known as psychological insulin resistance is characterized by an unwillingness to accept insulin therapy, leading to a delay in starting treatment<sup>[14]</sup>. The knowledge of the relationship<sup>3</sup> between diabetes and mental health is crucial in that psychiatric and diabetes-specific psychosocial problems are associated with diminished participation in self-management activities that can decrease the quality of life and care for victims and their families. Complications related to diabetes and mortality in the early stages are associated with psychiatric disorders in diabetic patients<sup>[15]</sup>. In addition to depression, anxiety and eating disorders, individuals

with type 1 or type 2 diabetes are at increased risk of these conditions <sup>[16]</sup>. For example, depression rates across the lifespan are twice as high for diabetics as for the general population. It was predicted by <sup>[17]</sup> that diabetic patients would have poorer mental health generally, and on a variety of mental health dimensions in particular. In addition, studies in the past have found that diabetes is linked to severe depressive disorder, anxiety, bipolar disorders <sup>[18]</sup>, schizophrenia <sup>[19]</sup>, personality disorders <sup>[20,21]</sup>, stress, trauma, abuse and neglect <sup>[22,23]</sup>, and sleep issues <sup>[23]</sup>. In order to reduce morbidity and mortality associated with diabetes and mental health conditions, non-pharmacological interventions such as Critical Time Intervention (CTI), can be used.

The CTI is an intervention programme that is time-limited and designed to lessen the adverse effects associated with homelessness and other risky outcomes by providing assistance to individuals at their critical transitional time <sup>[25, 26]</sup>. The CTI is characterised by concentrated case management that lasts for 6 to 9 mo and is geared towards assisting mental health patients navigate the severe service system and create contact with long-term community-based links, resources, and interventions <sup>[26]</sup>. The CTI may benefit adults with diabetes and mental health challenges. As a result, comorbid diabetes and mental health conditions make maintaining lifestyle changes more difficult. As a result, this group has more difficulty recognizing and discussing their health concerns, and engaging with services to manage their health <sup>[27]</sup>. Homelessness and inadequate care may also be challenges they face. Although CTI has received a lot of attention as a way of managing mental health conditions, little is known about its effectiveness in managing and treating diabetes and mental health conditions comorbidly. The CTI is an evidence-based practice designed to mobilize support for society's most disadvantaged individuals in times of transition <sup>[28]</sup>. This promotes greater integration into the community and ensures a continuous flow of care by allowing people to remain connected to their communities and social support networks during these difficult times. The CTI is also a type of time-limited ICM, which helps maintain continuity of care for service users while they are in transition, such as

from a shelter to a private residence after discharge <sup>[25]</sup>. As a result of this intervention, a person's network of support within the community is strengthened <sup>[29]</sup>.

In addition to reducing the risk of homelessness after institutional discharge, the CTI strives to enhance the quality of life for individuals and families. Secondly, it provides time-limited direct support in terms of emotional and practical assistance during the period of transition by reinforcing the consumer's long-term ties to formal services, family, and friends <sup>[28]</sup>. Among the key features of the CTI is the provision of post-discharge assistance by workers who have maintained close contact with clients before discharge <sup>[30]</sup>. Aside from providing emotional and practical assistance during critical transition periods, the CTI also offers case management services to enhance the relationship between an individual and their family, friends, and services <sup>[31]</sup>. There are three stages to critical time intervention <sup>[25]</sup>: (1) providing direct assistance to the client and assessing the resources available to support the client, (2) evaluating and adjusting the support systems as necessary, and (3) ensuring that existing community resources are transferred to the client. A variety of groups have benefited from CTI, including veterans, individual with psychiatric disorders, those who have been incarcerated, and people with diabetes. After being discharged from hospitals, shelters, prisons and other institutions, individuals with mental illness may become homeless. <sup>5</sup> The foundation of the CTI rests on elements found in other evidence-based models <sup>5</sup> such as Small caseloads, active community outreach, individual case management plans, psychosocial skill building, and motivational coaching are key elements <sup>[33, 34]</sup>.

Notwithstanding the substantial role of CTI in the management of mental health problems in patients with other health problems, there is a lacuna with respect to documented empirical evidence of the effectiveness of CTI in enhancing the mental health of diabetic patients. Therefore, conducting a scoping literature review to establish the scope and depth of empirical research on the effectiveness of CTI in improving the mental health of patients with diabetes is necessary due to the prevalence of diabetes worldwide. Taking this study into account, public health practitioners will be able to determine the extent of CTI's effectiveness in improving the

mental well-being of diabetics. Furthermore, psychologists or therapists will find this study useful since it will expose the existing gaps regarding CTI in treating diabetic patients' mental health. Therefore, the major aim of this current study was to establish the current significance of fostering the mental health of patients with diabetes through CTI by conducting a scoping review of the available empirical studies.

### **Research Questions**

These questions were addressed by this review were:

What are the mental health challenges associated with homeless diabetic patients?

What is the impact of CTI in enhancing mental health of homeless individuals during the time of transition?

## **MATERIALS AND METHODS**

### **Study Design**

Based on a scoping review of existing research studies, the current study examined the significance of fostering diabetes patients' mental health through critical time interventions. Due to the fact that the study relied on an empirical literature analysis, no ethics approval was necessary, and in light of the fact that scoping reviews provide a valuable tool in mapping the research process on a specific topic.

### **Protocol Development**

A protocol defining the methods and defining the inclusion and exclusion criteria was developed in advance. In this review, we followed the PRISMA guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)<sup>[34]</sup>.

### **Data Sources and Guidelines**

The literature was searched extensively in databases of medical and scientific literature, including Google Scholar, PubMed, Scopus, PsycINFO, Reference Citation Analysis, and Cochrane Library. Boolean operators were applied to a specific set of keywords (i.e., "OR," "AND") during the literature search. Search queries were used across titles, abstracts, subject-specific keywords, and topic fields in databases. The key words used in the primary search stage were: (a) "diabetes mellitus" OR "type I



diabetes" OR "type II diabetes" AND "Mental Health" "psychosocial support," "psychological," "psychiatric," "anxiety," "depression," AND "Critical Time Interventions" and other terms relevant to the current study (see Table 1).

(Insert Table 1))

Following the preliminary search which ended on September 20th, 2023, and the researchers added additional search terms to the list based on the results of the first search. The reference lists of the articles included in the search were further reviewed.

### **Eligibility Criteria**

This scoping review included articles that met all the following criteria:

Studies that attempted to treat participants of any age with comorbid diabetes and mental health condition.

Primary studies, using either retrospective or prospective design or either quantitative and/or qualitative design including clinical trials.

The review considered studies in any country across the globe.

Full-length studies that were published in journals as peer-reviewed articles.

Studies conducted in any year.

There were no restrictions on variables such as culture, stage of illness, occupational class or education. The searches were limited to the English language as the time and cost of translation were not feasible within this reviews' timeline.

However, for the exclusion criteria, the study excluded:

Studies which dealt only on the prevalence of mental health among diabetic patients.

Opinion papers, pre-conference abstracts and review studies were excluded.

Non-English language articles.

Commentary, editorial or case study on transition

Studies that treated either diabetic condition without mental health construct or vice versa.

### **Study selection and data extraction**

**Screening:** After the database search was completed, the results were exported into Zotero and duplicates were removed. In order to evaluate all retrieved citations, the

authors used a cloud-based systematic review management portal (rayyan.ai). Next, titles were screened to exclude irrelevant publications, opinion papers, and reviews. All titles and abstracts of papers were then screened by two reviewers using stipulated inclusion and exclusion criteria. To extract and synthesize data, all citations eligible for full-text review were examined using the same methodology. We kept articles with uncertain eligibility status aside for further review during the assessment process. Finally, the abstracts were read to determine whether the study's aim met the scoping review question.

**Selection:** The full-text articles were read to confirm each study's eligibility according to the inclusion and exclusion criteria. A third reviewer assisted the first two reviewers in resolving potential conflicts about eligibility through discussion after all articles selected after screening were independently reviewed. Data extraction was completed after discrepancies were resolved and papers meeting standards for inclusion were selected.

**Data Extraction Process:** In the extraction phase, the data were independently extracted from articles according to the theme, purposes, and questions of the present scoping review. Relevant information from all included papers were extracted using a pre-designed data extraction form that included items on study characteristics [e.g., Author and year of study, location, population and year of the study, Study objective, type of mental health disorder, participants' characteristics (age of participants & gender among others), method and sample, intervention description and findings]. Two reviewers participated independently in the data extraction process, and a third author reviewed all the extracted data to ensure consistency and accuracy. Later, all reviewers participating in data extraction discussed discrepancies and reached a consensus.

### **Data synthesis**

Using the collective body of evidence, a scoping review produces an evidence map and identifies potential gaps. A summary of the major study variables, interventions and all comorbidity health outcomes were provided by the authors. The findings were arranged and presented in tabular form to provide an overview of the existing studies.

## **RESULTS**

### **Selection of Sources of Evidence**

There were 77 articles related to mental health of people with diabetes that were found during the electronic search of the six databases. Following the removal of duplicates, 72 papers remained. Two independent researchers assessed papers based on stipulated criteria to exclude 48 papers in the first screening, which involved reading titles and abstracts. As a result, 24<sup>4</sup> papers were screened a second time by reading the full texts while still looking for the inclusion criteria, and three articles were finally selected for data extraction. After the full-text assessment, more than 5 papers were excluded, as shown in Figure 1.

(Insert Figure 1)

(Insert Table 2)

An overview of the included studies is provided in Table 2.<sup>4</sup> Findings from this scoping review reveal that the nineteen articles selected for data extraction were published between 2007 and 2022. The distribution of these studies reviewed across the globe showed that five studies were conducted in Canada.<sup>[35, 36, 37, 51, 54]</sup>, USA <sup>[40, 52, 46, 47, 48, 49, 41, 53]</sup>, Japan<sup>[48]</sup>, Britian<sup>[25, 43, 50]</sup> and the Netherlands<sup>[51]</sup> The study design included six survey studies, three qualitative, one retrospective evaluation, seven randomized controlled trial and one mixed method. The minimum sample size of the included studies is five while the maximum is 6944. Of these 19 studies, six studies focused on mental health, nine studies were on CTI, and four studies were on management diabetes among homeless individuals.

## **DISCUSSION**

To foster the mental health of homeless diabetic patients, this study used scoping review approach to unveil the mental health challenges of homeless diabetic patients

and the impact of CTI in enhancing mental health of homeless individuals during the time of transition. On the mental health challenges associated with homeless diabetic patients, this study revealed that diabetic patients with history of homelessness were more likely to be diagnosed with mental illness such as self-management disorder, low perception, depressions, substance abuse, cognitive disability, psychotic disorder, and bipolar disorder. The comorbidity of diabetics and mental health problems of homeless patients are associated with higher HBA1c. However, medication taking with increased supports and supervision within the shelter for patients with mental illness substantially reduced the HBA1c<sup>[46]</sup>.

This review also found that social support services are impactful in management of comorbidity of diabetes and mental health problems. Such social support that enhanced the mental health of diabetic patients are affordable house rents and rental assistance which reduces diabetic patients' expenditure with respect to rent and increase their financial muscle to offset their diabetes-related expenses.<sup>[47]</sup> In addition, a study identified that provision of in-shelter care, peer outreach and support, diabetes specialty outreach clinics, diabetes group care specific for this population, and community based pharmacy interventions are impactful in management of mental health of homeless diabetic patients.<sup>[54, 42, 37]</sup> Group medical visits to the shelter of homeless diabetic patients were found to be impactful and therapeutic.<sup>[37]</sup> This is attributed to its tendency of improving individual patients perception of diabetes management, emotional supports, accountability and social competition. This means that medical visit gives patients hope as well as part of the society. Therefore, social support services are integral and impactful mechanism of managing the mental health of diabetic patients because literature has report various ways it has been found useful. This equally entails that diabetes managements with enriched support system facilitates patients' recovery from diabetes symptoms such as reduction in fasting blood glucose (FBG) and HbA1c levels.

This review reveal that CTI is impactful in enhancing mental health of homeless patients during transitional period from the hospital through social supports and

interventions to ensure that homeless needs are met and delivered timely as well as engagement of these homeless patients. However, literature revealed that the effectiveness of CTI has not been tested on homeless diabetics' patients. This means that there is a lacuna on the use of CTI to enhance the mental health of patients with diabetes must especially on the homeless individuals transiting from hospital. However, literature has shown that effectiveness of CTI has been established on homeless individuals with mental health problem. A study revealed that CTI enhanced participants engagement on continuity with care and improved access to service<sup>[49]</sup>. Access to service is one the focus CTI especially for homeless patients at the during transition process. Literature show that is a robust intervention for promoting social supports on individual experiencing psychological distress and less social support,<sup>[51]</sup> and promotes unmet needs and lessen the symptoms of posttraumatic stress symptoms among abused women<sup>[52]</sup> Furthermore, CTI is also helpful in transitioning of prisoners with mental illness because clients who received CTI intervention were less anxious about release and reported receiving more support with housing, access to services, and community reintegration than their counterparts.<sup>[25]</sup> It has been reported to facilitates their access to medication<sup>[50]</sup> lowering psychiatric rehospitalization and prevention of recurrent of homeless.<sup>[45]</sup>

The reviewed studies revealed that CTI was impactful in management of individual with histories of chronic homelessness and occurring disorders through decrease in alcohol use, drugs, and psychiatric symptoms.<sup>[46, 47, 35]</sup> Perhaps this is due to the fact that they are known to suffer from a higher frequency of diabetes-related adverse consequences. A number of factors contribute to this disparity, including inadequate access to medical care, inability to pay for medications and supplies, dissatisfaction with healthcare providers, and conflicting priorities.

Moreover, one of the major contributors to the disparities in outcomes is likely related to the fact that diabetes treatments are often not tailored to the specific needs and circumstances of people who are homeless. According to the reviews, no studies have specifically examined CTI's impact on diabetic patients' mental health. This

implies that there is a gap in the literature concerning critical time interventions for fostering diabetic patients' mental health. Therefore, more studies are needed to truly understand CTI's impact on diabetic mental health.

This review identified two key findings regarding CTI's effectiveness in managing the mental health of homeless patients. First, CTI has been shown to improve housing outcomes and service engagement use outcomes for homeless people diabetes related ailments and their mental health conditions. Results like these coincide with CTI's focus of connecting individuals with community services and supports to address critical transition needs. It is clear from these findings that the CTI model is practical and adaptable in that it can be successfully implemented in a variety of settings and populations<sup>[53]</sup>. This assertion can be evidenced in the study of Davachi and Ferrari<sup>[36]</sup> which used a survey research design to conduct a 12-month intervention study to develop a diabetes management support program for homeless people, especially those at risk or already diagnosed with the disease. According to the study of Davachi and Ferrari<sup>[36]</sup> social services support which is part of CTI is effective for managing the mental health of people with pre-existing diabetes. A cohort study conducted by Wiens *et al.*,<sup>[35]</sup> in Ontario, Toronto in Canada between 2006 and 2019 further supports the above assertion. According to the study, 5219 diabetic people with documented homelessness (75%) found suitable matches. An important demographic and clinical characteristic of diabetic people was also balanced within a derived matched cohort. Secondly, CTI has been shown to be supportive and therapeutic in managing diabetic patients' mental health. This can be substantiated by the studies of Shaw *et al.*,<sup>[49]</sup> de Vet<sup>[51]</sup>, Kasprow<sup>[42]</sup>, and Shinn *et al.*<sup>[44]</sup> whose findings proved CTI effective in enhancing the mental health of homeless individuals. CTI may improve individuals' perception of diabetes management through problem solving, modeling, information and education, emotional support, accountability, and social competition.

### **Implications of Findings and Recommendations**

This study revealed that diabetic patients with history of homelessness were more likely to be diagnosed with mental illness and social support services are

impactful in management of comorbidity of diabetes and mental health problems. This implies that homeless diabetic patients suffer mental health disorder which could be attributed to adverse effects of their environments which predispose them to some substance abuse that increases their mental disorder. Therefore, an intervention such as CTI that focus on enhancing the mental health of homeless diabetic patients is required to facilitate and manage their smooth transition as well as ensure that they have access to supports services that facilitate their integration into society. This study supports existing research demonstrating that Critical Time Intervention is highly effective, supportive, and therapeutic for managing the mental health of patients, especially those who are homeless or have a history of homelessness. As a result, most homeless patients' mental health disorders were managed using either or both of these interventions and ultimately, they were successful in overcoming their challenges. Therefore, healthcare professionals are well positioned to identify homeless patients and work with them to reduce their individual barriers to diabetes care; however, organizations must ensure that patients are connected to the larger health care system and facilitate low barriers to accessing diabetes care. This review found limited evidence addressing how CTI achieves its positive effects. Exactly how CTI reduces the mental health conditions of diabetic patients with homelessness and other outcomes is unknown. Consequently, this lays the groundwork for future studies investigating CTI's impact on diabetic mental health. Further research is clearly needed to determine whether and how CTI's program components affect specific outcomes and to map these components onto specific mediators.

### **Limitations of the Review**

Due to unavailability of study that specific dealt with impact of CTI on homeless diabetic patients, this review revolved around the mental health challenges associated with homeless diabetic patients and the impact of CTI in enhancing mental health of homeless individuals during the time of transition. Second, the included studies used a variety of populations and settings, resulting in a difficult comparison across them. Accordingly, we did not assess methodological quality or bias risk in

accordance with the adhering guidelines. Furthermore, the study did not examine the costs of CTI or examine other kinds of case management interventions that could have been used in treating diabetic patients' mental health, instead focusing solely on CTI. Therefore, future reviews should consider all kinds of case management interventions that may have been used. Furthermore, we retrieved literature from leading databases in order to include peer-reviewed articles, while unpublished studies from unselected databases were not included. Last but not least, including only English-language articles may have resulted in a loss of evidence regarding the effectiveness of CTI for diabetic mental health.

## **CONCLUSION**

This review has shown that homeless diabetic patients are frequently diagnosed with several mental health problems which requires an intervention program such CTI for enhancing their mental health. The available literatures reviewed for this research shows that there is no specific CTI study that focused on managing the mental health of diabetic patients. This indicates that it has not been given adequate attention by researchers. In light of this, it is harmless to suggest that more empirical studies should be conducted across the globe, using both participants in hospitals as well as community-based settings to determine the effectiveness of CTI in managing mental health of diabetic patients more effectively and clearly.

## **ARTICLE HIGHLIGHTS**

### ***Research background***

CTI is an evidence-based model of practice that is time-limited and aims to activate support for most susceptible individuals during a transition period.

### ***Research motivation***

Diabetes can cause other health problems and complications, both physically and psychologically. In order to reduce morbidity and mortality associated with diabetes



and mental health conditions, non-pharmacological interventions such as CTI can be used.

### ***Research objectives***

This research aimed to examine the significance of fostering the mental health of diabetes patients through CTI.

### ***Research methods***

This research employed the scoping review methodology and followed the guidelines established by the Joanna Briggs Institute (JBI). The search databases were Google Scholar, PubMed, Scopus, PsycINFO, Reference Citation Analysis, and Cochrane Library.

### ***Research results***

Diabetic patients who had experienced homelessness were at higher risk of being diagnosed with mental illness and that social support services are impactful in the management of the comorbidity of diabetes and mental health problems. CTI is impactful in enhancing the mental health of homeless patients during the transitional period from the hospital through social support services.

### ***Research conclusions***

CTI is a promising intervention for alleviating mental health symptoms in homeless patients. More empirical studies are needed to determine how clinically effectively CTI is managing the mental health of diabetics.

### ***Research perspectives***

It is crucial to facilitate and manage the smooth transition of homeless diabetic patients into society, as well as to ensure that they have access to supports services that facilitate

their integration into society, by providing CTI that focus on enhancing their mental health.

## REFERENCES

- 1 **Golbidi S**, Ebadi SA, Laher I. Antioxidants in the treatment of diabetes. *Curr Diabetes Rev* 2011; 7: 106-125 [PMID: 21294707 DOI: 10.2174/157339911794940729]
- 2 **Devarajan M**, Subramaniaswamy V, Vijayakumar V, Ravi L. Fog-assisted personalized healthcare-support system for remote patients with diabetes. *J Ambient Intell Humaniz Comput* 2019; 10: 3747–3760. [DOI: 10.1007/s12652-019-01291-5]
- 3 **Banday MZ**, Sameer AS, Nissar S. Pathophysiology of diabetes: An overview. *Avicenna J Med* 2020; 10: 174-188 [PMID: 33437689 DOI: 10.4103/ajm.ajm\_53\_20]
- 4 **Rodríguez-Ramírez BA**, Rodríguez-Ramírez PM. Relationship between type 2 diabetes and periodontitis. *Mex J Med Res ICSA* 2023; 11: 48–53. [DOI:10.29057/mjmr.v11i22.10609]
- 5 **Lichti CF**, Wan X. Using mass spectrometry to identify neoantigens in autoimmune diseases: The type 1 diabetes example. *Semin Immunol* 2023; 66: 101730. [DOI: 10.1016/j.smim.2023.101730]
- 6 **Almheiri A**, Alhammadi A, AlShehhi F, Mohammad A, Alshamsi R, Alzaman K, Jabeen S, Haq B. Biomarkers for Prediabetes, Type 2 Diabetes, and Associated Complications. *Am J Health Med Nurs Pract* 2023; 9: 1–21. [DOI: 10.47672/ajhmn.1592]
- 7 **Heath H**, Rosario R, McMichael LE, Fanter R, Alarcon N, Quintana-Diaz A, Pilolla K, Schaffner A, Jelalian E, Wing RR, Brito A, Phelan S, La Frano MR. Gestational Diabetes Is Characterized by Decreased Medium-Chain Acylcarnitines and Elevated Purine Degradation Metabolites across Pregnancy: A Case–Control Time–Course Analysis. *J Proteome Res* 2023; 22: 1603–1613. [DOI: 10.1021/acs.jproteome.2c00430]
- 8 **Sousa M**, Bruges-Armas J. Monogenic Diabetes: Genetics and Relevance on Diabetes Mellitus Personalized Medicine. *Curr Diabetes Rev* 2020; 16: 807–819. [DOI: 10.2174/1573399816666191230114352]

9 **Sartorius N**. Comorbidity of mental and physical diseases: a main challenge for medicine of the 21st century. *Shanghai Arch Psychiatry* 2013; **25**: 68-69 [PMID: 24991137 DOI: 10.3969/j.issn.1002-0829.2013.02.002]

10 **Ee C**, Lake J, Firth J, Hargraves F, de Manincor M, Meade T, Marx W, Sarris J. An integrative collaborative care model for people with mental illness and physical comorbidities. *Int J Ment Health Syst* 2020; 14: 83. [DOI: 10.1186/s13033-020-00410-6]

11 Snow-Hill NL. The survey of attitudes toward homeless people: the validation of a new instrument assessing negative attitudes toward homeless people 4. (Dissertation). University of South Carolina; 2019.

12 **Robinson DJ**, Coons M, Haensel H, Vallis M, Yale J-F. Diabetes and mental health. *Can J Diabetes* 2018; 42: S130-S141. [DOI: 10.1016/j.jcjd.2017.10.031]

13 **Robinson EB**, St Pourcain B, Anttila V, Kosmicki JA, Bulik-Sullivan B, Grove J, Maller J, Samocha KE, Sanders SJ, Ripke S, Martin J, Hollegaard MV, Werge T, Hougaard DM, Neale BM, Evans DM, Skuse D, Mortensen PB, Børglum AD, Ronald A, Smith GD, Daly MJ. Genetic risk for autism spectrum disorders and neuropsychiatric variation in the general population. *Nat Genet* 2016; 48: 552-555. [PMID]: 26998691 DOI: 10.1038/ng.3529]

14 **Polonsky WH**, Hajos TR, Dain MP, Snoek FJ. Are patients with type 2 diabetes reluctant to start insulin therapy? An examination of the scope and underpinnings of psychological insulin resistance in a large, international population. *Curr Med Res Opin* 2011; **27**: 1169-1174 [PMID: 21469914 DOI: 10.1185/03007995.2011.573623]

15 **Toender A**, Vestergaard M, Munk-Olsen T, Larsen JT, Kristensen JK, Laursen TM. Risk of diabetic complications and subsequent mortality among individuals with schizophrenia and diabetes - a population-based register study. *Schizophr Res* 2020; **218**: 99-106 [PMID: 32029352 DOI: 10.1016/j.schres.2020.01.024]

16 **Ducat L**, Philipson LH, Anderson BJ. The mental health comorbidities of diabetes. *JAMA* 2014; **312**: 691-692 [PMID: 25010529 DOI: 10.1001/jama.2014.8040]

- 17 **Kang W**. Investigating the association between diabetes and mental health: A train-and-test approach. *Front Psychiatry* 2022; **13**: 1044714 [PMID: 36601525 DOI: 10.3389/fpsyt.2022.1044714]
- 18 **Calkin CV**, Chengappa KNR, Cairns K, Cooke J, Gannon J, Alda M, O'Donovan C, Reardon C, Sanches M, Růžicková M. Treating Insulin Resistance With Metformin as a Strategy to Improve Clinical Outcomes in Treatment-Resistant Bipolar Depression (the TRIO-BD Study): A Randomized, Quadruple-Masked, Placebo-Controlled Clinical Trial. *J Clin Psychiatry* 2022; **83** [PMID: 35120288 DOI: 10.1192/bjp.bp.114.152850]
- 19 **Lieberman JA**, Stroup TS, McEvoy JP, Swartz MS, Rosenheck RA, Perkins DO, Keefe RS, Davis SM, Davis CE, Lebowitz BD, Severe J, Hsiao JK; Clinical Antipsychotic Trials of Intervention Effectiveness (CATIE) Investigators. Effectiveness of antipsychotic drugs in patients with chronic schizophrenia. *N Engl J Med* 2005; **353**: 1209-1223 [PMID: 16172203 DOI: 10.1056/NEJMoa051688]
- 20 **Hackett RA**, Lazzarino AI, Carvalho LA, Hamer M, Steptoe A. Hostility and physiological responses to acute stress in people with type 2 diabetes. *Psychosom Med* 2015; **77**: 458-466 [PMID: 25886832 DOI: 10.1097/PSY.0000000000000172]
- 21 **Nefs G**, Speight J, Pouwer F, Pop V, Bot M, Denollet J. Type D personality, suboptimal health behaviors and emotional distress in adults with diabetes: results from Diabetes MILES-The Netherlands. *Diabetes Res Clin Pract* 2015; **108**: 94-105 [PMID: 25686507 DOI: 10.1016/j.diabres.2015.01.015]
- 22 **Farr OM**, Ko BJ, Joung KE, Zaichenko L, Usher N, Tsoukas M, Thakkar B, Davis CR, Crowell JA, Mantzoros CS. Posttraumatic stress disorder, alone or additively with early life adversity, is associated with obesity and cardiometabolic risk. *Nutr Metab Cardiovasc Dis* 2015; **25**: 479-488 [PMID: 25770759 DOI: 10.1016/j.numecd.2015.01.007]
- 23 **Ramos AR**, Wallace DM, Pandi-Perumal SR, Williams NJ, Castor C, Sevic MA, Mcfarlane SI, Jean-Louis G. Associations between sleep disturbances and diabetes mellitus among blacks with metabolic syndrome: Results from the Metabolic Syndrome Outcome Study (MetSO). *Ann Med* 2015; **47**: 233-237 [PMID: 25856540 DOI: 10.3109/07853890.2015.1015601]

- 24 **Manuel JI**, Nizza M, Herman DB, Conover S, Esquivel L, Yuan Y, Susser E. Supporting Vulnerable People During Challenging Transitions: A Systematic Review of Critical Time Intervention. *Adm Policy Ment Health* 2023; **50**: 100-113 [PMID: 36229749 DOI: 10.1007/s10488-022-01224-z]
- 25 **Lennox C**, Stevenson C, Edge D, Hopkins G, Thornicroft G, Susser E, Conover S, Herman D, Senior J, Shaw J. critical time intervention: a qualitative study of the perspectives of prisoners and staff. *J Forensic Psychiatry Psychol* 2020; **31**: 76-89. [DOI: 10.1080/14789949.2019.1665699]
- 26 **Reid N**, Mason J, Kurdyak P, Nisenbaum R, de Oliveira C, Hwang S, Stergiopoulos V. Evaluating the Impact of a Critical Time Intervention Adaptation on Health Care Utilization among Homeless Adults with Mental Health Needs in a Large Urban Center. *Can J Psychiatry* 2022; **67**: 57-66 [PMID: 33611924 DOI: 10.1177/0706743721996114]
- 27 **Hassan S**, Heinkel S, Burton A, Blackburn R, McCloud T, Ross J, Osborn D, Walters K. A qualitative study exploring the barriers and facilitators of implementing a cardiovascular disease risk reducing intervention for people with severe mental illness into primary care contexts across England: the 'PRIMROSE' trial. *BMC Health Serv Res* 2020; **20**: 753 [PMID: 32799925 DOI: 10.21203/rs.2.15800/v2]
- 28 **Whiffin CJ**, Gracey F, Ellis-Hill C. The experience of families following traumatic brain injury in adult populations: A meta-synthesis of narrative structures. *Int J Nurs Stud* 2021; **123**: 104043 [PMID: 34388366 DOI: 10.1177/1049731509360667]
- 29 Silberman School of Social Work. Understanding the critical time intervention model. CTI implementation. 2022. [cited 25 April 2023]. <https://sssw.hunter.cuny.edu/research/centers-networks/>
- 30 Improving care transfers for homeless patients after hospital discharge: a realist evaluation. Southampton (UK): NIHR Journals Library; 2021 Sep- [PMID: 34609809]
- 31 **Howerton AC**. **Serving poverty & homeless populations through structured encampments with personal interaction (s) and healthcare providers volunteering.** Scholar Work, Walden University.

32 **Draine J**, Herman DB. Critical time intervention for reentry from prison for persons with mental illness. *Psychiatr Serv* 2007; **58**: 1577-1581 [PMID: 18048559 DOI: 10.1176/ps.2007.58.12.1577]

33 **Meadows CJ**. **Ameliorating the revolving door of the mental health crisis and the criminal justice system: A Grant Proposal. (Thesis) California State University, Long Beach**; 2019.

34 **Moher D**, Liberati A, Tetzlaff J, Altman DG; PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *BMJ* 2009; **339**: b2535 [PMID: 19622551 DOI: 10.1136/bmj.b2535]

35 **Wiens K**, Bai L, Austin PC, Ronksley PE, Hwang SW, Spackman E, Booth GL, Campbell DJ. Characteristics of people with type I or type II diabetes with and without a history of homelessness: A Population-based Cohort Study. *medRxiv*; 2022. [DOI: 10.1101/2022.08.11.222781272022]

36 **Davachi S**, Ferrari I. Homelessness and diabetes: reducing disparities in diabetes care through innovations and partnerships. *Can J Diabetes* 2012; **36**: 75-82. [DOI: 10.1016/j.jcjd.2012.04.015]

37 **Thompson C**, Meeuwisse I, Dahlke R, Drummond N. Group medical visits in primary care for patients with diabetes and low socioeconomic status: users' perspectives and lessons for practitioners. *Can J Diabetes* 2014; **38**: 198-204 [PMID: 24909090 DOI: 10.1016/j.jcjd.2014.03.012]

38 **Campbell DJT**, Campbell RB, DiGiandomenico A, Larsen M, Davidson MA, McBrien K, Booth GL, Hwang SW. Using a community-based participatory research approach to meaningfully engage those with lived experience of diabetes and homelessness. *BMJ Open Diabetes Res Care* 2021; **9** [PMID: 34493497 DOI: 10.1136/bmjdrc-2021-002154]

39 **Campbell DJT**, Campbell RB, Booth GL, Hwang SW, McBrien KA. Innovations in Providing Diabetes Care for Individuals Experiencing Homelessness: An Environmental Scan. *Can J Diabetes* 2020; **44**: 643-650. [DOI: 10.1016/j.jcjd.2020.01.011]

- 40 **Mayberry LS**, Bergner EM, Harper KJ, Laing S, Berg CA. Text messaging to engage friends/family in diabetes self-management support: acceptability and potential to address disparities. *J Am Med Inform Assoc* 2019; **26**: 1099-1108 [PMID: 31403688 DOI: 10.1093/jamia/ocz091]
- 41 **Elder NC**, Tubb MR. Diabetes in homeless persons: barriers and enablers to health as perceived by patients, medical, and social service providers. *Soc Work Public Health* 2014; **29**: 220-231 [PMID: 24802217 DOI: 10.1080/19371918.2013.776391]
- 42 **Kaspro WJ**, Rosenheck RA. Outcomes of critical time intervention case management of homeless veterans after psychiatric hospitalization. *Psychiatr Serv* 2007; **58**: 929-935 [PMID: 17602008 DOI: 10.1176/ps.2007.58.7.929]
- 43 **Clark C**, Guenther CC, Mitchell JN. Case Management Models in Permanent Supported Housing Programs for People With Complex Behavioral Issues Who Are Homeless. *J Dual Diagn* 2016; **12**: 185-192 [PMID: 27070841 DOI: 10.1080/15504263.2016.1176852]
- 44 **Shinn M**, Samuels J, Fischer SN, Thompkins A, Fowler PJ. Longitudinal Impact of a Family Critical Time Intervention on Children in High-Risk Families Experiencing Homelessness: A Randomized Trial. *Am J Community Psychol* 2015; **56**: 205-216 [PMID: 26238278 DOI: 10.1007/s10464-015-9742-y]
- 45 **Tomita A**, Herman DB. The impact of critical time intervention in reducing psychiatric rehospitalization after hospital discharge. *Psychiatr Serv* 2012; **63**: 935-937 [PMID: 22810163 DOI: 10.1176/appi.ps.201100468]
- 46 **Asgary R**, Beideck E, Naderi R. Diabetes care and its predictors among persons experiencing homelessness compared with domiciled adults with diabetes in New York City; An observational study. *EClinicalMedicine* 2022; **48**: 101418 [PMID: 35516444 DOI: 10.1016/j.eclinm.2022.101418]
- 47 **Keene DE**, Henry M, Gormley C, Ndumele C. 'Then I Found Housing and Everything Changed': Transitions to Rent-Assisted Housing and Diabetes Self-Management. *Cityscape* 2018; **20**: 107-118 [PMID: 31406556 DOI: 10.2307/26472170]

48 **Yamamoto M**, Watanabe T, Uehara R, Horita R, Sado T, Nishio A. Prevalence of diabetes among homeless men in Nagoya, Japan: A survey study. *J Diabetes Investig* 2019; **10**: 667-672 [PMID: 30264429 DOI: 10.1111/jdi.12943]

49 **Shaw J**, Conover S, Herman D, Jarrett M, Leese M, McCrone P, Murphy C, Senior J, Susser E, Thornicroft G, Wright N, Edge D, Emsley R, Lennox C, Williams A, Cust H, Hopkin G, Stevenson C. Critical time Intervention for Severely mentally ill Prisoners (CrISP): a randomised controlled trial. *Health Serv Deliv Res* 2017; **5**: 1-138. [DOI: 10.3310/hsdr05080]

50 **Jarrett M**, Thornicroft G, Forrester A, Harty M, Senior J, King C, Huckle S, Parrott J, Dunn G, Shaw J. Continuity of care for recently released prisoners with mental illness: a pilot randomised controlled trial testing the feasibility of a Critical Time Intervention. *Epidemiol Psychiatr Sci* 2012; **21**: 187-193. [DOI: 10.1017/S2045796011000783]

51 **de Vet R**, Beijersbergen MD, Jonker IE, Lako DAM, van Hemert AM, Herman DB, Wolf JRLM. Critical Time Intervention for Homeless People Making the Transition to Community Living: A Randomized Controlled Trial. *Am J Community Psychol* 2017; **60**: 175-186 [PMID: 28872196 DOI: 10.1002/ajcp.12150]

52 **Lako DAM**, Beijersbergen MD, Jonker IE, Vet R de, Herman DB, Hemert AM van, Wolf JRLM. The effectiveness of critical time intervention for abused women leaving women's shelters: a randomized controlled trial. *Int J Public Health* 2018; **63**. [DOI: 10.1007/s00038-017-1067-1]

53 Herman DB. Transitional Support for Adults with Severe Mental Illness: Critical time intervention and its roots in assertive community treatment. *Res Soc Work Pract* 2014; **24**: 556-563. [DOI: 10.1177/1049731513510976]



## Footnotes

1

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**Fig. 1: Flow chart illustrating the screening and selection process of this scoping review**

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