Recognising Emotional Aspects of Diabetes; Understanding Detection of Diabetes Distress and Depression Among People with Type 2 Diabetes Mellitus in Community Settings

A thesis submitted to the National University of Ireland, Cork for the degree of Doctor of Philosophy in the School of Public Health

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DECLARATION

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ABBREVIATIONS

ADL Activities of Daily Living

BCW Behaviour Change Wheel

BDI Beck Depression Inventory

BFFS Best Fit Framework Synthesis

CASP Critical Appraisal Skills Programme

CES-D Center for Epidemiological Studies Depression

CI Confidence Interval

CLUSTER Citations, Lead authors, Unpublished materials, Scholar searches, Theories, Early examples, Related projects

COM-B Capability Opportunity Motivation Behaviour

CVD Cardiovascular Disease

DDS Diabetes Distress Scale

DM Diabetes Mellitus

DNS Diabetes Nurse Specialist

DSM Diagnostic and Statistical Manual of Mental Disorders

ELSA English Longitudinal Study on Ageing

ENTREQ Enhancing Transparency in Reporting the Synthesis of Qualitative Research

GP General Practitioner

GRADE CERQual Confidence in the Evidence from Reviews of Qualitative research

HADS Hospital Anxiety and Depression Scale

HbA1c Hemoglobin A1C

HCP Health Care Professional

HPA Hypothalamic Pituitary Adrenal

HRS Health and Retirement Study

IADL Instrumental Activities of Daily Living

ICD International Statistical Classification of Diseases and Related Health Problems

ISCED International Standard Classification of Educational DegreesOR Odds Ratio

PAID Problem Areas in Diabetes

PHQ Patient Health Questionnaire

PRISMA Preferred Reporting Items for Systematic Reviews and Meta-Analyses

PROSPERO Prospective Register of Systematic Reviews

QALY Quality Adjusted Life Years

QES Qualitative Evidence Synthesis

RETREAT Review question Epistemology Time/Timescale Resources Expertise Audience and purpose Type of Data

SREC Social Research Ethics Committee

SD Standard Deviation

SPICE Setting, Perspective, phenomenon of Interest, Comparison, Evaluation

SSR Selective Serotonin Reuptake Inhibitor

TDF Theoretical Domains Framework

TILDA The Irish Longitudinal Study on Ageing

T1DM Type 1 Diabetes Mellitus

T2DM Type 2 Diabetes Mellitus

UK United Kingdom

USA United States of America

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ABSTRACT

Background: Diabetes distress and depression are important to address among people with type 2 diabetes (T2DM), who increasingly receive T2DM care in the community. Detection is a pre-requisite for appropriate management, but evidence indicates low detection rates among people with T2DM. Diabetes distress and depression screening has been recommended in contemporary T2DM management guidelines as a strategy to detect these issues. Little is known about detection among people with T2DM in high-income countries or about factors influencing detection at the health system and heath professional (HCP) levels in this population. Moreover, implementation of diabetes distress and depression screening of people with T2DM in the community remains poorly understood.

Aim: To improve understanding of diabetes distress and depression detection and the implementation of screening among people with T2DM in community settings.

Methods: This PhD thesis employed a mixed methods approach, using a convergent design. Three studies were conducted. First, a cross-sectional comparative analysis estimated the prevalence of depression detection outcomes (undiagnosed, symptomatic and diagnosed and asymptomatic and diagnosed) and using multivariable logistic regression, modelled the association between diabetes and undiagnosed (versus diagnosed) depression in three high income countries with different health systems. Second, a qualitative evidence synthesis (QES) following the best-fit

framework method employed behaviour change theory, the theoretical domains framework (TDF), to identify HCP perceived barriers and enablers to diabetes distress and depression screening of people with T2DM in community settings, based on HCPs' experiences of implementing screening. Finally, a primary qualitative study using the TDF as a data collection and analytic framework and drawing on principles of chart stimulated recall, was conducted with HCPs working in the community setting in Ireland to understand current diabetes distress and depression detection practices and prospectively identify determinants of screening implementation in the Irish context.

Results: Undiagnosed depression was more prevalent in people with diabetes than without diabetes in each country with absolute rates varying by country; [Ireland: diabetes 10.1%(95%CI:7.5-12.8) vs no diabetes 7.5%(95%CI:6.8-8.2), England: diabetes 19.3%(95%CI:16.5-22.2) vs no diabetes 11.8%(95%CI:11.0-12.6), USA: diabetes 7.4%(95%CI:6.4-8.4) vs no diabetes 6.1%(95%CI:5.7-6.6)]. There was no clear pattern of association between diabetes status and undiagnosed depression across countries; Ireland: OR=0.82(95%CI:0.5-1.3), England: OR=1.47(95%CI:1.0-2.1), USA: OR=0.80(95%CI:0.7-1.0).

Ten articles (9 studies) were synthesised in the QES. All articles related to depression screening and one to diabetes distress screening. Articles included GP (n=7) and nurse (practice and nurse specialist; n=9) perspectives. Fifteen factors comprising 11 barriers, 3 enablers and 1 factor which was both a barrier and enabler, in 8 TDF domains: knowledge, skills, professional role and social identity, beliefs about consequences, reinforcement, environmental

context and resources, memory, attention and decision process, emotion, and 1 new domain: people with T2DM factors, were identified as influencing screening implementation. Three barriers; underestimation of depression severity, skills needed to screen, and discomfort screening were predominantly discussed by nurses. One barrier; culture and language issues and 1 enabler; availability of appropriate reimbursement, were only discussed by GP participants.

Twenty-eight HCPs across Ireland: 7 GPs, 9 practice nurses, 8 diabetes nurse specialists and 4 dieticians participated in semi-structured telephone interviews. Current practice involved people with T2DM or third parties (e.g. their family members) alerting HCPs to possible mental health issues among people with T2DM, or by HCPs asking people with T2DM about mental health as a response to implicit cues by people with T2DM. Some participants had administered screening tools albeit not systematically or necessarily part of T2DM care. Fifteen factors, comprising 7 barriers, 6 enablers and 2 factors which could inhibit or enable screening were identified. These related to 8 TDF domains; knowledge, skills, beliefs about consequences, environmental context and resources, memory, attention and decision process, emotion, social influences and 1 other domain; person with T2DM factors. Lack of knowledge about which tool(s) to use by HCPs with experience of screening and lack of awareness of diabetes distress, and, limited focus on psychosocial aspects in general practice due to under-resourcing of T2DM were only discussed by GPs and practice nurses.

Conclusion: Detection of diabetes distress and depression in people with T2DM is a challenge across health systems and the extent of detection as a challenge varies across countries. Screening implementation strategies should include educational materials, meetings and/or outreach activities, local opinion leaders, reminders and tailored interventions to address HCP specific determinants.

1 INTRODUCTION AND THESIS OVERVIEW

1.1 INTRODUCTION

Diabetes is one of the most concerning global public health challenges of the 21st century (1). The number of people with diabetes is increasing, driven by population growth and ageing (2) alongside increases in the prevalence of type 2 diabetes (T2DM) (3–6), which accounts for the majority of diabetes cases (7–10). As well as physical health related complications (11–16) emotional and psychological comorbidity is also common among people with T2DM (17–20). Diabetes distress and depression, the most studied emotional and psychological comorbidities (21,22), independently and adversely impact T2DM self-management behaviour and T2DM outcomes (23–27).

The limited available data have found that diabetes distress and depression often go undetected among people with T2DM (28–31). For the purposes of this PhD thesis, detection refers to case diagnosis only, rather than to diagnosis or treatment indicators. Understanding diabetes distress and depression detection as well as the implementation of strategies aimed at increasing their detection among people with T2DM is vital to inform improvement of detection practices and subsequent management. Individual (patient and health professional; HCP) (32,33) depression related (33,34) and health system (32,33,35) factors have been identified as important determinants of depression detection in general populations but less is known about how these play out in the diabetes context (30,33,36). To date, no studies have examined determinants of diabetes distress detection.

Most available studies demonstrate screening is an effective strategy to increase diabetes distress and depression detection rates in people with diabetes (28,37–48). However, screening may not be easily embedded into routine T2DM care. For instance, depression screening efficiency and acceptability issues underpinned the decision to remove a national screening programme targeting people with diabetes and heart disease in UK general practice (49).

As health systems continue to shift management of T2DM away from the acute setting and into the community (50–55), it is important to understand detection, including via screening, in the context of community T2DM care.

1.2 THESIS AIM AND OBJECTIVES

1.2.1 Aim

The overall aim of this PhD thesis is to improve understanding of diabetes distress and depression detection and the implementation of a strategy, “screening”, aimed at improving their detection among people with T2DM in community settings.

1.2.2 Objectives

1. Estimate and compare depression detection among people with and without T2DM across health systems

Studying depression detection in people with and without diabetes across health systems can provide new understanding about the interplay between country (e.g. different population-level characteristics), health system (e.g. financing models) and diabetes factors and their influence on depression detection. This will also inform the need for implementation of evidence-based detection interventions.

2. Identify all the known HCP perceived barriers and enablers to implementing diabetes distress and depression screening in adults with T2DM in community settings

Identifying the full spectrum of factors expressed by all the HCPs engaged in screening will add new knowledge about the perceived structural, organisational, professional and professional-patient interaction factors influencing diabetes distress and depression screening implementation.

3. Understand diabetes distress and depression detection process in community T2DM care in Ireland

In depth exploration of current diabetes distress and depression detection practices in Ireland can add new insight into ways of specifying future T2DM distress and depression detection recommendations for Ireland.

1.3 THESIS OUTLINE

This PhD thesis contains 6 Chapters. Chapters 3, 4 and 5 are research studies which address the aims and objectives outlined above. Chapter 2 provides an overview of the research informing this work and Chapter 6 draws together the findings of the preceding individual studies to discuss how this PhD thesis improves understanding of detection. Chapter 6 also discusses the practice and policy implications of this PhD thesis, it's strengths and limitations and makes recommendations for future research.

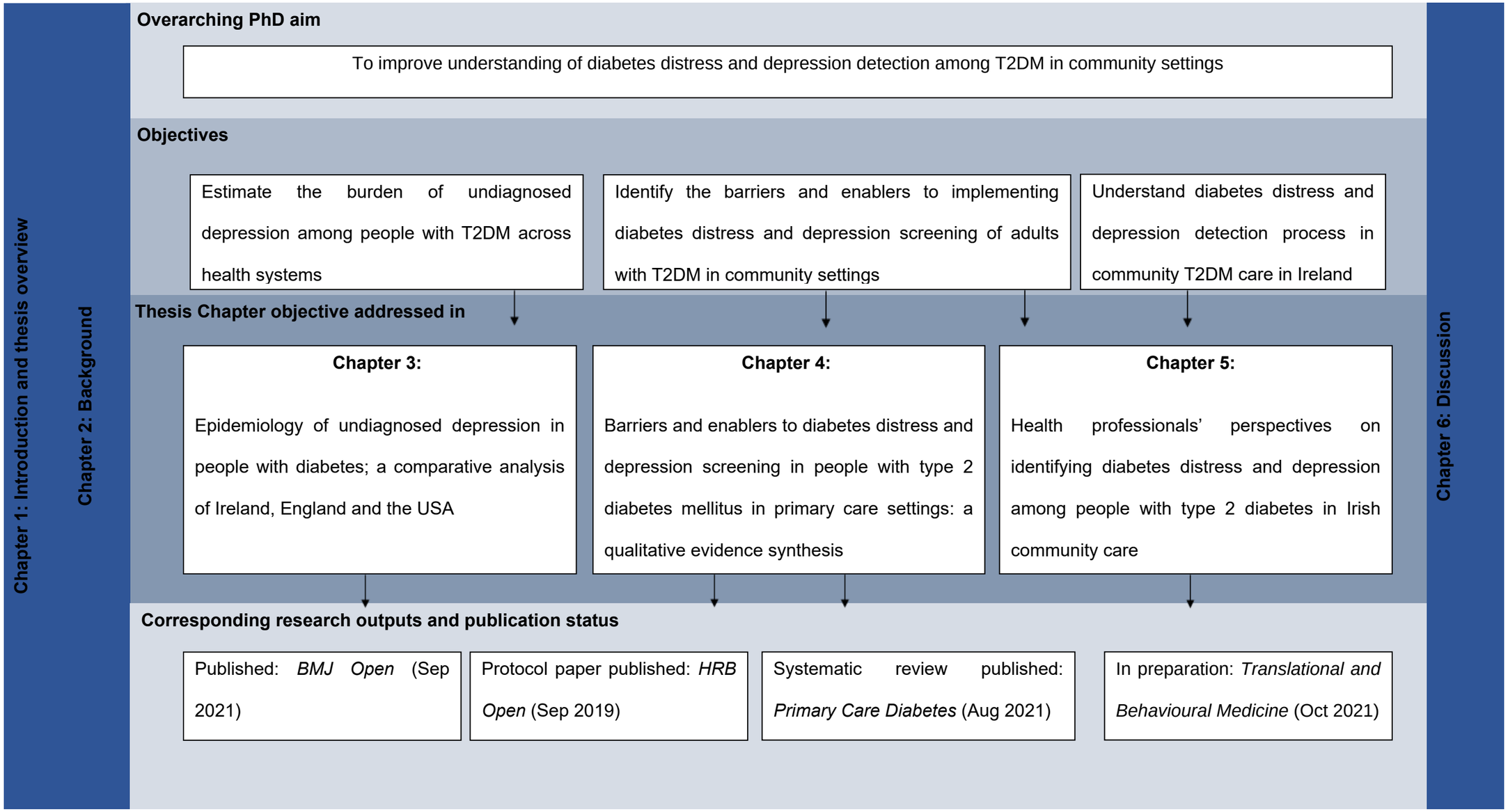

Figure 1.1 **- Overview of thesis including research questions, corresponding studies and research outputs**

2 BACKGROUND

2.1 Overview

This Chapter presents an overview of the literature which informed this PhD thesis. First, T2DM is defined and its epidemiology briefly described. Definitions of diabetes distress and depression are then presented, followed by discussion of the current state of knowledge about their prevalence among people with T2DM, impacts on T2DM and relationships with T2DM. Third, known factors influencing detection of diabetes distress and depression are described, following by a discussion of the effectiveness and implementation of diabetes distress and depression screening interventions.

2.2 Diabetes Mellitus

Diabetes mellitus represents a series of metabolic conditions characterised by hyperglycaemia (56). It results from defects in insulin secretion whereby the pancreas does not produce enough insulin or from insulin inaction whereby the body cannot effectively use the insulin that is produced, or both (56). T2DM is estimated to account for approximately 87–91% of all diabetes cases, with type 1 diabetes (T1DM) estimated to account for 7–12%, and other types accounting for 1–3% (7–10). T1DM is characterised by the body's inability to produce insulin due to permanent damage to beta cells in the pancreas (56). T1DM usually develops in childhood, but can occur at any age (57). T2DM is defined by elevated levels of blood glucose as a consequence of impaired insulin production by the pancreas and/or insulin resistance in the body's cells

(56). T2DM usually develops in middle and older aged adults, though there are also cases in younger age groups (58). Causes of T2DM include genetic (59,60) and environmental factors, principally poor diet, physical inactivity and obesity (60,61).

2.2.1 *T2DM as a growing public health concern*

Between 1980 and 2014, the number of people with diabetes has almost quadrupled worldwide due to increasing diabetes prevalence, population growth and ageing populations (2). The increase is thought to be driven by T2DM. This is because the prevalence of self-reported diagnosed diabetes in adults aged 18 to 39 years is constant over time while the prevalence over time has increased in older age groups (3–6). Consequently, the economic burden of diabetes is also increasing globally (62–65) and is driven by T2DM (66,67). As well as the direct costs of treating diabetes and its associated complications, diabetes also has indirect social and productivity costs, including those related to increased morbidity and mortality (66–68).

T2DM is associated with a number of serious microvascular complications including diabetic retinopathy (11–13), neuropathy (14), and nephropathy (15) and macrovascular complications including coronary heart disease (CHD), and stroke (16). People with T2DM have up to a threefold increase in all-cause mortality compared to those without T2DM (69–71). Complications are largely preventable if the condition is well-managed and risk factors (glucose levels, lipids, blood pressure) are well-controlled (72–75).

2.3 Defining Emotional and Psychological aspects of T2DM

People with T2DM can experience emotional problems as a direct consequence of diabetes such as diabetes-related distress (17), fears of complications and hypoglycaemia (76), and of invasive self-care behaviours e.g. psychological insulin resistance (77). People with T2DM are also at increased risk of common psychological problems such as depression (18), anxiety (19), and disordered eating (20) than persons without diabetes.

Diabetes distress and depression are the two most studied emotional and psychological aspects of diabetes (21,22). Diabetes distress and depression are distinct constructs which are strongly correlated, frequently co-occur (78,79), and are independent risk factors for one another (80,81). Patterns of diabetes distress and depression prevalence are similar across countries. In a recent systematic review, studies reporting higher levels of depressive symptoms also reported higher levels of diabetes distress and studies reporting lower levels of depressive symptoms also reported lower levels of diabetes distress (17). Diabetes distress and depression are each discussed in sections 2.3.1 and 2.3.2 below.

2.3.1 *Diabetes Distress*

Diabetes distress refers to the negative emotional or affective experience resulting from the challenge of living with the demands of diabetes (21,82). These experiences include worries, concerns, fears and threats associated with living with and managing diabetes over time, such as diabetes

management, potential complications or loss of functioning, access to care and interpersonal aspects (83). Diabetes distress does not necessarily imply psychopathology and it is not viewed as a comorbid disorder or condition; it is simply the emotional side of having diabetes (79,84).

Many sources of diabetes distress are similar across diabetes types and management regimes e.g. worry about future and complications, constant concern about food and eating, and feeling guilty when off track with management (85–87). Key differences have also been reported. The only available study comparing diabetes distress by diabetes type reported differences in the dominant issues experienced by people with T1DM (worry about future and complications, feeling burnt-out, and worry about low blood sugar reactions) and T2DM (lack of diabetes related goals, feeling discouraged by the diabetes treatment plan, and feeling deprived of food) (85). Among people with T2DM following different management regimes, sources of diabetes distress may also differ (87). For instance distress related to glycaemic control, depressive affect, physical diabetes burden (e.g. functional impairment and pain or discomfort) and fears of hypo- and hyperglycaemic episodes were more commonly reported by people with T2DM using insulin than those managed with oral diabetes medications (87). Distress associated with managing additional chronic conditions was more common among those using oral medications only, despite similar numbers of additional chronic conditions in both groups (87).

Approximately one third of people with T2DM experience diabetes-related distress at any one time (17). However, the majority of available data is USA

based, with no T2DM prevalence data available for Ireland (17). Causal factors leading to the onset of diabetes distress in people with T2DM have not been identified. The odds of moderate and high levels of diabetes distress in people with T2DM are higher among those who are female (83,88), lead a sedentary lifestyle (83,88), have a body mass index of 25kg/m^2 or more (88), have a poor quality diet (83), have two or more additional chronic conditions (88), have previously had major depression (83), experience more negative events or more chronic stress (83), have a shorter duration of T2DM (>10 years) (88), are on insulin therapy (89,90), have at least one diabetes related complication (83,88), experience weight (internalised or from a health professional) or diabetes stigma (internalised or by others) (91,92), or have reduced financial access to diabetes medications and supplies (90). Weight stigma includes negative stereotypes, blame, prejudice, and unfair treatment, due to a higher body weight or larger body size (93,94) and can come from members of society or be self-directed (internalised) by the person with overweight/obesity. Diabetes stigma includes perceived or experienced exclusion, discrimination, status loss, rejection, blame, or stereotyping based on the diagnosis or management of diabetes (95) e.g., feeling blamed by others for causing the condition (96).

The presence of moderate to high levels of diabetes distress has been associated with increased risk for poorer future quality of life (23), non-adherence to diabetes medications (24,25), and higher HbA1c levels (25,97,98). Diabetes distress is not thought to be associated with self-management behaviours including future diet, physical activity or blood

glucose testing behaviour (25,97). Diabetes distress has been associated with increased risk of all cause mortality among men in Japan with T2DM (99). It is not yet known whether diabetes distress is an independent risk factor for the onset of diabetes related complications.

Diabetes distress is relatively persistent over time (100,101), but can increase over time (102). Some authors have suggested that people with T2DM develop reasonably stable perceptions of the challenges of living with T2DM that are related to habitual ways of dealing with stress (101). This assertion is consistent with psychological literature that people have consistent coping dispositions (103,104). Another explanation is that diabetes distress may be cyclical in nature. As discussed, diabetes distress can lead to higher HbA1c levels (25,97,98), in turn providing negative feedback and thus demoralisation to the person, leading to poor coping and again feeding back into further diabetes distress and so forth (105).

2.3.2 *Depression*

The International Statistical Classification of Diseases and Related Health Problems 10th Edition (ICD-10) (106) and the Diagnostic and Statistical Manual of Mental Disorders 5th Edition (DSM-V) (107) define depression as a mood disorder characterised by the presence of a variety of symptoms, and associated impairment in an individuals' functional capabilities. The cardinal symptoms are low mood and anhedonia (an inability to experience pleasure in previously enjoyable activities). Other symptoms include changes in appetite, sleep, difficulties concentrating, loss of energy or fatigue, and, slowed or

agitated psychomotor response. Symptoms should be present for a two-week period and not attributable to a substance or medical condition. Depression ranges from mild to severe in symptom severity and may be a single episode or recurrent. Risk factors for depression onset in general populations include: female gender, depressive information processing, stressful life events and circumstances, parental depression and interpersonal relationship difficulties (108). The term depressive symptoms is often used in the literature to reflect mild or subclinical depression, particularly when using depression self-assessment scales rather than diagnostic tools.

Depression or it's symptoms is estimated as being twice as prevalent among people with T2DM compared to people without T2DM (109,110). As in general populations (111,112), the prevalence of depression or it's symptoms among people with T2DM varies considerably across regions (29,113). The course of depression or its symptoms among people with T2DM appears more recurrent and chronic than that among people without diabetes (114–116). For instance, in one study the duration of major depressive episodes was 23 months among people with diabetes compared with 4.5 - 5.5 months among general population counterparts (114).

The relationship between depression and T2DM is complex, likely bi-directional, with authors likening the debate to that of the 'chicken and the egg' (117,118). T2DM is estimated as posing a 24 - 33% increased risk of incident depression (119–123) and depression as posing an 18 - 60% increased risk of incident T2DM (120,124,125). Despite an abundance of research, there remains a lack of clarity as to the exact mechanisms and their temporality

linking depression and T2DM (125). The various stances are discussed in sections 1.3.2.1 to 1.3.2.3 below with proposed inter-relationships conceptualised in Figure 2.1.

2.3.2.1 The psychological burden hypothesis

The psychological burden posits that the burden of living with T2DM could precipitate or exacerbate depression or it's symptoms (126). In support of this hypothesis, a recent meta-analysis suggested the ongoing experience of T2DM plays a more significant part in the onset of depressive symptomatology than does T2DM diagnosis (123). Specifically, only previously (versus newly) diagnosed diabetes was associated with increased risk of depression and the association was non-significant after adjustment for microvascular diabetes-complications (123).

Explanatory mechanisms have been proposed at multiple levels. At the individual level, cognitions and beliefs related to diabetes, such as perceived disability and awareness of having a chronic illness, may impose higher levels of psychological burden on people with T2DM (126). People with T2DM can experience weight stigma (127) and diabetes stigma (96). Among adults with overweight or obesity, experiences of societal weight stigma predicted internalisation of weight stigma, which predicted reliance on maladaptive coping strategies, which in turn predicted depressive, anxiety and stress symptoms (128). Diabetes stigma (internalised and from others) has been associated with higher depressive symptomatology among people with T2DM whereby a one standard deviation increase in stigma resulted in a 0.5 point

increase in depressive symptomatology (129). Although diabetes stigma is associated with behavioural and HbA1c outcomes in people with T2DM, available literature indicates the associations are not clinically meaningful (129).

Having diabetes complications can cause functional limitations (reduced mobility, visual impairments, fatigue, pain) and a reduced quality of life (130) and functional impairment is a risk factor for depression (131). Socio-demographic factors, such as low socio-economic status, is also likely to play a role whereby pre-existing vulnerability to depression is compounded by financial or other stress associated with ongoing T2DM management.(132). Diabetes related health system factors have also been shown to be associated with depressive symptoms in people with diabetes. Graham and colleagues recently demonstrated an association between quality of diabetes care and depression in people with diabetes in Europe, using Euro Diabetes Index indicators for detection, care processes, access to care, and outcomes (133). In countries scoring in the highest diabetes care quality quartile, having diabetes was associated with a 3% relative increase in depressive symptoms (95% CI 1.00–1.05) compared to a 22% (1.14–1.31) relative increase in countries scoring within the lowest quartile (134). Suggested pathways for the association were: financial aspects of diabetes care, access to services and differential exposure to the social determinants of health (134).

2.3.2.2 Behavioural and psychological consequences of depression

Depression is thought to increase the risk of onset of T2DM via shared lifestyle related factors. Behaviours such as unhealthy eating and physical inactivity which increase the risk for T2DM (60,61), are often a challenge for people with depression (135,136). Research has demonstrated that people experiencing depression are less likely to include fruit and vegetables in their diet (135) and to engage in physical activity (136).

Finally, internalised mental health stigma among people with mental health conditions, including depression, exacerbates symptomatology and reduces the likelihood of help-seeking (137), thereby reinforcing behavioural consequences of depression which increase T2DM risk.

2.3.2.3 Biological mechanisms

Several biological mechanisms; effects of hyperglycaemia, low-grade inflammation, hypothalamic-pituitary-adrenal (HPA) axis dysfunction, immune system functioning and microvascular dysfunction, have also been implicated in association between T2DM and depression (138–144). Hyperglycaemia may be directly involved in the aetiology in depression in people with T2DM (142). Arousal of the nervous system as a result of diabetes, has also been suggested to account for an increased risk of depression in individuals with diabetes compared to those without (145). Conversely, altered stress responses and inflammatory markers caused by depression may subsequently lead to T2DM onset (146). More recently, shared genes relevant to the innate immune system have been identified in people with T2DM and

major depressive disorder (144). Direct evidence of the temporal associations of other biological factors is lacking (138,140–143).

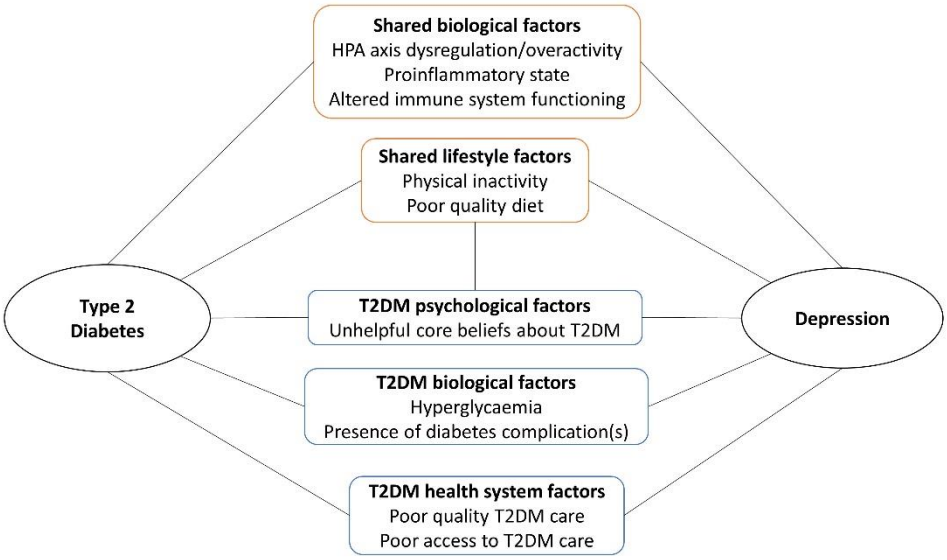

Figure 2.1 Conceptual explanatory mechanisms underpinning the bi-directional association between depression and T2DM

Regardless of whether depression pre-existed or developed after T2DM, depression can be particularly harmful among people with T2DM as it is a significant barrier to self-management behaviours (24,25) and diabetes outcomes (26,27). The presence of significant depressive symptoms is predictive of poorer compliance with dietary, physical activity and glucose testing recommendations (25) and medication non-adherence (24). Depression also increases risk of future microvascular and macrovascular diabetes complications (26,147) and all-cause mortality (27) in people with

diabetes. There is a growing body of literature that chronic subthreshold depression among people with T2DM can lead to similarly poor diabetes outcomes as those reported among people experiencing more severe episodic depressive disorder (114–116).

2.4 ORGANISATION AND MANAGEMENT OF T2DM CARE

In recent years, health systems have moved away from reactive, episodic management of chronic disease, including diabetes, in the acute setting and shifted management to the community where people can be managed at the lowest level of complexity (50). In many countries, efforts to achieve this for diabetes care have been through improving integration within and between care settings (51–55,148,149). Internationally and in Ireland, integrated care for diabetes has involved restructuring care to deliver routine care for uncomplicated diabetes cases and enhance diabetes specialist support in the community, and, co-ordinate management across primary and secondary care (51–55). Specialist community diabetes support services include; specialist diabetes nurses (150), community dietitians (151), and podiatrists (152). In line with this approach to diabetes care, management of T2DM internationally is either solely in primary care (uncomplicated T2DM) or shared between primary and secondary care (complicated T2DM), with T1DM management often occurring in secondary care only (153–158).

2.4.1 *Addressing diabetes distress and depression in T2DM care*

Given what is known about diabetes distress and depression in T2DM (discussed in sections 2.3.1 and 2.3.2 above), their appropriate management are crucial in T2DM care.

Effective interventions are available to improve symptoms of diabetes distress and depression among people with T2DM. Psycho-educational interventions and those targeting the emotional aspects of diabetes are most effective at decreasing diabetes distress (159). Individual and group-based diabetes-tailored psychological interventions are also effective in reducing severe diabetes distress (160–163). Psychological interventions, targeting emotional aspects (i.e. affect, well-being, resilience, coping and motivation) and/or cognitive aspects (i.e. Knowledge, comprehension or awareness about diabetes, medication taking, healthy lifestyle behaviours, goal setting and self-efficacy) to reduce diabetes distress are effective in improving self-efficacy (161,164) and HbA1c (160–163). Mathiesen and colleagues qualified that only interventions with four or more sessions resulted in changes in HbA1c (162). One available systematic review, which examined the effectiveness of self-efficacy-focused diabetes education programmes on diabetes distress, demonstrated positive changes in diabetes self-management behaviours (164). Other reviews did not include diabetes self-management as an outcome and no reviews included diabetes complications as an outcome(s). Some review authors concluded there is a need for higher quality trials in this area (161,164). Taken together, in the first instance, diabetes education programmes encompassing emotional aspects of T2DM should be used to

reduce diabetes distress. Where diabetes distress persists following education-based interventions, group based or individual intervention by a psychologist with expertise in diabetes may be required.

Regarding depression, between 2008 and 2022, several systematic reviews have examined the effectiveness of psychosocial e.g. peer support, psychological e.g. targeting emotional or cognitive aspects and/or pharmacological therapies on depression and diabetes outcomes among people with diabetes and co-occurring depressive symptoms or clinical depression (165–172). Interventions are effective in improving depression symptoms (165–174) and psychological therapies specifically also improve work and social functioning (172) and adherence to diabetes self-management regimes and depression medication (174). In a recent comprehensive review of different types of intervention, Van der Feltz and colleagues reported improvements in HbA1c following pharmacotherapy, group based psychological therapy, individual psychological therapy and collaborative care with higher HbA1c and higher depression symptoms predicting improvements in HbA1c levels (173).

An adapted stepped care model has been proposed to manage co-occurring depression in T2DM in primary care (175,176). The stepped care model for depression involves providing the least restrictive and least costly interventions prior to provision of higher intensity care (177). Adaptations for depression management in people with T2DM include psychoeducation about the links between depression and T2DM (if appropriate) and collaborative care (i.e. coordinated multidisciplinary depression care) (174,178–181). The

approach is in line with Van der Feltz and colleagues treatment recommendations for co-occurring depression or its symptoms based on the findings of their systematic review (173). Few cost data are available but one review including four USA based studies reported that collaborative care including psychological therapy may be more cost-effective than usual care (182).

2.5 DETECTION OF DIABETES DISTRESS AND DEPRESSION IN PEOPLE WITH DIABETES

2.5.1 *Defining detection*

Throughout this PhD thesis, the terms ‘detection’ and ‘recognition’ are used when discussing identification of diabetes distress and depression. The term ‘recognition’ is only used in the background chapter in the context of discussing existing literature (34,183,184). This term usually refers to diagnosis of depression and also other indications of clinical management (e.g. recording of the presence of depression or its symptoms in clinical notes, referral to mental health specialists, prescription of antidepressants) (34,183,184). The term ‘detection’ is used in the background chapter and throughout the PhD thesis to refer to the point of initial recognition of the presence of diabetes distress or depression by a diabetes HCP. It does not capture other indications of clinical management. Detection is used instead of the term ‘diagnosis’ because diabetes distress does not necessarily imply psychopathology (i.e. it is not viewed as a comorbid disorder or condition

(79,84)), and as such, it is not appropriate to “diagnose” diabetes distress. Detection is also used to capture identification of subthreshold levels of depression, which diabetes HCPs may not attach a depression diagnosis to, but as mentioned, are important in the context of T2DM (114–116).

2.5.2 *Understanding diabetes distress and depression detection and non-detection in T2DM*

Detection of both diabetes distress and depression are prerequisites for their appropriate subsequent management. No epidemiological estimates of diabetes distress detection are available. Regarding depression, evidence to date indicates varied rates of undetected depression among people with diabetes between low and higher income countries (29,30,185). For instance, in a nationally representative USA sample, approximately 45% of people with diabetes and co-occurring depression had not received a depression diagnosis (30). A similar proportion (40%) of a community-based T2DM population in Spain with diabetes and co-occurring depression had not previously received a diagnosis (185). Consistently lower levels of depression diagnosis have also been reported among people with T2DM attending diabetes outpatient departments across 14 predominantly low and middle income countries (29). Taken together, these studies may reflect regional differences in depression prevalence among people with T2DM (113) and/or country level factors influencing detection.

In general populations, country level factors (gross national income) explain more variation in depression diagnosis and management than in depression

prevalence (32,111). Health system specific factors may also play a role in explaining observed variation among people with T2DM. For instance, introduction of universal health care in Chile resulted in increased access to depression diagnoses among the general population there (186). Similarly, in the USA, having private health insurance (35) was associated with increased the odds of depression detection while no health insurance was associated with undiagnosed depression (30). Poorer access to depression treatment in lower income and less economic developed countries (111,112,187,188) may be a barrier to detection by HCPs if they are unable to subsequently offer appropriate management options (189).

Less is known about how different health care systems, particularly in high-income countries influence detection or interact with T2DM to do so. In their 2015 review, Menear and colleagues concluded that physical comorbidity does not consistently negatively affect depression recognition (i.e. symptom identification, antidepressant prescription or mental health referral) in primary care and that recognition may vary depending on the specific conditions or combination of conditions examined (190). The only diabetes specific study in the review reported that people with diabetes had increased odds of having depression detected by a heath professional (via HCPs self-reporting; a mental health problem as the main reason for the visit, the person having been depressed at some time during the previous 12 months, counselling the person for mental health problems during the visit, or referring the person to a mental health specialist) in primary care than did those without diabetes (36). Suggested explanations were HCP knowledge about the association between

depression and physical comorbidity, higher depression prevalence rates, and greater interaction with healthcare systems among people with diabetes than without (191,192). However, the finding of a protective effect of diabetes on detection is potentially at odds with qualitative evidence of HCPs citing a number of diabetes related barriers to detection (33), specifically, normalising depression or its symptoms as an understandable reaction to being diagnosed or living with diabetes and depression and diabetes symptom overlap (33). Other GP reported factors perceived to influence their detection of depression in primary care are: fear of stigmatization and misdiagnosing depression, a lack of time to detect depression during short primary care consultations and long waiting lists for specialised mental health care (33). Although research has not yet directly linked HCP weight or diabetes stigma to diabetes distress or depression detection among people with T2DM, weight stigma is common among diabetes HCPs and has been associated with provision of poorer quality health care and poorer quality patient-HCP communication regarding weight management and health behaviour change (91,193). Relatedly, the presence of diabetes stigma (from others) has been associated with poorer quality patient-HCP interactions (91).

People with T2DM factors influencing help seeking behaviour may influence detection via non-disclosure, reluctance to accept a diagnosis or treatment, poorer quality patient-HCP interactions and non-attendance at diabetes appointments. Poor mental health literacy (194), internalised mental health stigma and fear of disclosure (195) and self-reliance (196) are negatively associated with help-seeking. These factors also interact with each other so

that mental health stigma impacts some groups, such as men and young people, more than others (195). In addition, since weight stigma is a deterrent to healthcare utilisation (193), and internalised diabetes stigma with poorer quality patient-HCP interactions (91), people with T2DM may also contribute to non-detection via non-attendance at appointments and poorer quality patient-HCP communication during appointments. Demographic factors, being separated or divorced and having a higher level of educational attainment have been identified as determinants of depression diagnosis in general populations (32). People who were widowed versus married/cohabiting or living in rural versus urban locations had reduced odds of depression diagnosis (32). Female gender (30,32), co-occurring physical comorbidity (30,32,35) and higher numbers of stressful life events in the past year (psychological stress) (35) have been associated with both receiving and a depression diagnosis and having undiagnosed depression. Whereas, other demographic (age (30,32) employment status (30,32) race/ethnicity (30), behavioural (smoking status) and health (body mass index (BMI)) (30) factors do not appear strongly associated with depression detection outcomes (30) i.e. diagnosed and/or undiagnosed depression.

Finally, depression related factors influence its detection by non-mental health specialists. Specifically, decreasing depression severity, decreasing number of depression symptoms, dysthymia and the absence of comorbid anxiety disorders have been associated with non-recognition of depression by GPs (34).

2.6 SCREENING AS A STRATEGY TO IMPROVE DIABETES DISTRESS AND DEPRESSION DETECTION AMONG PEOPLE WITH T2DM

2.6.1 *A problem with the status quo to detect diabetes distress and depression in T2DM care?*

Despite recommendations over the past 25 years encouraging wellbeing in people with diabetes (197), evidence from the diabetes attitudes wishes and needs (DAWN) study demonstrates that people with T2DM are not routinely asked about their mental or emotional health during interactions with diabetes HCPs. In 2013, the group reported that one third of people with diabetes across 17 countries were asked by a member of their healthcare team in the last year if they had been anxious or depressed. This ranged from 14.6% to 57.3% across countries. 15% of people with diabetes, ranging from 6.6% to 45.1% across countries, were asked by a member of their healthcare team most or all of the time about how diabetes affects their life (198).

2.6.2 *Overview of screening interventions*

Depression screening interventions have been widely used in general primary care populations to increase depression detection (37,199–202). These have also been used to increase detection of both diabetes distress and depression among people with diabetes, including T2DM (28,37–48,203). At a minimum, screening interventions have involved administration of a screening tool and if indicated, the corresponding full item assessment scale by a health professional to determine the presence or absence of diabetes distress and/or

significant depressive symptoms (39,40,44,200,201). Other interventions have embedded screening as part of structured diabetes distress and/or depression management programmes (28,37,38,199–203). Of interventions screening people with diabetes in community settings, these have been delivered by different members of the primary and community-based diabetes care team, namely GPs and practice nurses (39,40,44–47), diabetes nurse specialists (38) and pharmacists (37).

Screening interventions in diabetes have employed one or more of the effective and available screening and corresponding full item self-assessment tools. Of the six scales identified in the literature as being used to assess diabetes distress (82), the Problem Areas in Diabetes (PAID) scale and the Diabetes Distress Scale (DDS) are the most prominent (76,204). For diabetes distress, 'diagnostic' testing can be completed using the PAID-5 (205), PAID-20 (204) and DDS-17 (76). Screening scales, the PAID-1 (205) and the DDS-2 (206) have been developed as psychometrically robust short-form measures of the PAID and DDS scales which are suitable for screening. The full versions of the PAID and the DDS are both psychometrically sound instruments and provide comparable estimates of diabetes distress (207). The DDS is suggested for use if: (1) different areas of diabetes distress are to be assessed separately, (2) relationships between distress and selfcare or metabolic outcomes are to be evaluated and (3) cross-cultural comparisons regarding distress are desired. The PAID should be considered if: (1) the whole variety of diabetes-related concerns is to be analysed, (2) the impact of diabetes

distress on quality of life or depression will be appraised, or (3) comparisons of distress across diabetes types are intended (207).

Diagnostic interviews, such as the Structured Clinical Interview for DSM-5 (SCID-5) disorders (208) or the Schedule for Clinical Assessment in Neuropsychiatry 2.1 (209) represent the gold standard for the diagnosis of mental disorders. These interviews are lengthy and non-mental health specialists are not usually trained in their administration. As such, depression symptom self-assessment tools which are closely aligned to standard psychiatric interview criteria for diagnosis of major depressive disorder and are recommended to indicate the presence of possible mild, moderate and severe depression symptomatology by GPs and inform management decisions (177,210). The Patient Health Questionnaire (PHQ-9) (211,212), Beck Depression Inventory (BDI-II) (213), Center for Epidemiological Studies Depression Scale (CES-D) (214) and the Hospital Anxiety and Depression Scale (HADS) (212,215) are self-reported symptom measurement scales validated for depression for use in diabetes populations. The BDI-II, CES-D and HADS demonstrate the most clinical specificity and sensitivity, and the PHQ-9 demonstrates the best validity among people with diabetes (212). Authors of a 2019 systematic review of the diagnostic accuracy of depression questionnaires in adults with diabetes recommended either the PHQ-9 (with a cut-off score of ≥10) or the CES-D (with a cut-off score of ≥16) (216). The PHQ-9 short form, the PHQ-2 is widely available and recommended for use as an initial first step in depression assessment in general primary care populations (210).

Cut off scores indicating the need for administration of a full item diabetes distress scale and subsequent depression assessment have been established (205,206,210). Specifically, those responding ≥3 on the PAID-1 (205), whose average of the two DDS-2 screening items is ≥3, or whose sum is ≥6 (206) and scoring ≥2 on the PHQ-2 should be followed up for additional assessment (217).

2.6.3 *Effectiveness of screening interventions*

Among people with diabetes, most evidence has found diabetes distress or depression assessment using screening and/or full-item assessment scales resulted in newly identified cases in community care settings (37,41,42,44,46,47). The largest of these studies was a time series analysis across 65 general practices in Leeds, UK. Incentivised depression screening of people with diabetes and heart disease resulted in increased diagnoses among those in the targeted group i.e. with diabetes and heart disease and to a lesser extent, those outside of the targeted group (41). There is also some evidence of limited impact on detection of new depression cases in primary care, possibly related to rural practice location (39,40) and results from diabetes outpatient populations are mixed regarding the effects on treatment uptake (218,219). Research is currently being undertaken to synthesise the available evidence on this topic and understand differences in screening and assessment impact e.g. due to mode of administration, HCP type and T2DM care setting, among people with T2DM (220). In the meantime, there is strong evidence that depression screening in general adult populations increases detection of depression in primary care populations compared to usual

practice (199–202). As in diabetes populations, the effects on depression treatment initiation are mixed (199–202), with higher levels of new treatment initiation reported when screening is embedded as part of structured depression management programmes (199,200,202).

No economic evaluations are available of diabetes distress screening programmes. One available economic evaluation of changes to the care pathway for people with T2DM and depression i.e. depression case-finding and collaborative care suggested these strategies may lead to a reduction in diabetes related complications and depression. Specifically, the combined policy of collaborative care and annual depression screening avoided the greatest proportion of diabetes related complications (1.5%), compared to either policy alone and had the greatest impact on life years and quality adjusted life years (QALYs) (221). Only the policy change of collaborative care (but not screening or screening and collaborative care combined) was estimated to be cost-effective under the UK National Health Service threshold (176).

2.6.4 *Debate about screening in community T2DM care*

Although screening has been delivered as part of community-based diabetes care (37–40,44–47), debate exists as to whether or not the psychological burden of T2DM is prevalent to an extent warranting screening in these settings. Some authors have argued in favour of community-based screening citing most people with T2DM are managed in the community (176,222) and there is a high level of latent depression among people with diabetes managed

there (223,224). High levels of diabetes distress have also been reported in community-based samples (17). Those arguing against screening in the community cite evidence of lower levels of psychological comorbidity among people with T2DM managed in community compared to secondary care i.e. diabetes outpatient clinics (225). Nonetheless, diabetes distress and/or depression screening of all adults with diabetes is recommended in many contemporary evidence-based guidelines (see Table 2.1).

2.7 SCREENING IMPLEMENTATION IN PRACTICE

Despite diabetes distress and/or depression screening recommendations in several countries (Table 2.1), it's acceptability and relevance to people with T1DM (226), considerations for implementation based on person with diabetes perspectives (227,228), and evidence of its feasibility and acceptability in intervention studies (44,226), real world implementation of incentivised depression screening of people with diabetes and heart disease in UK general practice settings was suboptimal (229) and subsequently removed due to questions about its efficiency and acceptability (49). Suboptimal levels of depression screening implementation in general practice populations by nurses in the USA have also been reported which were partly explained by nurse speciality (acute care, adult, family, women's health) and thus possibly related to differences in nurse training (230). In the context of depression screening of people with diabetes and heart disease in the UK, acceptability issues may have related to GPs' preference for clinical questioning as

opposed to screening to detect depression in general practice populations (189). There is evidence that nurses, who were primarily responsible for implementing the UK programme, did not always ask screening questions, or did so in a way that discouraged positive responses to screening questions by those being screened (189). This was thought due to nurse' uncertainty about how to ask questions and have safe and contained conversations about patients' mental health (189). Nothing is known about the implementation of diabetes distress screening.

It remains unclear what, if any of these health professional determinants differ across health professional groups and other potential barriers to screening implementation may operate at structural (e.g. financial disincentives), organizational (e.g. inappropriate skill mix, lack of facilities or equipment), peer group (e.g. local standards of care not in line with desired practice), and professional-patient interaction (e.g. communication and information processing issues) levels (231). Structural factors influencing access to depression diagnosis in general populations (30,32,35,20(189).) may also influence screening implementation. Indeed, patients' health insurance type has been associated with depression screening rates in general primary care populations among practice nurses in the USA (230). In the context of diabetes, competing physical health needs may influence screening implementation, whereby health professionals working in general practice are less likely to administer depression screening protocols to those with more complex T2DM (233).

2.8 CHANGING HEALTH PROFESSIONAL BEHAVIOUR TO IMPROVE SCREENING IMPLEMENTATION

As discussed in section 2.7, screening recommendations have not been well implemented in the real world. Understanding the HCP behavioural determinants of screening is a necessary first step to improve its implementation in practice (234). The intention is that by understanding behavioural determinants, specific implementation strategies can be selected to minimise identified barriers and capitalise on identified enablers to undertaking evidence-based practices in context (234)(235). Available determinant frameworks have been informed by ecological, implementation and behavioural science theory (235). While no one theoretical approach is currently recommended (above others), there is consensus that the use of appropriate theory is important in identifying determinants of implementation (235). As well as understanding implementation, behavioural science theory can be helpful in conceptualising complex behaviour change interventions, in both planning interventions and evaluating outcomes such as highlighting the constructs or types of individuals that should be targeted by interventions (236).

Evidence-based recommendations should be clearly specified (i.e. state who should do what, with who, and when) to best promote the uptake of research into practice (237,238). Although many contemporary T2DM guidelines recommend screening or clinical questioning of all people with T2DM (Table 2.1), these are inconsistently and not well specified. With the exception of

guidelines for Ireland (239,240), assessment is recommended through the administration of screening and assessment tools (158,241–244). Guidelines specific to screening do not specify which HCP should screen (158,241–244) and most use vague terminology like “regularly” or “periodically” (158,242,243) to indicate when screening should be done. Only the 2018 Canadian clinical practice guidelines (242) explicitly states that all people with diabetes should be assessed. However, in recent years, targeted screening approaches i.e. of people with T2DM and demographic and/or psychosocial risk factors for diabetes distress and depression has been proposed as a more efficient use of limited health system resources (245,246). Of the guidelines naming specific screening tools possible screening and assessment tools to use (241–244), the patient health questionnaire (PHQ) was consistently recommended for depression (241,242,244). There were discrepancies between guidelines in the diabetes distress screening and assessment tools listed (242,243). For these reasons, the application of behavioural science theory may be particularly helpful in understanding screening implementation and informing screening guideline and intervention specification.

Table 2.1 - Summary and timeline of recommendations relating to screening and clinical questioning about diabetes distress and depression

Title	Country	Year	Recommendation
Psychosocial factors and diabetes mellitus: evidence-based treatment guidelines (247)	Germany	2005	When presented with unspecific complaints, depression should be taken into consideration in terms of differential diagnostics…As part of the screening questions for depressive disorders, **the physician should inquire** about depressive mood (despondency, hopelessness), loss of interest and pleasure in activities, and reduction in drive. If signs of depression are present, the physician always should ask about suicidal thoughts and impulses.
Common Mental Health Problems - Identification and Pathways to Care (244)	UK	2011	Be alert to possible depression (particularly in people with…a chronic physical health problem with associated functional impairment) and consider **asking people who may have depression two questions, specifically:** • During the last month, have you often been bothered by feeling down, depressed or hopeless? • During the last month, have you often been bothered by having little interest or pleasure in doing things?

Title	Country	Year	Recommendation
			If a person answers 'yes' to either of the above questions consider depression and follow the recommendations for assessment
Psychosocial care for people with diabetes: a position statement of the American Diabetes Association (248)	USA	2016	Providers should consider an assessment of symptoms of diabetes distress, depression, anxiety, and disordered eating and of cognitive capacities **using patient-appropriate standardized/validated tools** at the initial visit, at periodic intervals, and when there is a change in disease, treatment, or life circumstance.
International Diabetes Federation Clinical Practice Recommendations for managing Type 2 Diabetes in Primary Care (241)	International	2017	**Screening for depression with a validated tool** should be encouraged in primary care diabetes clinics.
Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada (242)	Canada	2018	Individuals with diabetes should be regularly screened for **diabetes-related psychological distress** (e.g. diabetes distress, psychological insulin resistance, fear of hypoglycemia) **and psychiatric disorders** (e.g. depression, anxiety disorders) **by validated self-report questionnaire or clinical interview**
Model of Integrated Care for Patients with Type 2 Diabetes A Guide for Health Care Professionals	Ireland	2018	Practice nurses should also **ask about psychological wellbeing**

Title	Country	Year	Recommendation
(Clinical Management Guidelines) (239)			
Diagnosis and Management of uncomplicated Type 2 Diabetes Mellitus in Adults (T2DM): A succinct practical guide for Irish General Practice (240)	Ireland	2019	HCPs in general practice should periodically assess for psychiatric disorders in people with diabetes
Note. Selection of guidance documents summarised in table 2.1 was informed by Speight and colleagues (197), the special interest in this PhD thesis on the Irish context and by searching the literature.			

2.9 SUMMARY

Diabetes is one of the most concerning global public health challenges of the 21st century (1). As well as physical health related complications (11–16) emotional and psychological comorbidity is also common among people with T2DM (17–20). Available data has shown that diabetes distress and depression often go undetected among people with T2DM (28–30,249). However, patterns across health systems in high income countries remain unclear, as does the influence of diabetes related factors on detection. Most available studies show that screening is an effective strategy to increase detection of these issues among people with T2DM (28,37–48). Although the majority of routine T2DM care is community-based in most high-income countries, little is known about diabetes distress or depression screening implementation in this setting or indeed those factors influencing implementation.

2.10 AUTHOR CONTRIBUTION

I was the lead author of each research paper presented in Chapters 3, 4 and 5. This involved formulation of the research question for each chapter, literature screening, data collection and analysis, and drafting each manuscript. My supervisors, Prof. Patricia Kearney, Dr Sheena McHugh and Dr Elaine Toomey guided me on the study design, data analysis and interpretation for all research papers. Chapter 3 involves analysis of publicly

available data from three national ageing cohort studies; The Irish Longitudinal Study on Ageing, The English Longitudinal Study on Ageing and the Health and Retirement Survey. I obtained and prepared the datasets for analysis. Together with my supervisors, Dr Kate O'Neill advised on the statistical analysis for this work and reviewed manuscripts. Chapter 4 involved an evidence synthesis of qualitative data. Drs Emmy Racine, Brenda Lynch and Elaine Toomey were second reviewers during the screening and/or data extraction stages of the review and reviewed manuscripts. Chapter 5 involved primary qualitative data collection using semi-structured interviews. I collected data for this study and Dr Kate Gajweska was a second coder and reviewed manuscripts. Co-author contributions in Chapters 3 – 5 are reported as part of the methods sections.

3 EPIDEMIOLOGY OF UNDIAGNOSED DEPRESSION IN PEOPLE WITH DIABETES MELLITUS; A COMPARATIVE ANALYSIS OF IRELAND, ENGLAND AND THE USA

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3.1 ABSTRACT

Objectives: Improving detection of depression in people with diabetes is recommended. However, little is known about how different health systems compare in depression detection. We estimated and compared the; (1) prevalence of depression detection in people with and without diabetes and, (2) association between diabetes and undiagnosed depression across 3 health systems.

Design: Cross-sectional analysis of 3 nationally representative studies; The Irish Longitudinal Study on Ageing, the English Longitudinal Study on Ageing, and the Health and Retirement Survey.

Setting: Community dwelling adults in Ireland, England and the USA.

Participants: Adults aged ≥50 years.

Primary and secondary outcome measures: The primary outcome was depression diagnosis. The secondary outcome was any depression. Any depression was defined by the presence of self-reported doctor-diagnosed depression or current depression symptoms on the Centre for Epidemiological Studies-Depression scale. Depression diagnosis was categorised as; undiagnosed, symptomatic and diagnosed, and asymptomatic and diagnosed. We estimated age standardised prevalence of depression diagnosis by country and diabetes status. Anyone who self-reported having ever received a doctor diagnosis of diabetes were classified as having diabetes. Among respondents with depression, we estimated the association between diabetes

and undiagnosed depression by country using multivariable logistic regression.

Results: The prevalence of depression (diagnosed and undiagnosed) was higher in people with diabetes in each country with absolute rates varying by country; undiagnosed prevalence [Ireland: Diabetes 10.1%(95%CI:7.5-12.8) vs No Diabetes 7.5%(95%CI:6.8-8.2), England: Diabetes 19.3%(95%CI:16.5-22.2) vs No Diabetes 11.8%(95%CI:11.0-12.6), USA: Diabetes 7.4%(95%CI:6.4-8.4) vs No Diabetes 6.1%(95%CI:5.7-6.6)]. In the fully adjusted model, there was no clear pattern of association between diabetes status and undiagnosed depression; Ireland: OR=0.82(95%CI:0.5-1.3), England: OR=1.47(95%CI:1.0-2.1), USA: OR=0.80(95%CI:0.7-1.0).

Conclusions: Although undiagnosed depression was more prevalent among people with diabetes, the relationship between diabetes and undiagnosed depression differed by country. Targeted efforts are needed to improve depression detection among community-dwelling older adults, particularly those with diabetes.

Keywords: Prevalence, Diabetes Mellitus, Depression, Adults, Population surveys

3.2 INTRODUCTION

Diabetes is a serious global public health issue with type 2 diabetes accounting for approximately 90% of cases (250). Between 1980 and 2014, the number of people with diabetes has almost quadrupled worldwide (2). Diabetes can lead to complications that adversely impact people with diabetes and burden health systems (251). Depression among people with diabetes is of growing concern. Depression is commonly reported as being three-times higher in people with type 1 diabetes and nearly twice as prevalent in people with type 2 diabetes compared to those without (18). Among people with diabetes, depression is associated with increased risk of developing diabetes-related complications (26) increased mortality (27), and increased costs to health systems (252). Prevalence estimates among people with type 2 diabetes vary across regions (113). However, less is known about the breakdown of depression by its detection status i.e. undiagnosed, diagnosed and symptomatic, diagnosed and asymptomatic (29,30). Although variation in access to depression diagnosis and treatment in different countries has been reported in type 2 diabetes populations (29), there is a paucity of up-to-date nationally representative prevalence estimates of depression detection outside of the USA (30). Cross-country comparisons of depression diagnosis are needed in diabetes populations because country level factors may influence access to depression diagnosis and treatment (32). This may be due to health system differences influencing depression detection and management (32,186,253), such as health system financing (186) and depression management (253). For instance, implementation of universal

health care for depression in Chile resulted in increased self-reported depression diagnoses or physician consultations for depression (186). Regarding management, higher rates of antidepressant prescribing in the USA compared to the UK are associated with more conservative prescribing guidelines for depression in the UK (253).

Diabetes has been associated with increased odds of depression diagnosis and treatment in the USA (36). However, the consistency of this association has not been compared across countries, despite health system differences in diabetes care which may influence the likelihood of depression and subsequent detection. For instance, poorer quality diabetes care may influence the likelihood of depression diagnosis in people with versus without diabetes via increased psychological burden of diabetes. A 2018 study demonstrated an association between quality of diabetes care and depression outcomes in people with diabetes in Europe, using Euro Diabetes Index indicators for detection, care processes, access to care, and outcomes (133). Specifically, in countries scoring in the highest quartile, having diabetes was associated with a 3% relative increase in depressive symptoms (95% CI 1.00–1.05) compared to a 22% (1.14–1.31) relative increase in countries scoring within the lowest quartile of diabetes care quality (134). The authors suggested related pathways for this association may include financial aspects of diabetes care, access to services and differential exposure to social determinants of heath. These findings suggest that improved quality of diabetes care may reduce some of the psychological burden associated with living with diabetes (134). Countries vary in the extent to which psychosocial care is integrated

into diabetes care (254). In 2012, approximately 70% of diabetes health professionals surveyed in the UK indicated major improvements were needed in the provision of psychological support and care compared to approximately 50% of USA counterparts (254).This study uses data from 3 nationally representative surveys of adults aged 50 years and older in Ireland, England and the USA i.e. 3 high-income countries with different health system financing and organisation of diabetes care (Appendix 8.1, Table 8.1) to estimate and compare the; (1) prevalence of depression detection in people with and without diabetes and, (2) association between diabetes and undiagnosed depresson.

3.3 METHODS

3.3.1 *Study design and data sources*

We conducted a cross-sectional analysis of 3 nationally representative ageing studies of community dwelling adults aged ≥ 50 years in the Republic of Ireland (The Irish Longitudinal Study on Ageing; TILDA) (255), England (The English Longitudinal Study on Ageing; ELSA) (256) and the USA (the Health and Retirement Study; HRS) (257). Established after HRS, TILDA and ELSA were designed to be comparable with HRS. All 3 studies collect detailed self-report sociodemographic, physical and mental health information (255–257). We used data from wave 1 TILDA (255), wave 5 ELSA (256) and wave 10 RAND HRS (257) which use corresponding data collection periods i.e. 2009-2011 (TILDA) and 2010 (ELSA and HRS). RAND HRS is a cleaned version of HRS

which more closely corresponds with TILDA and ELSA. Table 3.1 details the design and population of each survey.

Table 3.1 - Design characteristics of TILDA, ELSA and HRS surveys

	TILDA (wave 1) (255)	**ELSA (wave 5)** (256)	**HRS (wave 10)** (257)
Sampling frame at wave	The sampling frame used for wave 1 TILDA was the Irish Geodirectory; a comprehensive and up-to-date list of all residential addresses in Ireland	The sampling frame used for wave 5 ELSA was comprised of participants of the Health Survey for England from years 1998, 1999, and 2001 and two refreshment samples drawn from the Health Survey for England from years 2001-2004 and 2006	The sampling frame used for wave 10 HRS comprised 6 cohorts born during different periods; the initial HRS cohort (born 1931–41), the Asset and Health Dynamics Among the Oldest Old (born 1890-1923), the Children of the Depression (born 1924-30), War Babies (born 1942–47), Early Baby Boomers (born 1948–53) and Mid Baby Boomers (born 1954–1959)
Sampling design	Multistage probability sampling with each residential address in the country having an equal probability of selection	Multistage stratified probability sampling with postcode sectors selected at the first stage and household addresses selected at the second stage (Health Survey for England)	Multi-stage area probability design involving geographical stratification and clustering and oversampling of certain demographic groups (all 6 cohorts)

	TILDA (wave 1) (255)	**ELSA (wave 5)** (256)	**HRS (wave 10)** (257)
Data collection period at wave	2009-2011	2010	2010
Data collection method	Face-to-face	Face-to-face	Up until 2006, interviews were conducted face-to-face. Since 2006, half of the sample are assigned a face-to-face interview and the other half a telephone interview. Respondents aged 80 years and older complete face-to-face interviews
Survey response rate at wave	62%	78%	89%
Sample size	8504	9522	21041

3.3.2 *Patient and public involvement*

This is a secondary analysis using data from the TILDA, ELSA and HRS studies. Adults aged 50 years and older, with or without diabetes, were not directly involved in the design or conduct of this study.

3.3.3 *Variables and definitions*

Diabetes mellitus

Anyone who self-reported having ever received a doctor diagnosis of diabetes was classified as having diabetes. All others were classified as having no diabetes.

Depression

Depression symptoms were assessed using the 8-item Centre for Epidemiological Studies-Depression (CES-D) self-report depression symptom measure (258,259). Due to different response formats across surveys (i.e. 4-item response in TILDA and 2-item response in ELSA and HRS), the maximum CES-D score in TILDA is 24 and 8 in ELSA and HRS. We applied the recommended CES-D cut-off score of ≥9 for TILDA respondents (258) and ≥4 for ELSA and HRS respondents (260) to indicate the presence of depression symptoms.

In each survey, participants were asked; ‘Has a doctor ever told you that you have a psychological disorder.’ TILDA and ELSA participants who answered yes then indicated from a list provided, the problem they currently have or

previously had. Those who indicated having ever received a diagnosis of 'depression' were categorised as having ever received a depression diagnosis. HRS participants who responded yes to the question; 'Has a doctor ever told you that you have (chronic) depression?' were categorised as having ever received a depression diagnosis.

'No depression' was defined as scoring below the CES-D cut-off score and having never received a doctor diagnosis of depression. 'Any depression' was defined as meeting the CES-D cut-off score or self-reporting having ever received a doctor diagnosis of depression. Depression was categorised as;

- *Diagnosed and asymptomatic:* Respondents who self-reported doctor diagnosed and did not meet CES-D cut-off score
- *Diagnosed and symptomatic:* Respondents who self-reported doctor diagnosed depression and met CES-D cut-off score for depression symptoms
- *Undiagnosed depression:* Respondents who did not self-report doctor diagnosed depression and met CES-D cut-off score.

Covariates

Known factors across individual and health system levels associated with depression diagnosis and which may differ between people with and without diabetes were selected from the literature. These were; sociodemographic (gender, age, ethnicity, education, marital status), physical health (presence of cardiovascular disease, number of additional chronic conditions, disability)

(30,32) and access to health care (35,186). Ethnicity was categorised as white or non-white. As ethnicity was unavailable in TILDA, all participants were assigned 'white'. To measure education, we applied the same procedures as other authors (261). In TILDA and ELSA, education was measured according to the International Standard Classification of Educational Degrees (ISCED-97) and regrouped into 'low education' (pre-primary, primary or lower secondary education), 'medium education' (secondary or post-secondary education), and 'high education' (first and second stage of tertiary education). Corresponding levels in HRS were defined as 'low education' (less than high school) 'medium education' (high school education) 'high education' (some college or a college degree). Marital status was categorised as; married, separated or divorced, widowed, never married. The presence of disability was defined as having self-reported limitations in 1 or more of the 6 basic Activities of Daily Living (ADL) or of the 7 Instrumental Activities of Daily Living (IADL) (262). Presence of cardiovascular disease was based on the presence of heart problems comprising angina, heart attack, congestive heart failure, a heart murmur, an abnormal heart rhythm, stroke, or any other heart trouble (TILDA and ELSA) and, heart attack, coronary heart disease, angina, congestive heart failure, stroke, or other heart problems (HRS). A continuous variable, other chronic conditions, was derived using self-report doctor diagnosed arthritis, cancer, dementia or other memory problems and lung disease. Regarding health insurance, TILDA and ELSA respondents were categorised as having: (1) dual coverage – government and private, (2) private insurance only (3) public insurance only, and (4) no health insurance. HRS respondents were categorised as having: (1) dual coverage – public and private, (2) private

insurance only (3) public insurance – Medicare, (4) public insurance – Medicaid, and (5) no health insurance.

3.3.4 *Analysis*

Prevalence of depression by diabetes status and depression diagnosis.

We reported unadjusted and age standardised depression prevalence estimates by diabetes status and depression diagnosis for each country as a percentage with corresponding 95% confidence intervals and further stratified estimates by sex. Age standardised estimates were calculated separately for each survey using marginal standardisation, to make inferences to the populations drawn from individual countries (263). We applied regression based standardization, an equivalent to direct standardization (264). To do this, we ran age adjusted logistic regression, followed by Stata's postestimation 'margins' command.

Association between diabetes and undiagnosed depression among people with depression

We performed crude and adjusted logistic regression among respondents who self-reported any depression. We combined the asymptomatic and diagnosed depression and symptomatic and diagnosed depression categories into 1 'diagnosed' depression reference category. Covariates were added to the model in blocks: sociodemographic variables first (age sex, ethnicity, education status, marital status, then physical health status (cardiovascular

disease, number of additional chronic conditions, disability), then access to health care (health insurance type).

Analyses were conducted in Stata version 15 using the ‘svy’ function. Data from individual surveys were analysed separately with corresponding survey sampling weights applied to adjust for differential non-response and to reduce the potential for participation or selection bias (255–257). A complete case analysis was carried out.

3.3.5 *Ethical considerations*

Ethical approval was obtained from the Social Research Ethics Committee (SREC), University College Cork (reference number 2018-160). TILDA was approved by the Trinity College Dublin Research Ethics Committee (255), ELSA by the South Central Berkshire Research Ethics Committee (256) and HRS by the University of Michigan Health Science/Behavioural Sciences Institutional Review Board (257).

3.4 RESULTS

For the purpose of reporting the results, we refer to data relating to TILDA as ‘Ireland’, to ELSA as ‘England’ and to HRS as ‘USA’.

3.4.1 *Sample characteristics*

The analytic sample was; 8120 (Ireland), 8633 (England) and 18608 (USA), after removing individuals with missing data (Ireland <1% (n=27), England <1% (n=38) and USA 3% (n= 620). Sample characteristics of the population by country are provided in Appendix 1 supplementary file 2. Respondents from England were on average older than respondents from the USA and Ireland and a higher proportion of USA respondents than those from Ireland and England were female (supplementary file 2). Prevalence of diabetes also varied across countries; Ireland: 8.0% (95% CI:7.4-8.6), England: 11.0% (95% CI:10.3-11.7), USA; 18.8% (95% CI:18.1-19.5) and depression; Ireland: 12.8% (95% CI:11.9-13.8), England: 19.5% (95% CI:18.6-20.4), USA; 26.7% (95% CI:25.9-27.6) (Appendix 8.1, Table 8.2). Table 3.2 reports sample characteristics by diabetes status and country.

Table 3.2. - Characteristics and depression status of TILDA, ELSA and HRS participants by diabetes status

	Ireland n (%)		England n (%)		USA n (%)	
	DM N = 629	**No DM N = 7491**	**DM N = 942**	**No DM N = 7691**	**DM N = 4011**	**No DM N = 14597**
Female gender	264 (42)	4131 (53)	441 (46)	4333 (54)	2186 (51)	8606 (56)
Age (mean, SD)	67 (SD = 8.7)	63 (SD = 9.1)	69 (SD = 8.9)	67 (SD = 9.1)	66 (SD = 10.1)	64 (SD = 11.0)
Non-white ethnicity	Unavailable	Unavailable	49 (7)	192 (3)	1378 (23)	3633 (15)
Education status						
Low	400 (72)	3973 (63)	375 (43)	2229 (32)	1284 (26)	3090 (16)
Medium	162 (22)	2438 (28)	239 (25)	2113 (28)	1153 (29)	4222 (28)
High	67 (6)	1080 (9)	256 (24)	2768 (33)	1574 (45)	7285 (56)
Other			72 (7)	581 (8)		
Marital status						
Married	419 (65)	5189 (68)	584 (63)	5306 (70)	2480 (63)	9394 (67)
Separated	38 (6)	509 (7)	94 (10)	794 (10)	571 (15)	2134 (14)
Widowed	115 (20)	1063 (15)	217 (22)	1175 (15)	760 (16)	2294 (12)
Never married	57 (9)	730 (10)	47 (5)	416 (5)	200 (6)	775 (7)
Health						
Disability	128 (22)	751 (11)	336 (38)	1534 (20)	1304 (30)	2724 (16)
CVD	207 (33)	1408 (19)	309 (33)	1600 (20)	1540 (37)	3312 (20)
Other chronic conditions (mean, SD)	0.5 (SD = 0.6)	0.4 (SD = 0.6)	0.7 (SD = 0.7)	0.5 (SD = 0.7)	0.9 (SD = 0.8)	0.7 (SD = 0.7)
Health insurance						
Any private	299 (43)	4384 (54)	79 (8)	1091 (14)	1987 (56)	8713 (67)
Public	287 (50)	2311 (35)	863 (92)	6660 (86)	N/A	N/A
Medicare	N/A	N/A	N/A	N/A	1485 (32)	3811 (21)

	Ireland n (%)		England n (%)		USA n (%)	
	DM N = 629	**No DM N = 7491**	**DM N = 942**	**No DM N = 7691**	**DM N = 4011**	**No DM N = 14597**
Medicaid	N/A	N/A	N/A	N/A	155 (3)	386 (2)
None	43 (7)	796 (11)	N/A	N/A	384 (10)	1687 (10)

DM = Diabetes

N/A = Not applicable

3.4.2 *Prevalence of depression by diabetes status and diagnosis*

Age adjusted estimates are reported in Table 3.2. Depression prevalence varied across countries but within countries, depression prevalence was higher in people with diabetes compared to those without; Ireland: 17.5% (95% CI:14.3-20.8) vs 12.4% (95% CI:11.5-13.3), England: 27.2% (95% CI:24.0-30.3) vs 18.5% (95% CI:17.6-19.5), USA; 34.1% (95% CI:32.2-36.0) vs 25.1% (95% CI:24.2-26.0) (Table 3.3). We observed similar patterns when prevalence estimates were stratified by sex (Table 3.3). Unadjusted depression prevalence by diabetes status and depression diagnosis are reported in Appendix 8.1, Table 8.3.

Prevalence of undiagnosed depression was also higher in people with diabetes; Ireland: 10.1% (95% CI:7.5-12.7) vs 7.5% (95% CI:6.8-8.2), England: 19.4% (95% CI:16.6-22.1) vs 11.7% (95% CI:11.0-12.5), USA; 7.3% (95% CI:6.4-8.3) vs 6.1% (95% CI:5.7-6.6) (Table 3.3). Age adjusted prevalence of depression by diagnosis and diabetes status stratified by sex is reported in Figure 3.1 and Figure 3.2. When stratified by sex, prevalence of undiagnosed depression was similar (Ireland, USA) or higher (England) in males and females with than without diabetes (Figure 3.1 and Figure 3.2). Unadjusted estimates are reported in Appendix 8.1, Table 8.3.

Table 3.3 - Prevalence of depression by diabetes status stratified by type and by sex

	Ireland n (%, 95% CI)		England n (%,95% CI)		USA n (%,95% CI)	
	DM N = 629	No DM N = 7491	DM N = 942	No DM N = 7691	DM N = 4011	No DM N = 14597
Depression status by type						
Any	105 (17.5, 14.3-20.8)	920 (12.4, 11.5-13.3)	238 (27.2, 24.0-30.3)	1390 (18.6, 17.7-19.5)	1343 (34.1, 32.2-36.0)	3660 (25.1, 24.2-26.0)
Diagnosis						
Undiagnosed	61 (10.1, 7.5-12.7)	533 (7.5, 6.8-8.2)	176 (19.4, 16.6-22.1)	875 (11.7, 11.0-12.5)	372 (7.3, 6.4-8.3)	1028 (6.1, 5.7-6.6)
Symptomatic	22 (4.0, 2.3-5.7)	142 (1.9, 1.6-2.2)	30 (4.0, 2.5-5.5)	210 (2.9, 2.5-3.4)	414 (11.1, 9.7-12.4)	988 (6.5, 6.0-7.0)
Asymptomatic	22 (3.6, 2.1-5.1)	245 (3.0, 2.6-3.5)	32 (3.7, 2.4-4.9)	305 (3.8, 3.4-4.3)	557 (15.9, 14.3-17.4)	1644 (12.4, 11.7-13.1)
Any depression (by sex)						
Female	59 (21.7, 17.6-25.7)	593 (14.8, 13.6-16.1)	132 (32.0, 28.3-35.6)	916 (21.5, 20.2-26.3)	876 (40.8, 38.5-43.0)	2559 (30.0, 28.9-31.2)
Male	46 (14.6, 11.7-17.5)	327 (9.7, 8.7-10.8)	106 (23.3, 20.2-26.3)	474 (15.0, 13.816.3)	467 (27.3, 25.3-29.3)	1101 (19.0, 17.8-20.1)

DM = Diabetes

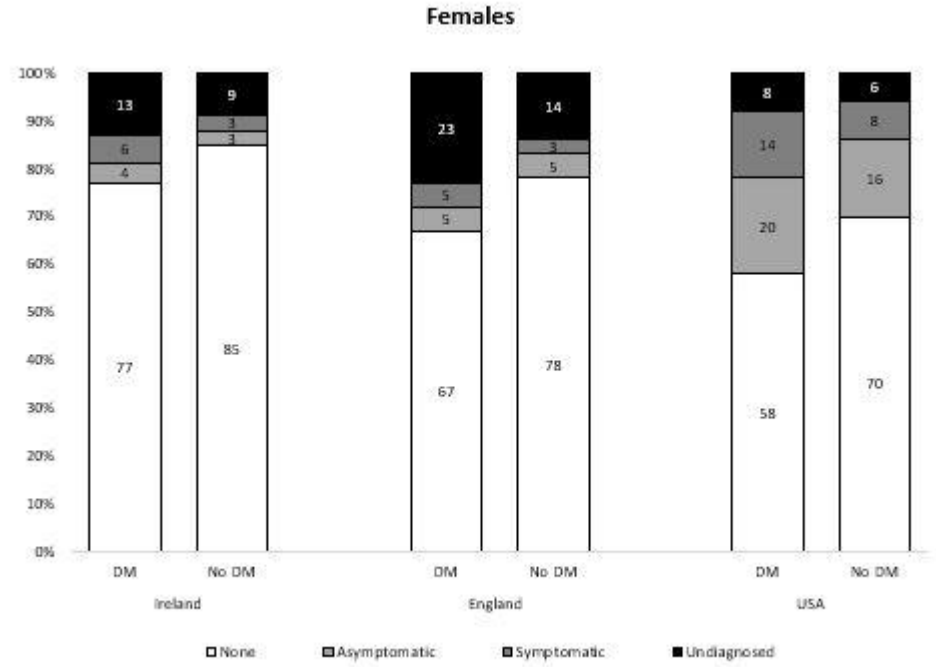

Figure 3.1 - Depression diagnosis by diabetes status and country (Females)

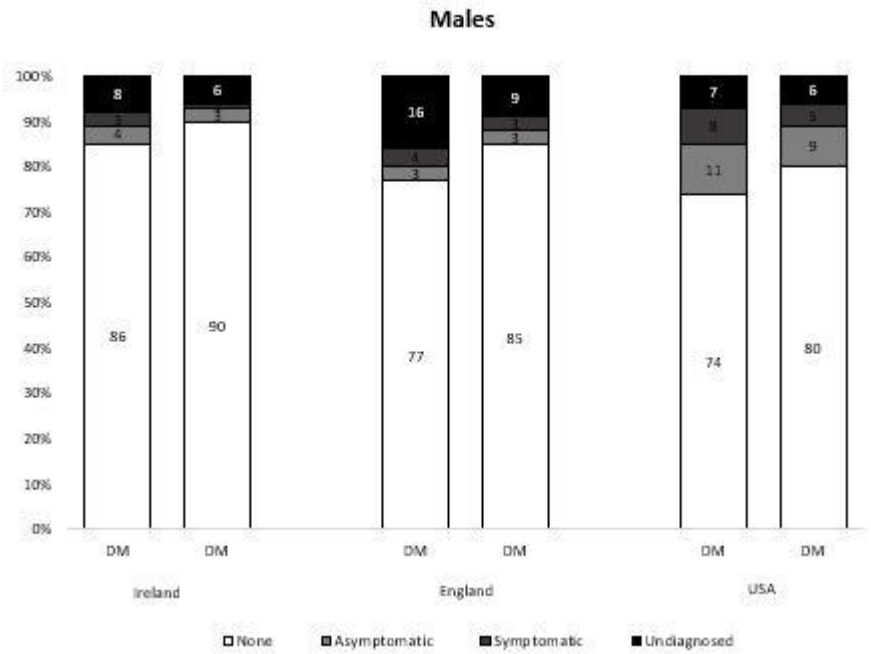

Figure 3.2 - Depression diagnosis by diabetes status and country (Males)

3.4.3 *Association between diabetes and undiagnosed depression among people with depression*

Characteristics of people with depression by diabetes status are reported in Appendix 8.1, Table 8.4.

Results of the logistic regression analysis are reported in Table 3.4. In model 1, the unadjusted odds of undiagnosed depression were similar in people with and without diabetes in Ireland and the USA. In England, people with diabetes had increased odds of undiagnosed depression. Adjustment for sociodemographic factors attenuated the strength of the association in each country. Addition of individual health-related factors to the model further attenuated the strength of the association in Ireland, had no effect on the strength of the association in England and increased the strength of the association in the USA. In the final model, adjustment for health insurance type further attenuated the association between diabetes and undiagnosed depression in Ireland, increased the strength of the association in England and resulted in no change in the USA. In the final model, diabetes was associated with increased odds of undiagnosed depression in England and reduced odds of undiagnosed depression in Ireland and the USA, though the 95% CI overlapped with the null in Ireland.

Table 3.4. - Odds of undiagnosed (vs diagnosed) depression in people with versus without diabetes stratified by country

	Ireland (N = 1025) OR (95% CI), p	**England (N = 1628) OR (95% CI), p**	**USA (N = 5003) OR (95% CI), p**
Model 1	0.99 (0.65-1.51), 0.913	1.71 (1.23 -2.37), 0.001	0.90 (0.75-1.09), 0.285
Model 2	0.90 (0.59-1.39), 0.574	1.50 (1.05-2.13), 0.026	0.71 (0.59-0.86), <0.001
Model 3	0.85 (0.53-1.35), 0.479	1.49 (1.05-2.13), 0.027	0.78 (0.64-0.94), 0.012
Model 4	0.84 (0.52-1.34), 0.462	1.51 (1.06-2.16), 0.023	0.79 (0.64-0.96), 0.016

Model 1 = unadjusted.

Model 2 (demographic) = gender + age + ethnicity + education + marital status.

Model 3 (health status) = gender + age + ethnicity + education + marital status + disability + CVD + other chronic conditions.

Model 4 (health insurance) = gender + age + ethnicity + education + marital status + disability + CVD + other chronic conditions + health insurance.

3.5 DISCUSSION

3.5.1 *Main findings*

Using large representative population-based samples of adults aged ≥ 50 years in Ireland, England and the USA, depression prevalence was consistently higher among people with diabetes and varied across countries. Diabetes was associated with increased odds of undiagnosed depression in England and reduced odds of undiagnosed depression in Ireland and the USA.

3.5.2 *Comparison with existing literature*

Prevalence of depression by diabetes status and diagnosis

Consistent with the literature, depression (113,265) and depression diagnosis (29,32) prevalence varied across countries. Most depression was undiagnosed in Ireland and England and diagnosed in the USA. Differences may be partly due to differences in sociodemographic and health factors influencing access to depression diagnosis. For instance, in our study, educational attainment and separation and divorce rates were higher in the USA versus other samples (32). In line with previous research, disability was more prevalent in our study among respondents in England and may influence undiagnosed depression via increased risk of developing depressive symptoms (266).

As expected, we reported higher depression prevalence in those with diabetes (18). The difference in prevalence reported in our study i.e. approximately 1.4-1.5 times as prevalent, was smaller than is frequently reported i.e. approximately three times and twice as prevalent (18) and was stable across countries. This may be partly due to our measurement of depression which included persons with current depression and with a lifetime history of depression. To our knowledge, ours is the first study to estimate and compare depression diagnosis prevalence in people with and without diabetes. The difference in prevalence of depression diagnosis varied; undiagnosed depression ranged from 1.2 times as prevalent (USA) to 1.6 times as prevalent (England) in people with versus without diabetes.

Association between diabetes and undiagnosed depression among people with depression

In Ireland and in England, the proportion of people with undiagnosed depression, were broadly similar to recent estimates in general populations in high income countries (32) and lower than estimates reported in type 2 diabetes populations, from predominantly middle and low income countries (29). In the USA, the proportion of people with diabetes who were undiagnosed was lower than earlier estimates (45 and 49%) (30,223). This may be due to the larger age range of participants in these studies i.e. from 18 years and older (30,223) or new recommendations to screen for depression among adults in the USA in 2009 (267).

Our results suggest country level variation in the association between diabetes and undiagnosed depression. In Ireland, diabetes was associated with reduced odds of undiagnosed depression, however 95% confidence intervals included the null after adjustment for covariates. This may reflect a general gap in access to depression diagnosis among adults experiencing depression in Ireland (32). In England, higher proportions of people with diabetes compared to without had not received a depression diagnosis, even after adjustment for covariates. This was surprising, given the overall quality of diabetes care in England compared to other countries (134,268,269). Possible population and health care professional factors should be examined to better understand the increased odds of undiagnosed depression among people with diabetes in England. Results from the USA were consistent with the limited

available evidence that diabetes is associated with increased access to depression diagnosis (32,36).

3.5.3 *Strengths and Limitations*

The main strengths of our study are the use of comparable nationally representative data. Heterogeneity in depression measurement is a typical problem in the depression and diabetes literature (18), and we used a comparable depression measure (35,260). Our findings are generalisable to adults aged 50 years and older in Ireland, England and the USA.

There are also some limitations to the study. Primarily, a number of differences across datasets limited the scope of the analysis. Estimates would have been strengthened by capturing depression treatment (i.e. medication use and/or psychological therapies), and by accounting for frequency of health service utilisation (261). However, these data were not collected in each survey. Although race is not asked in TILDA, census figures for Ireland from the year 2010 classify 98% of the population aged 50 years and older as white and as such, we did not anticipate race to influence estimates for Ireland. Second, the ability of the 8-item CES-D to screen and diagnose depression in persons with diabetes has not been assessed. However, given the CES-D can be used as a screening tool in the diabetes population (216), we deemed the CES-D an appropriate indicator of depression in our study. Third, the use self-report doctor diagnoses may introduce misclassification bias, potentially leading to underestimation of diagnosed depression and overestimation of undiagnosed depression in our study. However, self-report is considered a suitable measure

for estimating the prevalence of diabetes (270) and depression when compared to medical records (271). Finally, our classification of diabetes only includes a small proportion of people with type 1 diabetes. For instance, type 2 diabetes accounts for approximately 1.7% (n=11) of all diabetes cases in the TILDA dataset (272,273). Therefore, our results may be more reflective of the epidemiology of undiagnosed depression in people with type 2 diabetes.

3.5.4 *Implications*

Our findings have 3 important implications for research, policy and practice. First, the findings underscore the magnitude of undiagnosed comorbid depression and diabetes across 3 high income countries with different healthcare systems. Further investigation is needed to understand high rates of undiagnosed depression in order to support implementation of recommended psychosocial care guidelines for people with diabetes e.g. mental health screening and ensuring access to appropriate mental health expertise for people with diabetes (241,248). Second, since diabetes distress is specific to diabetes and not currently measured in the datasets used (255–257) and may also frequently go undiagnosed in people with diabetes (28) our findings may underestimate the gap in access to diagnosis for psychological comorbidity in adults aged ≥ 50 years with versus without diabetes. Finally, longitudinal studies can play a pivotal role in understanding the psychological impact of diabetes, and monitoring strategies aimed at improving psychological aspects of diabetes care.

3.5.5 *Conclusion*

Among adults aged 50 years and older, in 3 high income countries, undiagnosed depression was prevalent and consistently more so in people with compared to without diabetes. Among those with depression, the influence of diabetes on the likelihood of undiagnosed depression varied by country. Taken together, the findings underscore the urgent need for targeted efforts to improve detection of depression among community dwelling adults aged ≥ 50 years living in high income countries, particularly those with diabetes.

4 BARRIERS AND ENABLERS TO SCREENING AND DIAGNOSING DIABETES DISTRESS AND DEPRESSION IN PEOPLE WITH TYPE 2 DIABETES MELLITUS; A QUALITATIVE EVIDENCE SYNTHESIS

Systematic review protocol published in HRB Open

Systematic review published in Primary Care Diabetes

4.1 ABSTRACT

Aim: Synthesise qualitative evidence of healthcare professionals' (HCP) experiences of diabetes distress and depression screening in people with type 2 diabetes (T2DM) in primary care to identify HCP barriers and enablers to screening implementation.

Methods: Searched 6 electronic databases in October 2020 for qualitative studies exploring HCPs' experiences of diabetes distress and depression screening in T2DM populations. Applying a best-fit framework synthesis, data were coded to the theoretical domains framework (TDF), followed by thematic analysis of data that did not fit the TDF. Study quality and confidence in findings were assessed using CASP and GRADE-CERQual respectively.

Findings: Of 4942 unique records identified, 10 articles were included. We identified 15 barriers and enablers in 8 TDF domains and 1 new domain; people with T2DM factors. One barrier (poor awareness about the rationale for screening) and 2 enablers (perceived impacts on T2DM care, receiving financial reimbursement) were assessed as findings of high confidence.

Conclusion: HCPs experience many barriers and enablers to diabetes distress and depression screening among people with T2DM in primary care. Future interventions and policies should ensure HCPs understand the rationale for screening, highlight the benefits of screening, resource screening appropriately and address HCP group specific barriers.

Keywords: Systematic review; Qualitative evidence synthesis; Qualitative research; Depression; Diabetes distress; Diabetes; Screening; Primary care.

4.2 INTRODUCTION

People with diabetes experience an array of diabetes-specific and non-diabetes specific mental health related issues (274). For instance, diabetes distress and depression negatively affect diabetes self-management (23–25) and are prevalent among people with type 2 diabetes (T2DM) (17,18). Diabetes distress affects approximately 36% of people with T2DM (17), and depression is twice as prevalent in people with T2DM as in the general population (18). Therefore, identification and management of these issues is a critical part of T2DM care.

High levels of undiagnosed diabetes distress and depression have been reported among people with T2DM (28,30,223,275,276). Accordingly, T2DM guidelines increasingly recommend use of screening tools for their initial detection and monitoring (241,248,277). The majority of available evidence indicates depression screening increases diagnosis of depression in general primary care populations (199–202), including in people with diabetes (39–42). Diabetes distress and depression screening has also resulted in increased diagnoses in secondary care (43,249). Studies of general primary care populations have also examined the effectiveness of screening on depression treatment initiation (199–202).The evidence is mixed (199–202),

with the strongest positive effects reported in studies embedding screening into structured depression management programmes (199,200,202).

However, suboptimal implementation of depression screening in routine primary care diabetes management has been suggested (40,233). Diabetes and non-diabetes specific factors may influence depression screening implementation in primary care (33,49,189,227,233). Diabetes specific factors are thought to include greater T2DM severity (233) and depression and T2DM symptom overlap (33). Regarding non-diabetes factors, a qualitative evidence synthesis (QES) of GP perspectives on diagnosing depression in primary care populations reported a preference for opportunistic clinical questioning over questionnaires. Clinical questioning was perceived as being more in line with a model of diagnosing depression based on aetiological and contextual thinking and questionnaires as being solely symptom focused. Questionnaires were primarily used to enhance patients' acceptance of the diagnosis when GPs anticipated or encountered resistance to the diagnosis (189).

The perspectives on screening and diagnosing depression among people with T2DM (227,228), and of GPs relating to general primary care populations (189) are well understood. However, less is known about the diabetes specific factors which influence HCP engagement with diabetes distress and depression screening (33,233). Moreover, it is vital to understand perspectives of all HCPs involved in this activity. Practice and diabetes nurses also provide diabetes care in primary care (53,278–280) and therefore likely to play a key role in diabetes distress and depression screening in this cohort. Therefore, a QES capturing the perspectives of all healthcare professionals (HCP) involved

in diabetes distress or depression screening of people with T2DM in primary care can add to the literature by identifying the full spectrum of factors which influence screening implementation (281).

4.3 METHODS

4.3.1 *Review question*

The objective of this QES was to synthesise the available qualitative evidence that explores HCPs' views and experiences of screening and diagnosing diabetes distress and depression among people with T2DM in primary care, to identify barriers and enablers to screening implementation.

4.3.2 *Review design*

This QES is reported in accordance with the 'Enhancing Transparency in Reporting the Synthesis of Qualitative Research' (ENTREQ) statement (282) (Appendix 8.2, Table 8.5). Search strategy results provided in a 'Preferred Reporting Items for Systematic Reviews and Meta-Analyses' (PRISMA) flow diagram (283) (Figure 4.2). The review protocol is registered on PROSPERO (registration number: CRD42019145483) and has been published (284). The review team included researchers experienced in QES (E.T), qualitative (S.M.H, E.T, P.K, E.R, N.M.G), diabetes (P.K, S.M.H, E.R, N.M.G), and implementation (E.T, S.M.H, P.K, E.R, B.L, N.M.G) research.

We applied the RETREAT (Review question-Epistemology-Time/Timescale-Resources-Expertise-Audience and purpose-Type of Data) framework prior to (284), and on completion of primary study searching, to select a 'best fit' framework synthesis (BFFS) approach (Appendix 8.2, Table 8.6) (285) as outlined by Carroll and colleagues (286–288).

4.3.3 *Application of the synthesis approach*

BFFS has been utilised in health research (286–288). It involves using an existing framework to identify a priori themes and applying thematic analysis to data that cannot be coded to the a priori framework to produce a new or adapted "best fit" framework (286–288). We applied BFFS as outlined in Figure 4.1.

4.3.4 *Selection of the a priori framework*

Several approaches have been utilised in BFFS to inform selection of the a priori coding framework (286,287). Given our review focus on barriers and enablers influencing HCP implementation of a behaviour i.e. mental health screening, whereby no behaviour specific theories exist, we sought an a priori framework focused on implementation behaviours. Several frameworks for understanding drivers of implementation behaviour i.e. determinant frameworks, are available (235). The Theoretical Domains Framework (TDF) is one such framework and is particularly relevant to this QES as it was specifically developed to identify influences on health professional behaviour related to implementation of evidence-based recommendations (289,290). It's original 12 domain version was derived from 33 theories of behaviour change

that together incorporated 128 key theoretical constructs relevant to health behaviour change (290). Following a validation process, two additional domains influencing implementation were added (291). We applied the revised 14 domain version (291) described in Appendix 8.2, Table 8.8, which has previously been applied to BFFS to explore implementation issues (292).

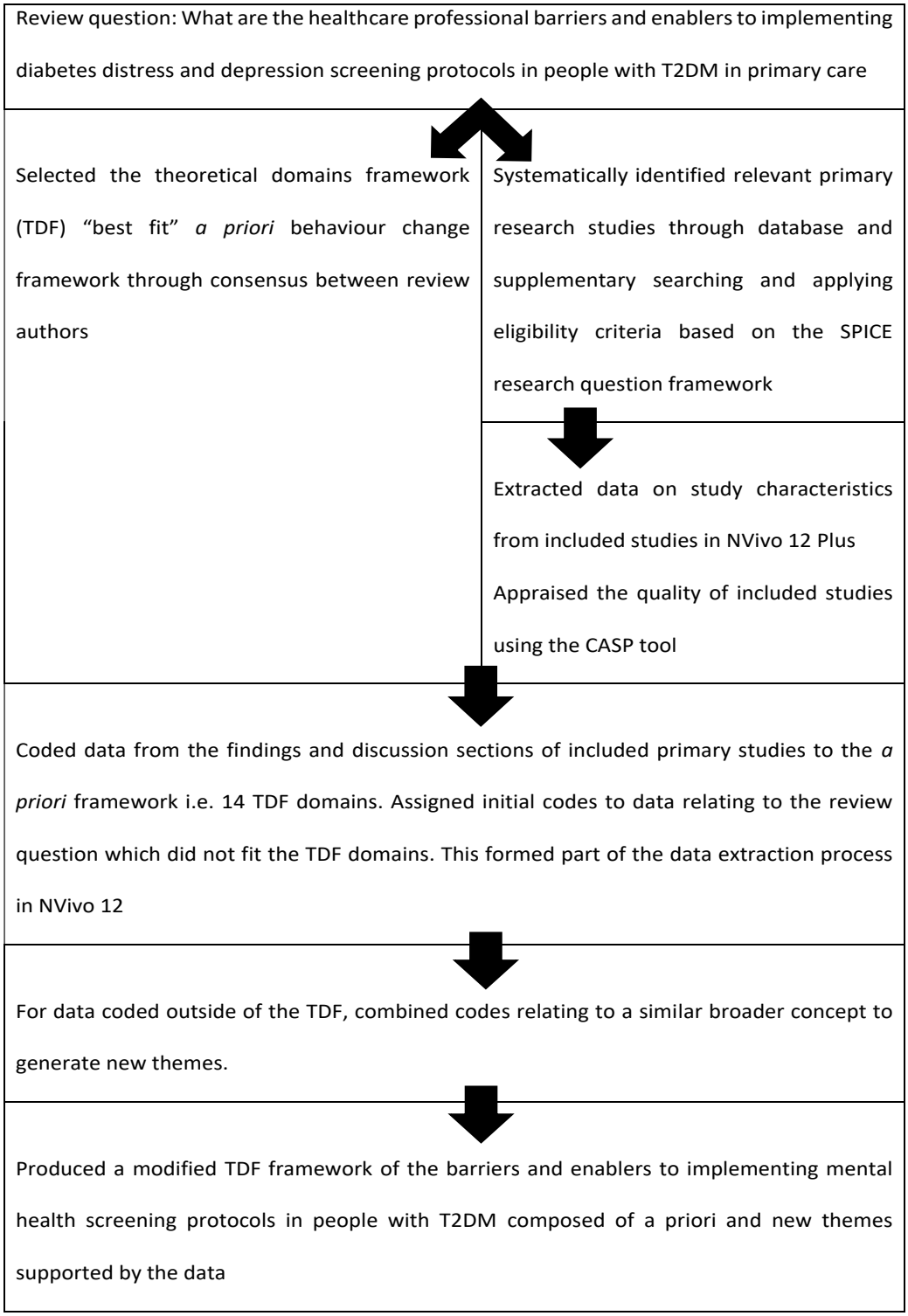

Figure 4.1 - Flow diagram of our application of BFFS. Adapted from (286).

4.3.5 *Systematic identification of primary studies*

4.3.5.1 Search strategy

We applied an “exhaustive” approach to searching (293). N.M.G undertook electronic database and supplementary searching to identify eligible primary studies on 10th September 2019 and updated the search on 21st October 2020.

Six databases; CINAHL, EMBASE, MEDLINE, PsycINFO, Academic Search Complete, Scopus, were selected through consultation with an expert librarian based on their coverage of items in fields pertinent to the review i.e. medicine, nursing, gerontology, health services research and psychology. N.M.G developed the search string with support from the librarian and academic literature to maximise identification of relevant items (293). Search terms were adapted for individual databases as needed, for example, MeSH terms were used for MEDLINE. Certain search terms were truncated, for example depress* or recogni*, to ensure all spellings were captured. The search strategy with results for all databases is reported in Appendix 8.2 Table 8.7. There was no restriction on the year searched to ensure retrieval of studies from the earliest date.

Supplementary searching involved backward (i.e. searching the reference lists) and forward (i.e. searching “cited by” results on google scholar) searching of included studies and searching the publications of lead authors of included studies. We also conducted a rudimentary search on greylit.org in September 2019 which did not return any search results. This was consistent with steps

1-4 of the CLUSTER approach (Citations, Lead authors, Unpublished materials, Scholar searches, Theories, Early examples, Related projects), ensuring systematic and stepwise supplementary searching (294)

On completion of searching, all references were exported to EndNote X7 and duplicate items removed.

4.3.5.2 Inclusion and exclusion criteria

Study inclusion and exclusion criteria (Table 4.1) were informed using the SPICE (Setting, Perspective, phenomenon of Interest, Comparison, Evaluation) framework (295).

Table 4.1 - Study inclusion and exclusion criteria using the SPICE framework

SPICE component		Included	Excluded
S	Setting	• Primary care • Any country	• Other care settings
P	Perspective	• Any primary care HCP involved in implementing mental health screening in a diabetes population e.g. GPs, Practice Nurses, Diabetes Nurse Specialists, Psychologists • Studies including patient and HCP perspectives were eligible if HCP perspectives could be separated	• Studies only reporting perspectives of people with T2DM, their families, or carers

SPICE component		Included	Excluded
I	phenomenon of Interest	• The process of implementing mental health screening in people with T1DM, T2DM or diabetes type not specified • Studies about diabetes distress or depression management were eligible if findings related to screening implementation could be separated	• Studies of depression screening in populations with chronic conditions whereby findings relating to diabetes cannot be separated • Studies of depression screening in multimorbid populations • Studies of depression screening in people without diabetes • Studies including screening but not discussing HCPs' views and experiences of their use
C	Comparison	• HCP group	
E	Evaluation	• HCPs' perceptions and experiences of the phenomenon of interest	

SPICE component		Included	Excluded
	Studies	• Qualitative or mixed-method employing qualitative data collection and analyses methods • Multiple-method and mixed-method were eligible if qualitative results could be separated	• Non-English language • Literature reviews • Quantitative • Conference presentations • Studies where full texts remain unavailable after efforts to obtain them

4.3.6 *Screening and data extraction*

The final EndNote library was exported to Rayyan QCRI for screening (296). Screening took place in two stages; (1) title and abstract and (2) full-text screening. In both stages, N.M.G screened all items and two review authors (E.R and B.L) each independently assessed 50% of items. On completion of each stage, N.M.G met with reviewers separately to resolve outstanding conflicts. Items included by both reviewers in stage 1 were carried forward for stage 2 screening.

N.M.G developed a data extraction form (Appendix 8.2, Table 8.8), to extract general study information, study design, study context, qualitative data of barriers and enablers to the phenomenon of interest, study limitations, implications, conclusions and quality appraisal information. The extraction form was agreed by the review team (P.K, S.M.H, E.T) and piloted on two papers by 3 reviewers (N.M.G, E.R and E.T). N.M.G extracted data from all included studies. E.R and E.T each independently extracted data from 50% of items to check for consistency, accuracy, and to minimize potential bias during extraction. Data regarding barriers and enablers were extracted from the results/findings sections and included verbatim quotes from participants and findings reported by study authors. Where additional findings or author interpretations of the findings were reported in the discussion section, these data were also extracted (297).

4.3.7 *Data synthesis*

The synthesis process was managed in QSR NVIVO (298). Phase 1 coding was guided by the definitions of each TDF domain (Appendix 8.2, Table 8.8). Any relevant data which could not be coded to the TDF were assigned a code reflecting the data. Following this initial coding, the lead author met separately with reviewers (E.R and E.T) to compare coding to the TDF, to agree codes assigned to data not coded to the TDF and discuss potential themes relating to these data. During phase 2 coding, N.M.G categorised codes of data not coded to the TDF into groups reflecting similar ideas to generate new themes. These were subsequently added to the barriers and enablers identified in phase 1. The adapted best-fit framework was critically appraised by the review authors and further refined by N.M.G.

4.3.8 *Consideration of study quality*

Quality of included studies were assessed using the Critical Appraisal Skills Programme (CASP) for qualitative research (299) which has previously been endorsed for use in QES by the Cochrane Collaboration and others (300,301). N.M.G appraised all included articles and E.T and E.R each appraised 50% of these. NMG met with the reviewers separately to resolve differences in appraisal. Assessment of study quality was not used as a criteria to exclude studies that otherwise met the inclusion criteria, but to inform the reviewers' confidence in individual review findings (302).

4.3.9 *Confidence in the findings*

Confidence in the review findings were determined using the Grading of Recommendations Assessment, Development, and Evaluation-Confidence in the Evidence from Reviews of Qualitative research (GRADE-CERQual) approach given its application to support decision making based on qualitative evidence (302) and the availability of resources to support its use (303–307). Application of the GRADE CERQual by 2 reviewers is preferable and may be further strengthened by multiple reviewers (302). N.M.G initially applied the GRADE-CERQual to 6 review findings and 2 other reviewers familiar with the data (E.R and E.T) independently applied GRADE CERQual to a sample of these. Reviewers' rationale for judgements were subsequently discussed and disagreements resolved. N.M.G subsequently applied GRADE CERQual to all findings, with judgements reviewed by E.T and outstanding disagreements resolved.

4.3.10 *Deviations from the study protocol*

The inclusion criteria reported in our review protocol states that studies conducted in primary care and outpatient diabetes settings would be eligible for inclusion (284). However, following further discussion among the research team, only studies conducted in primary care were eligible for inclusion in the final review. This strengthened the focus of the review on understanding implementation in a specific T2DM care setting.

4.4 FINDINGS

4.4.1 *Search results*

The search generated 4819 unique citations after duplicates were removed. Forty-nine full-text articles were retrieved as potentially relevant, of which 10 reporting on 9 studies met the inclusion criteria.

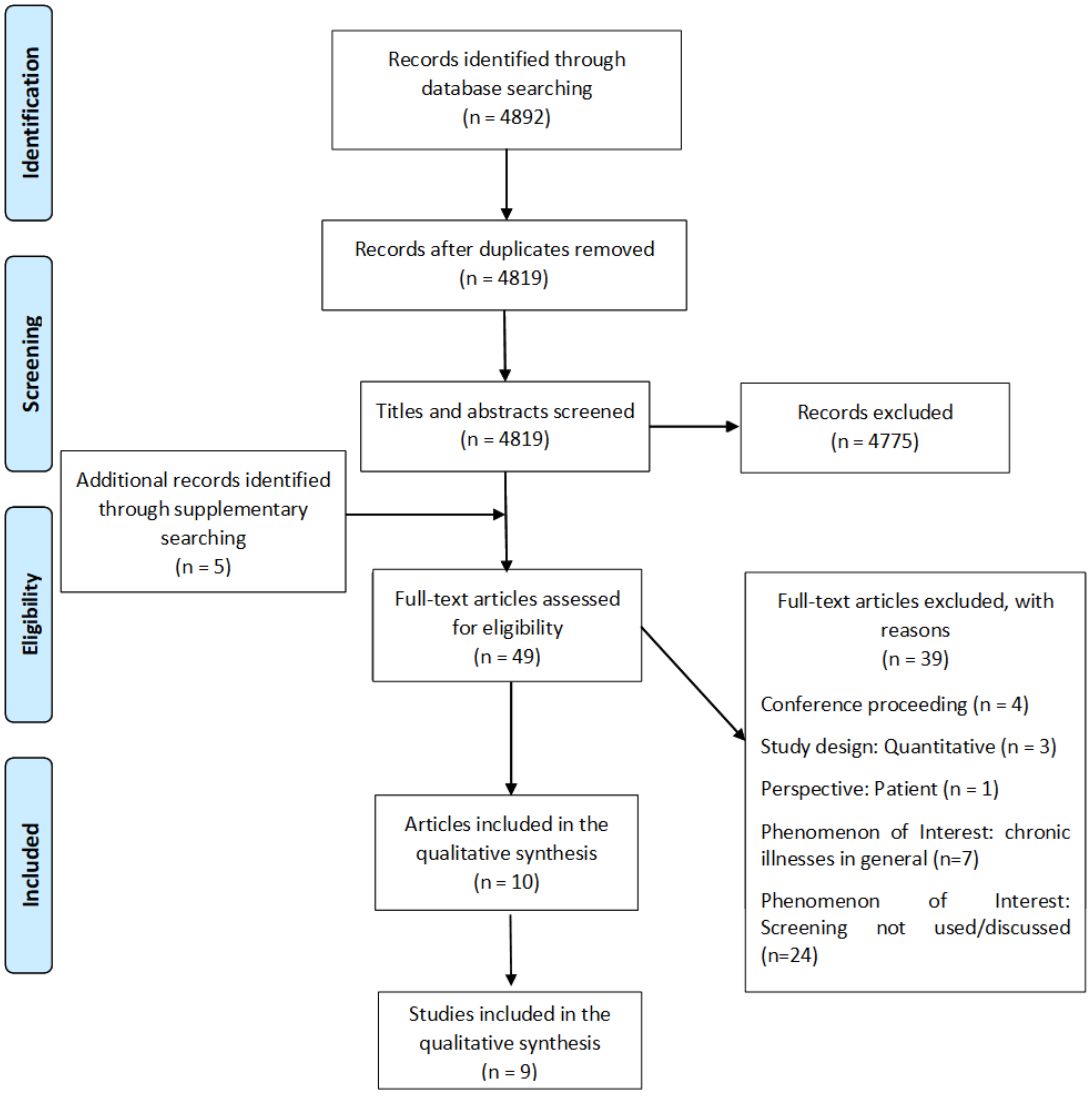

Figure 4.2. PRISMA flow diagram of search results. Full texts excluded with reasons are reported in Appendix 8.2, Table 8.9.

4.4.2 *Characteristics of included studies*

Characteristics of included articles are reported in Table 4.2. Seven related to depression screening (33,308–313), 1 to wellbeing screening (314), 1 to depression and anxiety screening (315) and 1 to anxiety, depression and diabetes distress screening (316). Three studies (4 articles) related specifically to people with T2DM (311,312,314,316) and others did not specify diabetes type. Of those that did not specify diabetes type, 4 were conducted in the context of annual diabetes review visits in UK primary care (33,308–310). One study included GPs only (314), 3 articles (2 studies) included practice nurses only (311,312,315) and 6 studies included a mix of HCPs e.g. GPs, practice nurses, nurse specialists (diabetes and heart disease) (33,308–310,313,316). We report findings as relating to GP and nurse perspectives.

Table 4.2. - Characteristics of included studies (n= 229 participants and 63 patient observations)

First author	Year of publication	Country	Study objectives	Study design	Data collection	Data analysis	Participant characteristics (n)	Description of screening implementation
Alderson (308)	2014	England	Examine the process of case-finding for depression in people with diabetes and coronary heart disease within the context of a pay-for-performance scheme	Ethnography	Observation of diabetes and coronary heart disease consultations, debrief interviews, patient record review	Thematic analysis	GPs and practice nurses from 12 GP practices **50/63 observations** were diabetes consultations (n=9 GP observations, n=54 nurse observations)	Depression screening • among people with diabetes • using the PHQ-2 and PHQ-9 for positive PHQ-2 results • during annual diabetes review visits • as part of national policy with GP practice reimbursement for screening
Chapman (314)	2016	China	Examine the barriers and enablers to implementing psychological care recommendations for people with T2DM	Qualitative	Focus groups	Thematic analysis using the theoretical domains framework as a coding framework	Community healthcare doctors **(n=23)**	Wellbeing assessment (including mood and diabetes distress) • among all people with T2DM • using the WHO-5 • periodically
Coventry (33)	2011	England	Identify and explore barriers to detecting and managing depression in primary care in people with two exemplar long term conditions: diabetes and coronary heart disease	Qualitative	Interviews and focus groups	Thematic analysis	GPs (n=8), practice nurse (n=5), mental health specialists (n=5), managers (n=4), other (n=2) **(n=19)**	Depression screening • among people with diabetes • using the PHQ-2 and PHQ-9 for positive PHQ-2 results • during annual diabetes review visits • as part of national policy with GP practice reimbursement for screening
Girard (315)	2017	Canada	Describe nurse activities in patients with chronic disease (diabetes; type not specified, and coronary heart disease) and common mental disorders	Qualitative	Individual semi-structured interviews	Descriptive qualitative analysis guided by an evidence-based structure for	Practice nurses **(n=13)**	No screening intervention/programme • interview schedule asked about the use of screening tools for common mental disorders

First author	Year of publication	Country	Study objectives	Study design	Data collection	Data analysis	Participant characteristics (n)	Description of screening implementation
						describing nurse activities		
Maxwell (310)	2013	Scotland	Understand how implementation of case-finding for depression in people with diabetes and coronary heart disease might impact its effectiveness	Secondary qualitative analysis of two studies	Focus groups	Constructivist grounded theory	GPs (n=20), practice nurses (n=21), chronic disease specialist nurses (n=28), other; managers, other service providers (n=21) **(n=90)**	Depression screening • among people with diabetes • using the PHQ-2 and PHQ-9 for positive PHQ-2 results • during annual diabetes review visits • as part of national policy with GP practice reimbursement for screening
*Pols (311)	2017	Netherlands	Explore patient and practice nurse experiences with the Step-Dep program (depression screening and stepped care for people with T2DM and heart disease)	Qualitative	Individual semi-structured interviews	Thematic analysis	Practice nurses **(n=9)** psychology specialism; (n=6), somatic specialism; (n=3)	Depression screening • among people with T2DM • using the PHQ-2 and PHQ-9 for positive PHQ-2 results • during annual diabetes review visits as part of the Step-Dep programme
*Pols (312)	2018	Netherlands	Investigate patients' and practice nurses' perceptions of depression in patients with T2DM and/or coronary heart disease screened for subthreshold depression	Qualitative	Individual semi-structured interviews	Thematic analysis	Practice nurses **(n=9)** psychology specialism; (n=6), somatic specialism; (n=3)	Depression screening • among people with T2DM • using the PHQ-2 and PHQ-9 for positive PHQ-2 results • during annual diabetes review visits • as part of the Step-Dep programme

First author	Year of publication	Country	Study objectives	Study design	Data collection	Data analysis	Participant characteristics (n)	Description of screening implementation
Schlicht (313)	2013	Australia	Determine the safety and acceptability of the TrueBlue model of nurse-managed care for people with diabetes or coronary heart disease in primary care	Mixed	Clinical record audit, focus groups, individual semi-structured interviews	Thematic analysis (of acceptability data)	GPs (n=5), practice nurses (n=5) **(n=10)**	Depression screening • among people with diabetes • using the PHQ-2 and PHQ-9 for positive PHQ-2 results • during annual diabetes review visits • as part of the TrueBlue programme
Stoop (316)	2019	Netherlands	Examine the psychosocial health care needs of people with T2DM from the perspective of patients and diabetes HCPs and the factors that impede or facilitate a positive attitude towards specialized psychosocial health care in people with T2DM	Qualitative	Focus groups	Content analysis	GPs (n=10), practice nurses (n=6), diabetes nurse specialists (n=2) **(n=18)**	Emotional distress screening • among people with T2DM • using the GAD-7 (anxiety) and PHQ-9 (depression) and PAID (diabetes distress)

4.4.3 *Quality appraisal of included studies*

The overall quality of included articles was very good (Appendix 8.2, Table 8.10). Inadequate evidence of reflexivity was found in 7 articles (33,308,309,313–316) and the relationship between the researcher and participants was not sufficiently addressed in 2 articles.

4.4.4 *Synthesis*

Following the steps outlined in Figure 4.1, we produced an adapted version of the TDF, describing GP and nurse barriers and enablers to mental health screening in people with T2DM (Table 4.3). The framework consisted of 15 individual review findings relating to 8 TDF domains; Knowledge, Skills, Professional Role and Social Identity, Beliefs about consequences, Reinforcement, Environmental context and resources, Memory, attention and decision process, Emotion, and 1 new domain; Person with T2DM factors, developed from data that did not fit the TDF.

4.4.4.1 Knowledge

Seven studies discussed knowledge influencing screening (33,308,310,312,314–316), with 3 factors identified; poor awareness about the rationale to screen (33,308,310,312,314–316), nurses' underestimating depression symptoms (308,310,312), and, unawareness of screening policies and recommendations (308,310,314).

Poor awareness about the rationale to screen

Among study participants, some GPs (314,316) and nurses (310,316) were unaware of the rationale to screen (314–316) and others' beliefs about the link between mental health and diabetes influenced implementation; GPs (33,308,316), nurses (308,312,315,316). When HCPs were unaware or unconvinced of an association between T2DM and depression, they didn't always implement screening (312,314,316). The belief that depression could be a consequence of T2DM (33,308,310,312,315,316), fostered vigilance of possible psychological problems, acting as a precursor to screening (315). It also led to fidelity issues (33,308,310) whereby questions were framed to identify mood problems specific to T2DM; "Then so do you feel ok about your diabetes, do you have any, do you worry about it...?" (172; practice nurse). This belief also contributed to GPs and people with diabetes normalising depression, such that it went undiagnosed (33).

Nurses' underestimation of depression severity

Three studies discussed how nurses' perceptions of depression differed compared to patients' and questionnaire assessments (308,310,312). This led to nurses underestimating depression symptom severity (308,312).

Unawareness of screening guidelines and protocols

In two articles, nurses and GPs were unaware of the existence of screening guidelines and protocols (308,314) leading to screening not being implemented (308).

4.4.4.2 Skills

Availability of skills needed to screen

All the studies identified skills in broaching and discussing mental health and in using screening tools as important. Having these skills supported GPs and nurses in their roles in screening (33,311,313,315).

Nurses described difficulties “phrasing and asking questions” (172; practice nurse), possibly from not receiving any prior training in mental health or screening (308–310,315). GPs expressed difficulties screening non-English speaking groups (33). Training in mental health and using screening tools was described as fundamental for nurses (310,315,316) and GPs (314,316). Training in using screening tools and in risk management enabled nurses to discuss mental health for the first time (311,313) and active listening skills were conducive to patient disclosure of mental health concerns (315). Mental health expertise enabled GPs to draw on allegorical methods (33) and nurses to use psychoeducation (315) to facilitate acceptance of the presence of mental health problems.

4.4.4.3 Professional and social role and identity

All articles discussed HCPs’ role and identify, with 3 factors identified; clarity about who screens (33,308,311–316), prioritising physical aspects of T2DM care (33,308,311,315,316), and, preference for clinical questioning (33,308–311).

Clarity about who screens

All articles including nurse participants noted that nurses were responsible for screening as part of their role in T2DM reviews (33,308–311,313). Screening by GPs was opportunistic and they were usually responsible for supporting management of identified issues (33,308,313,315,316). Some GPs thought screening should be undertaken by another HCP (313,316), such as practice nurses who they thought may have more time (313) or by someone with mental health training (316). In studies where nurses were responsible for screening, nurses usually referred patients to the GP or mental health specialists for diagnosis and management (313,315,316). Where GPs and nurses were unclear about how positive results would be acted upon (308,313), patients went unmanaged (308) or nurses went beyond their role by engaging in counselling type discussion (308,313).

Prioritising physical aspects of care

Both GPs and nurses prioritised physical T2DM care (308,309,314). GPs in 1 study who skipped screening, explained that psychological aspects were not prioritised by opinion leaders (314). Nurses' priority to complete appointments on time led to nurses discounting patients' cues about mental health, negatively framing screening questions e.g. "you have no problems coping, do you?" (308), skipping screening, selectively screening those perceived as not depressed, and, administering screening at the end of appointments (309). Nurses in 1 study reported focusing visits on emotional aspects when they arose or scheduled longer follow-up appointments for mental health (315).

Preference for clinical questioning

GPs (33,309) and nurses (308,310,311) expressed their preference for using clinical questioning, rather than tools to identify possible depression. HCPs believed they could identify mood changes through existing knowledge of patients (33,308) and natural conversation versus a stilted screening process (310). One GP considered screening “inappropriate” when people were already visibly distressed (233; GP). Despite this preference, GPs in 1 study described ways they align screening with their preferred consultation style and to save time (309). Examples were; having patients complete forms in the waiting room, GPs completing the form with the patient, skipping question 10 (suicide ideation), recalling questions from memory, and, administering screening by phone (309).

Beliefs about consequences

All articles discussed perceived consequences of screening; 8 regarding the perceived impact on the quality of T2DM care (308–313,315,316) and 6 regarding perceived patient reactions (33,308,312–315),

Perceived impact on the quality of T2DM care

GPs and nurses found screening useful in preventing missed cases (309,311,313,316), commenting that without explicitly asking, depression could go undetected. In addition, nurses perceived screening tools as beneficial in providing an ice-breaker for longer discussion and supporting acceptance of the presence mood problems (311–313). HCPs also believed depression screening tools should not replace clinical judgment when making treatment decisions (309,311) and follow-up care must be in place (308–310)

to ensure screening is more than a “tick-box” exercise (172; practice nurse, 233; GP).

Perceived patient reactions

HCPs believed screening could be a positive or negative experience for people with diabetes (33,308,312–315). GPs and nurses commented that screening validated symptoms and conveyed HCPs’ interest in their patients to them (33,313). Others felt screening didn’t always align with patients’ expectations for T2DM care (314) and perpetuated patients’ mental health stigma (33,308,312,315). Patient stigma was considered a general societal problem in the study carried out in China (314) and specific to older people, especially males, in other studies mentioning this (33,308,312,315). HCPs skilled in mental health could mitigate patient stigma (33,315).

4.4.4.4 Reinforcement

Availability of appropriate reimbursement

Four studies, across 2 heath systems discussed reimbursement systems for mental health screening (33,308,309,314). GPs in China discussed how their payment structure would need to change from a fixed salary payment to incentivisation for provision of additional services (314). In UK studies, where a pay-for-performance system was available, GPs considered incentivised depression screening an enabler to screening (33,308,309). However, some felt the available remuneration was not worth the additional workload and did not implement incentivised screening (33,308).

4.4.4.5 Memory, attention, decision processes

Including screening in review templates

Having screening included on the diabetes review visit template was considered useful by GPs (309) and nurses (311) to prevent screening being skipped. However, in 1 study, GPs ignored computerised prompts to screen (314).

4.4.4.6 Environmental context and resources

Eight articles mentioned environmental or contextual factors influencing screening (33,308–310,313–316); 7 relating to limited time and poor timing of screening during consultations (33,308–310,314–316); and 6 relating to access to supports for positive screening results (308–310,313,315,316).

Limited time and poor timing during diabetes consultations

Time to screen was a common challenge for GPs (33,309,314,316) and nurses (308–310,316). Among nurses, pressure to complete review visits led to short-cuts such as skipping screening, rushing screening and selectively screening those perceived as likely to provide a negative response (308–310). This was also the case for some GPs whereby screening questions were ‘fired at people’ and cases potentially missed (310). As mentioned previously, GPs in 1 study adapted screening implementation to fit their consultation style and save on time (310) and nurses in 1 study scheduled longer follow-up appointments (315).

Regarding timing of screening, when screening questions occurred after lifestyle related questions (33,308–310), nurses reported the challenge to 'switch' from something that could be measured to something more subjective (308). Where screening questions were asked at the start of appointments (311,313,315), nurses could decide whether to focus the appointment on psychological or somatic aspects (315). GPs in 1 study suggested afternoon appointments may afford more time to screen than morning appointments (314).

Limited access to follow-up psychological services or expertise is a barrier to implementation Management supports for positive screening results varied within and across studies (308–310,313,315,316). Having mental health expertise available to those responsible for screening and referral access to mental health specialists facilitated screening implementation (308,313,315). GPs (309,310) and nurses (310) noted the lack of management options available to people with possible depression, leading to screening questions being asked in a way that discouraged a positive response (309,310). Screening recommendations alone, without available management support, impeded implementation (315,316).

4.4.4.7 Emotion

An uncomfortable task, especially for nurses

Many nurses expressed a discomfort or emotional burden associated with screening (33,308–311). It stemmed from nurses' perceived skill deficit (33,308–311), short consultation times (33,308–310), and, the belief that

positive screening results would not be acted upon (308). When nurses had relevant skills and processes in place, they felt confident screening (310–312,315). A GP in 1 study also expressed discomfort, associated with patients' denial of the presence of mental health problems (33).

4.4.4.8 People with T2DM factors

Cultural and language issues

GPs in two studies discussed the challenge of administering screening tools to ethnic minority groups (33,309). The term depression didn't always directly translate across cultures and languages, such that screening was difficult even with support from interpreters (33,309). GPs in 1 study with an interest in mental health described their use of metaphor and careful use of language to help this cohort agree about the presence of a mental health concern (33).

4.4.5 *GRADE CERQual assessment of induvial review findings*

We applied the GRADE CERQual assessment to 15 individual review findings. Our overall assessment of confidence is reported in Table 4.3 with a detailed description of each assessment in Appendix 8.2, Table 8.11. One barrier; poor awareness about the rationale to screen and 2 enablers; perceived impacts on T2DM care, receiving financial reimbursement, were assessed as being of high confidence. Nine factors were assessed as being of moderate confidence and 3 as being of low confidence.

Table 4.3 - Best-fit framework and GRADE CERQual Summary of Qualitative Findings

Summary of the review finding	Articles contributing data	CERQual assessment of confidence	Explanation of CERQual assessment
Knowledge	(33,308,310,312,314–316)		
1. *Poor awareness about the rationale to screen* Some HCPs felt unaware of the rationale to screen and others' believed screening should identify depression caused by diabetes	(33,308,310,312,314–316)	High	Minor concerns about methodological limitations, coherence and relevance. None or very minor concerns about adequacy.
2. *Nurses' underestimation of depression severity* Nurses tended to underestimate depression symptom severity	(308,310,312)	Moderate	Minor concerns about methodological limitations, coherence and relevance. Moderate concerns about adequacy.
3. *Unawareness of screening policies and recommendations* Some nurses and GPs were unaware of the existence of screening policies and recommendations	(308,314)	Low	Minor concerns about methodological limitations. None or very minor concerns about coherence. Moderate concerns about adequacy and relevance.
Skills	(33,308–316)		

Summary of the review finding	Articles contributing data	CERQual assessment of confidence	Explanation of CERQual assessment
4. Availability of skills needed to screen Having skills in mental health and using screening tools supported screening implementation. However, many nurses felt they lacked these skills	(33,308–316)	Moderate	Minor concerns about methodological limitations and coherence. None or very minor concerns about coherence. Moderate concerns about relevance.
Social and professional role and identity	(33,308–316)		
5. Clarity about who screens HCPs had different roles in screening and often lacked clarity about how to act on positive screening results	(33,308–311,313)	Moderate	Minor concerns about methodological limitations and adequacy. None or very minor concerns about coherence. Moderate concerns about relevance.
6. Prioritising physical aspects of care HCPs usually prioritised physical T2DM care	(33,308,309,314,315)	Moderate	None or very minor concerns about methodological limitations and coherence. Minor concerns about adequacy. Moderate concerns about relevance.

Summary of the review finding	Articles contributing data	CERQual assessment of confidence	Explanation of CERQual assessment
7. Preference for clinical questioning HCPs preferred using clinical questioning than screening tools to identify possible depression	(33,308–311)	Moderate	None or very minor concerns about methodological limitations, coherence and adequacy. Moderate concerns about relevance.
8. Preference for clinical questioning HCPs preferred using clinical questioning than screening tools to identify possible depression	(33,308–311)	Moderate	None or very minor concerns about methodological limitations, coherence and adequacy. Moderate concerns about relevance.
Beliefs about consequences	(33,308–316)		
9. Perceived impact on T2DM care Screening had perceived benefits; preventing missed cases and supporting acceptance of mental health issues, which could not always be fully realised	(308–313)	High	Minor concerns about methodological limitations, adequacy and relevance. None or very minor concerns about coherence.
10. Perceived patient reaction Screening could be a positive or negative experience for people with T2DM by validating symptoms and conveying support or, eliciting mental health stigma	(33,308,312–315)	Low	Minor concerns about methodological limitations. None or very minor concerns about coherence. Moderate concerns about adequacy and relevance.
Reinforcement	(33,308,309,314)		

Summary of the review finding	Articles contributing data	CERQual assessment of confidence	Explanation of CERQual assessment
11. Availability of appropriate reimbursement Incentivisation can facilitate screening	(33,308,309,314)	High	None or very minor concerns about methodological limitations. Minor concerns about coherence, adequacy and relevance.
Memory, attention and decision processes	(310,313,314)		
12. Including screening in review templates Having screening named as part of the diabetes review check-list usually facilitated screening	(310,313,314)	Low	Moderate concerns about methodological limitations and adequacy. Minor concerns about coherence and relevance.
Environmental context and resources	(308–310,313–316)		
13. Limited time and poor timing during diabetes consultations Time to screen was a common challenge for HCPs in the context of time limited diabetes visits. There were also challenges associated with screening too early and too late during appointments.	(33,308–310,313–316)	Moderate	Minor concerns about methodological limitations and coherence. None or very minor concerns about adequacy. Moderate concerns about relevance.

Summary of the review finding	Articles contributing data	CERQual assessment of confidence	Explanation of CERQual assessment
14. *Limited access to follow-up psychological services or expertise is a barrier to implementation* Management support for positive screening results varied within and across studies. Their presence supported implementation and absence hindered it.	(308–310,313,315,316)	Moderate	Minor concerns about methodological limitations, coherence and adequacy. Moderate concerns about relevance.
Emotion	(33,308–311)		
15. *An uncomfortable task, especially for nurses* Many nurses expressed discomfort implementing screening, which may be mitigated when nurses perceive themselves as sufficiently skilled to screen	(33,308–311)	Moderate	None or very minor concerns about methodological limitations and coherence. None or very minor concerns about adequacy.
Person with T2DM factors	(33,309)		
16. *Cultural and language issues* Some GPs experienced challenges screening ethnic minority groups due to language barriers and cultural differences in the	(33,309)	Moderate	None or very minor concerns about methodological limitations and coherence. Minor concerns about adequacy. Moderate concerns about relevance.

Summary of the review finding	Articles contributing data	CERQual assessment of confidence	Explanation of CERQual assessment
meaning and stigma associated with depression			

4.5 DISCUSSION

4.5.1 *Main findings*

This QES identified 15 barriers and enablers to mental health screening and diagnosis in people with T2DM experienced by HCPs (GP, practice nurse, chronic disease nurses). Most barriers and enablers were discussed by both GPs and nurses. Three barriers; underestimation of depression severity, skills needed to screen, and discomfort screening were predominantly discussed by nurses. One barrier; culture and language issues and 1 enabler; availability of appropriate reimbursement were only discussed by GP participants. Using the GRADE CERQual, 3 findings were assessed as being of high confidence; poor awareness about the rationale to screen, perceived impacts on T2DM care, and receiving appropriate financial reimbursement.

4.5.2 *Comparison with existing literature*

Several of our findings were in line with known barriers and enablers influencing depression screening implementation by GPs in general adult populations and by practice nurses in the context of multimorbidity i.e. preference for clinical questioning, time constraints, access to management options for depression, and having positive patient-clinician relationships (189,317). We identified additional T2DM specific barriers and enablers to screening implementation which may help explain limited effectiveness of screening on new depression diagnosis (40). For instance, even when HCPs know about recommendations, they may not be fully aware of the rationale for screening, thereby neglecting to identify mood problems unrelated to T2DM.

At the GP practice level, unclear screening and follow-up protocols may help explain instances where positive screening results have not been followed up (40). While competing health demands were also a barrier during time restricted T2DM consultations, greater T2DM severity was not identified by HCPs in our study, suggesting HCPs may be unaware it can reduce the likelihood of screening administration (233). Finally, while embedding screening into review templates may facilitate screening, its feasibility appears influenced by health system financing models and access to appropriate management services. For instance, findings from the current study show that in the absence of easily accessible and clearly defined management services for identified issues, HCPs may ask questions in a way that discourages positive responses to screening questions (309,310). Conversely, there were no evidence of fidelity issues with screening when HCPs responsible for screening had easy access to mental health expertise and/or referral pathways (308,313,315).

Regarding HCP group specific factors, like practice nurses involved with multi-morbidity management (317), the majority of nurses felt insufficiently skilled to broach the topic of mental health with people with T2DM, leading to unease and avoidance among nurses when undertaking this task. Factors influencing screening solely discussed by GPs were financial reimbursement (enabler) and patient cultural and language differences (barrier). It is unclear why only GPs discussed these factors. One possible explanation is that GPs are more likely than nurses to directly benefit from financial reimbursement for care (318). Unlike nurses, GPs in our review reported previous experience of

managing mental health in general primary care populations (33,314). In a related review, GPs also report experience of managing mental health as influencing their perspectives on their use of depression self-assessment scales (189).

4.5.3 *Strengths and limitations*

In this review, measures were put in place to ensure high quality analysis including application of recommended approaches (e.g. of GRADE-CERQual and of the RETREAT framework), utilizing multiple independent reviewers and transparency through adherence to the protocol (284). Another strength was the representation of nurses. To date, syntheses about identification and management of mental health issues in primary care have focused on GP experiences (189) but nurses are often responsible for this task among persons with T2DM (248,277). Finally, by focusing our review on a single chronic disease i.e. T2DM, we were able to discern factors influencing screening implementation, specific to primary care T2DM management, and general primary care populations (302).

This study also has a number of limitations. First, owing to the small number of chronic disease nurse participants in the included primary studies (n=30), findings were reported as relating to GP and nurse perspectives only. While we were unable to discern any notable differences between specialist and practice nurse perspectives, given that diabetes nurse specialists work full time in diabetes, their experiences of diabetes distress and depression screening may differ somewhat to practice nurses. Second, our QES may not

capture the perspectives of the full spectrum of HCPs currently involved in this task in primary care. For instance, although some studies included other HCP perspectives (e.g. managers, mental health specialists), it was not possible to distinguish these unique perspectives from GP and nurse perspectives. Additionally, community dietitians (diabetes) (151) and community pharmacists (319,320) in some regions may already incorporate psychosocial aspects or implement screening to persons with T2DM, but no studies exploring the experiences of these HCPs were identified. Third, our findings offer limited insight into country and health-system level factors influencing screening implementation, with 4 of the included studies coming from 1 health care system (UK) (33,308–310). While health system differences in psychosocial care recommendations for people with T2DM (e.g. financing systems, primary care HCP training in mental health), and cultural factors (e.g. societal and generational mental health stigma), may influence mental health screening implementation, we could not explore these factors in more depth. Fourth, our review did not capture challenges associated with screening and diagnosing other pertinent psychological difficulties experienced by people with T2DM (e.g. disordered eating, dementia) (321,322). Finally, our application of the CASP may have been limitation since it is thought to perform less well than other tools in evaluating aspects of methodological study quality (323). However, a fit-for purpose quality appraisal tool specific to the aims of methodological assessment as part of the GRADE CERQual approach (324) i.e. assessment of how identified methodological limitations of a study could influence confidence in an individual review finding, rather than assessing the

overall quality of an individual study included in the QES (304), is currently being developed. In it's absence, the review team selected the CASP based on decision support criteria set out by Majid and Vanstone (325).Implications

The findings from this review have a number of important implications for research, policy and practice on this topic. Our review highlighted the need for additional primary research to explore implementation of diabetes-distress screening and the perspectives of the wider community T2DM management team on diabetes distress and depression screening in T2DM, and HCP perspectives on screening in health-care systems outside of the UK.

Regarding policy and practice implications, application of BFFS and GRADE-CERQual resulted in a clear set of actionable findings (326), assessed as being of high (n=3), moderate (n=9) and low confidence (n=3). Our findings provide additional insight into implementation of depression screening policies of people with diabetes in primary care (40,233) and can ultimately be used to inform the design of more appropriate interventions and policies (326). Such strategies could attend to HCP specific barriers, ensure HCPs fully understand the rationale for screening, highlight the HCP perceived benefits of screening, resource screening appropriately and ensure access to appropriate expertise and management options. This may be supported through incorporation of at least some components of collaborative care relating to the review findings e.g. enhanced inter-professional communication (327).

4.5.4 *Conclusion*

GPs, practice nurses and chronic disease specialist nurses experience many barriers and enablers to diabetes distress and depression screening among people with T2DM. The barriers and enablers identified were similar across health professional groups, with some factors reported predominantly or exclusively by GPs or nurses. Future interventions and policies could attend to HCP specific barriers, ensure HCPs fully understand the rationale for screening, highlight the HCP perceived benefits of screening and resource screening appropriately.

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