# Understanding the role of health beliefs amongst adults engaging with secondary and tertiary preventive services to live well with type 2 diabetes.

A rapid review

Version 1.0

Mae'r ddogfen yma ar gael yn y Gymraeg/This document is available in Welsh

## Details of Evidence Review Report

**Title:** Understanding the role of health beliefs amongst adults engaging with secondary and tertiary preventative services to live well with type 2 diabetes: A rapid review.

**Authors:** Kate Shiells, Alesha Wale, Golibe Ezenwugo, Salina Khatoon, Helen Morgan, Amy Fox-McNally, Hannah Shaw, and Amy Hookway; Public Health Wales Evidence Service.

**Date:** 06/12/2024

**Version:** V1.0

**Publication/Distribution:** to be stored internally to PHW staff via SharePoint, and published externally on PHW website. Report also to be distributed to PHW R&E directorate, and Beaufort Research.

**Protocol details:** Protocol available on PHW staff via SharePoint, or on request via evidence.service@wales.nhs.uk

## Contents

# 1. Key messages/ Executive summary

Globally, type 2 Diabetes Mellitus is a growing health challenge as its prevalence is expected to rise dramatically, with estimates suggesting 1 in 11 adults with be living with diabetes in Wales by 2035/36 (Public Health Wales, 2023). Currently in Wales, the All-Wales Diabetes Prevention Programme supports individuals at higher risk of type 2 diabetes to make changes to their diet and be more physically active. However, a proportion of those identified as being at-risk of or diagnosed with type 2 diabetes in Wales are not engaging with these services.

The Health Belief Model is a behaviour change model developed by Becker (1974) to help explain and predict health related behaviours. Utilising six constructs, the model provides a framework to highlight factors that influence health-related behaviours. These include an individual's perceived-susceptibility and severity to a condition, benefits and barriers of behaviour change, and cues to action that will make the behaviour change more easily achievable and factors that can empower people to have the confidence to make a behaviour change (Abraham and Sheeran, 2015). The model can be applied to a range of health behaviours and provides a useful framework for shaping behaviour patterns relevant to public health (Abraham and Sheeran, 2015).

Given the predicted rise in prevalence and current issues around service engagement, it is important to understand the key influencers of engagement among this population so they can benefit most. Therefore, the Evidence Service at Public Health Wales undertook an evidence review using the Health Belief Model as a behavioural framework to better understand how people at risk of- and with type 2 diabetes perceive diabetes, and how these beliefs can influence engagement with diabetes prevention programmes.

## Key findings:

### How do health beliefs around type 2 diabetes influence engagement with secondary prevention services in people at risk of type 2 diabetes?

- Ten studies met the inclusion criteria for this question. Eight of these used a qualitative study design and two used mixed methods.
- Five studies explored engagement with the NHS Diabetes Prevention Programme in England, and one with the NHS Digital Diabetes Prevention Programme. One study looked at engagement with the All Wales Diabetes Prevention Programme. The remaining three

studies explored engagement with various other diabetes prevention interventions or programmes in specific areas of the UK.

- All components of the health belief model were found to influence the decision to engage with secondary diabetes prevention programmes to varying degrees.
- **Perceived susceptibility** had a mixed influence on engagement. For some, a family history of type 2 diabetes was a motivating factor. Conversely, others felt the inevitability of developing the condition decreased their motivation to engage.
- **Perceived severity** was also linked to the decision to engage, whereby those who viewed pre-diabetes as an asymptomatic condition were less likely to attend a prevention programme. Feeling overwhelmed by a pre-diabetes diagnosis was also linked with reduced engagement. Fear of developing diabetes and its consequences, and recognising that pre-diabetes was a reversible condition, drove others to take part in a prevention programme.
- **Perceived benefits** of engaging in a prevention programme included obtaining knowledge and support to improve health and obtaining peer support from group sessions. Experiencing improved health and wellbeing after engaging in a programme motivated some to continue to engage.
- Numerous **perceived barriers** were also identified, such as accessibility issues; cost; co-morbidities; competing responsibilities; difficulties with enrolling in the programme; off-putting format of the programme; and the value of the programme not being communicated by health professionals.
- **Self-efficacy** to manage pre-diabetes could also positively influence the decision to engage, whereby participants valued the programme as a way to support their previous successful behaviour change. It could also negatively influence decision-making, with some participants believing that they had sufficient willpower to manage the condition by themselves.

Modifying factors:

- **Income** was identified as a barrier to engagement, whereby some participants in receipt of benefits could not afford to travel to an in-person prevention programme.
- **Ethnicity** was shown to influence ongoing engagement in certain components of a diabetes prevention programme, with some South Asian participants describing difficulties in maintaining healthy eating behaviours during cultural or religious celebrations.

Cues to action:

- **Influence from health professionals** was linked with increased motivation to engage with a prevention programme. This included health professionals discussing the programme in more detail with patients and emphasising its benefits.
- **External support from family and friends** was found to motivate some individuals to engage. For instance, if family members also adopted a healthier lifestyle or drove participants to sessions.
- **Programmes which included monitoring of behaviour** were believed to increase

accountability and improve engagement in certain elements of a diabetes prevention programme.

## How do health beliefs around type 2 diabetes influence engagement with tertiary prevention services in people diagnosed with type 2 diabetes?

- A total of five studies met the inclusion criteria for question 2. Four of these used a qualitative study design and one used a quantitative cross-sectional design
- Services included diabetic retinopathy screening (n=2) diabetes education programmes (n=2) and an education and physical activity programme (n=1).
- A lack of **perceived susceptibility**, influenced by information provided by healthcare professionals, led to decreased engagement with diabetic retinopathy screening.
- Increased **perceived severity**, influenced by information provided by healthcare professionals, or a family history of diabetes, led to increased engagement with diabetic retinopathy screening and an education and physical activity programme.
- Medical reassurance was a **perceived benefit** increasing engagement with diabetic retinopathy screening.
- Increased knowledge about managing type 2 diabetes was a **perceived benefit** increasing engagement with education programmes.
- Increased support from others who have type 2 diabetes was a **perceived benefit** increasing engagement with diabetes education programmes, and an education and physical activity programme.
- **Barriers to engagement** with tertiary prevention services included a lack of information; the format or delivery method of the service; accessibility issues; competing responsibilities; comorbidities and concerns around stigma.
- Participants **perceived self-efficacy** to prevent type 2 diabetes complications led to decreased engagement with diabetes education programmes.

### Modifying factors

- **A family history of diabetes** increased engagement with diabetic retinopathy screening as the perceived severity of complications was increased, however a family history was also found to decrease engagement with an education programme by increasing individuals perceived self-efficacy to effectively self-manage.
- **Age** was found to decrease engagement with an education and physical activity programme as it was perceived to be aimed at younger people.
- **Homelessness** was found to be a barrier to engagement with diabetic retinopathy screening as this caused challenges accessing appointments.

### Cues to action

- **Information provided by healthcare professionals** was a cue to action to attend an education and physical activity programme and diabetic retinopathy screening.

## 1.1. Implications for practice, and future research

### Implications for practice:

The influence of healthcare professionals and the information they provide to patients about prevention services was found to impact health beliefs and engagement across both research questions. In order to improve engagement, it is essential that patients are fully informed about the availability of prevention services, what they involve and how they could benefit from engaging. Furthermore, the way in which this information is communicated to patients may also need to be considered, as some study participants with pre-diabetes stated that a letter about the programme made them less likely to engage as opposed to if they had had a conversation with a health professional. In question 1, perceived severity was linked with engagement, with varying beliefs around whether the condition warranted engagement with prevention services or not. In some instances, the belief that diabetes was inevitable and a feeling of being overwhelmed by a pre-diabetes diagnosis led study participants not to engage. In this instance, information from health professionals may need to strike a balance between highlighting risks, but also emphasising the way in which programmes can prevent progression to diabetes. A follow-up invitation to the preventative programme may also be needed, once individuals have had time to reflect.

One of the main identified benefits of engaging in secondary preventative services was to obtain knowledge and support to improve health. However, some participants were more motivated to attend to lose weight as opposed to preventing diabetes. Therefore, when discussing the programme with patients, health professionals may wish to look at patient goals for improving health and discuss how the prevention programme may address these. In some instances, low self-efficacy was a barrier to engagement, and this may also need to be addressed before an individual is willing to engage with secondary prevention programmes.

Preferences were given for both in-person, digital, group and individual sessions in both questions, suggesting a choice of options may need to be provided. Group sessions may provide invaluable peer support to some, but the opportunity to attend digital sessions may address the accessibility issues highlighted by some study participants, such as those without access to transport or on a low income. While it may not be practical to provide online access to all prevention services, where possible, this could also mean services are more inclusive for those who have other competing priorities co-morbidities. Some study participants in question 1 also cited programmes with an element of accountability or monitoring as a driver to engage on an ongoing basis, although again, this may need to be tailored to individual preference.

### Implications for research:

Further research could explore the impact on engagement of delivering secondary and tertiary services online. Secondly, while the evidence base for question 2 was limited and only focused on three tertiary prevention services, some findings were specific to individual services. As such, future research into how health beliefs influence engagement with the full range of tertiary prevention services available could address this gap, identify additional findings, and clarify if health beliefs are specific to individual services or common across them all. Further research conducted with those who choose not to attend secondary services may also provide new insights into the decision making behind non-engagement with diabetes prevention services, as research containing non-attendees was somewhat lacking in question 1. The evidence was also limited among ethnic minority populations, capturing the voices of these groups in future research may provide additional insights and confirm whether certain influences on engagement may be unique to certain populations.

## 2. Background and purpose

Globally, type 2 diabetes mellitus is a growing health challenge, and is often linked to increasing rates of obesity, poor diet, and sedentary lifestyles (Hossain, Al-Mamun and Islam, 2024). The prevalence of type 2 diabetes is expected to rise dramatically; however, in Wales, the projection is particularly concerning with recent data showing that over 200,000 adults in Wales are living with type 2 diabetes (Public Health Wales, 2023). Further estimations project that over 61,000 people are yet to be diagnosed and by 2035, the prevalence of type 2 diabetes will reach 10% of the population (Public Health Wales, 2023). Therefore, it is important that populations described as being at-risk of type 2 diabetes or already diagnosed, engage with services to help manage or prevent type 2 diabetes.

In Wales, the All-Wales Diabetes Prevention Programme supports individuals at higher risk of type 2 diabetes to make changes to their diet and be more physically active. However, a proportion of those identified as being at-risk of or diagnosed with type 2 diabetes in Wales are not engaging with these services to support and maintain good health. To mitigate this and understand the key influencers, the Research and Evaluation team at Public Health Wales requested that the Evidence Service at Public Health Wales undertake an evidence review using the Health Belief Model to better understand how people with type 2 diabetes perceive it and how these beliefs can influence engagement for the All-Wales Diabetes Prevention Programme.

The Health Belief Model is a behaviour change model developed by Becker (1974) to help explain and predict health related behaviours. Abraham & Sheeran (2015) describe the model as focusing on:

> “Two aspects of individuals’ representations of health and health behaviour: threat perception and behavioural evaluation. Threat perception was construed as two key beliefs: perceived susceptibility to illness or health problems, and anticipated severity of the consequences of illnesses. Behavioural evaluation also consisted of two distinct sets of beliefs: those concerning the benefits or efficacy of a recommended health behaviour, and those concerning the costs of, or barriers to, enacting the behaviour. In addition, the model proposed that cues to action can activate health behaviour when appropriate beliefs are held. These ‘cues’ included a diverse range of triggers, including individual perceptions of symptoms, social influence, and health education campaigns. Finally, an individual’s general health motivation, or ‘readiness to be concerned about health matters’, was included in later versions of the model (e.g., Becker et al. 1977b). There were therefore six distinct constructs specified by the HBM.”

## 3. Methods

This rapid review aimed to answer the following questions:

1) How do health beliefs around type 2 diabetes influence engagement with secondary prevention services in people at risk of type 2 diabetes?

2) How do health beliefs around type 2 diabetes influence engagement with tertiary prevention services in people diagnosed with type 2 diabetes?

### 3.1. Search methods

Separate searches were conducted for relevant literature relating to questions 1 and 2. In order to meet the rapid timescales required for completion of this review, the decision was made to search for secondary level literature (i.e. systematic reviews), screen these for eligibility against the review's inclusion criteria, and then extract relevant primary studies undertaken in the UK/Ireland for inclusion in the review.

To help inform development of the search strategies for this review, search strategies from relevant published reviews were consulted to identify relevant terms for question 1 (Barry, Greenhalgh and Fahy, 2018; Johnson, et al. 2011; McMullen, et al. 2024) and question 2 (Coffey, Mahon and Gallagher, 2019; Sibounheuang, Olson and Kittiboonyakun, 2020; Poudel, et al. 2018). Search strategies for both question 1 and 2 can be found in appendix A. All database search strategies were peer reviewed by an alternative member of the author team.

All searches were conducted in August 2024 for systematic reviews published from 2000 to 2024 and where possible were limited to the English language. Searches were undertaken across the following databases: Medline (Ovid), PsycINFO (Ovid), CINAHL (EBSCO) and Scopus (Elsevier) using appropriate subject headings, wide ranging free text terms and synonyms to describe the key concepts of each question. In addition, the websites of the following organisations were searched for relevant grey literature: Diabetes UK, Diabetes Research and Wellness Foundation, The InDependent Diabetes Trust, Department of Health and Social Care, Public Health Agency (Northern Ireland), Public Health Scotland, Public Health Wales, and UK Health Security Agency. Key terms were used to describe the key concepts of each question. An advanced search in Google was also conducted, and the first two pages were screened for relevant literature. No citation tracking for additional systematic reviews was undertaken and no authors or topic experts were contacted.

### 3.2. Study record management

Search results were exported into Endnote reference management software and duplicates removed.

## 3.3. Eligibility criteria & selection process

All systematic reviews identified through the searches were screened against the selection criteria for either Q1 or Q2 (tables 1 and 2, below).

For the purposes of this rapid review, secondary prevention services were defined as those aimed at preventing people with pre-diabetes from developing diabetes, and tertiary prevention services were defined as those aimed at preventing known complications of type 2 diabetes, in those already diagnosed with the condition.

Table 1: Review eligibility criteria Q1

| Review question 1: | | |
|---|---|---|
| How do health beliefs around type 2 diabetes influence engagement with secondary prevention services in people at risk type 2 diabetes? | | |
| | Include: | Exclude: |
| Sample | Community dwelling adults aged 18 years and over who are clinically diagnosed as 'pre-diabetic' and therefore at risk of progressing to type 2 diabetes.<br>Health professionals. | Community dwelling people younger than 18 years of age.<br>Community dwelling adults not identified as pre-diabetic.<br>Community dwelling adults with a diagnosis of type 2 diabetes.<br>Adults receiving in-patient care, or in a long-term care facility and those living in prisons.<br>Pregnant women diagnosed with, or at risk of developing gestational diabetes. |
| Phenomenon of Interest | Secondary prevention services include those contained in 'Healthier You' diabetes prevention programme[1], which include lifestyle and behavioural interventions including education and exercise. Courses may focus on quitting smoking, eating healthily, and exercising more, but they all have a focus on preventing the development of type 2 diabetes. Interventions can be group based or | |

---

[1] https://www.england.nhs.uk/diabetes/diabetes-prevention/

| | | |
|---|---|---|
| | digital.<br>perceptions of patients' health beliefs from the perspective of health professionals. | |
| Design | Any | |
| Evaluation | Reported or explored aspects of the Health Belief Model (susceptibility, severity, motivation, benefits, self-efficacy, costs, and cues to action) and how these influence engagement with secondary prevention services outcomes. | |
| Research type | Systematic reviews will be used to identify relevant UK focused primary research. | Secondary literature, commentaries, opinion pieces, conference abstracts, protocols. |
| **Other Study Considerations** | | |
| Relevant systematic reviews identified will be screened for eligible primary studies. If considered relevant, only primary studies conducted in the UK/Ireland will be considered for inclusion in this systematic review.<br>Inclusion limited to primary studies published after 2000 as perceptions likely to have changed since then.<br>Published in English language. | | |

## Table 2: Review eligibility criteria Q2

| | | |
|---|---|---|
| **Review question 2:** | | |
| How do health beliefs around type 2 diabetes influence engagement with tertiary prevention services in people diagnosed with type 2 diabetes? | | |
| | **Include:** | **Exclude:** |
| Sample | Community dwelling adults aged 18 years and over with a diagnosis of type 2 diabetes.<br>Health professional perceptions of patients' health beliefs. | Community dwelling people younger than 18 years of age.<br>Community dwelling adults not diagnosed with type 2 diabetes.<br>Adults receiving in-patient care, or in a long-term care facility and those living in prisons.<br>Pregnant women diagnosed with, or at risk |

| | | |
|---|---|---|
| | | of developing gestational diabetes. |
| **Phenomenon of Interest** | Tertiary prevention services include:<br>• Glycated haemoglobin (HbA1c) measurement, with a suggested target of 59 mmol/mol.<br>• Blood pressure (BP) measurement, with a suggested target of 140/80 mm Hg.<br>• Cholesterol level measurement, with a suggested target for total cholesterol (TC) of 5 mmol/L.<br>• Retinal screening.<br>• Foot checks.<br>• Urinary albumin testing.<br>• Serum creatinine testing.<br>• Weight check.<br>• Smoking status check.<br>• Educational programmes<br>• Remission programmes | |
| **Design** | Any | |
| **Evaluation** | Reported or explored aspects of the Health Belief Model (susceptibility, severity, motivation, benefits, self-efficacy, costs and cues to action) and how these influence engagement with tertiary prevention services outcomes. | |
| **Research type** | Systematic reviews will be used to identify relevant UK focused primary research. | Secondary literature, commentaries, opinion pieces, conference abstracts. |
| **Other Study Considerations** | | |
| Relevant systematic reviews identified will be screened for eligible primary studies. If considered relevant, only primary studies conducted in the UK/Ireland will be considered for inclusion in this systematic review.<br>Inclusion limited to primary studies published after 2000 as perceptions likely to have changed since then.<br>Published in English language. | | |

Search results were imported into Rayyan screening software (Ouzzani, et al. 2016) for screening. Titles and abstracts of the systematic reviews were screened independently in duplicate by two reviewers, with any disagreements being resolved by discussion. The full texts of those included at title and abstract were also screened by two reviewers independently in duplicate. Disagreements were similarly resolved by discussion.

Included primary studies from systematic reviews which met our inclusion criteria were then extracted into a spreadsheet to identify which were conducted in the UK/Ireland. These were then transferred to an Endnote library and deduplicated. The full texts of any undertaken in the UK/Ireland were then screened against the same inclusion criteria in tables 1 and 2 (with the exception of study design) by two reviewers independently in duplicate. Disagreements were resolved by discussion.

## 3.4. Critical appraisal

Included primary studies were critically appraised to assess their methodological quality. Each study was appraised independently by two reviewers using the JBI quality appraisal checklist for qualitative and cross sectional study designs, and the MMAT tool for mixed methods (Hong, et al. 2018: Lockwood, et al. 2015; Moola, et al. 2020). The appraisals were then discussed by the reviewers and a consensus reached on quality. Any concerns from critical appraisal of the individual studies are highlighted in the comments section of the data extraction table (appendix B).

## 3.5. Data extraction

The characteristics of the included primary studies were extracted into data extraction tables (appendix B) by one reviewer and consistency checked by a second reviewer.

## 3.6. Synthesis

Deductive thematic synthesis of the included studies was undertaken to construct themes.

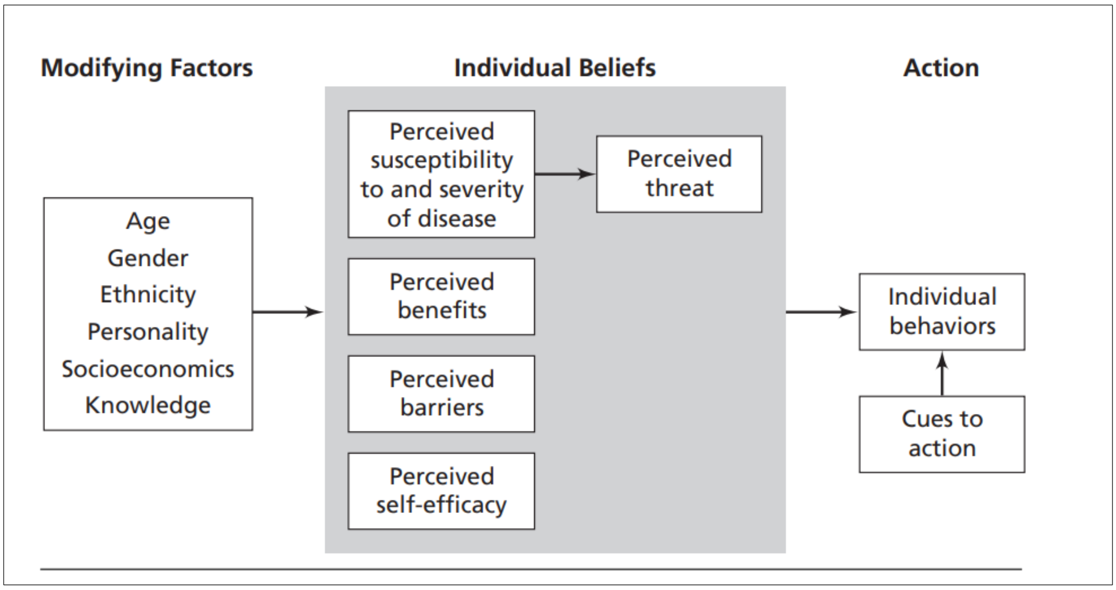
Each primary study was read and relevant findings were coded separately by two reviewers using ATLAS.ti. Reviewers then met to compare codes and sort these into broad themes for synthesis.

In order to identify how health beliefs influence engagement in secondary and tertiary diabetes prevention services amongst the populations being examined, the Health Belief Model (Figure 1) was used as a framework for organising the review themes.

Themes identified from qualitative synthesis were sorted under the broad headings of the Health Belief Model to provide a structured summary of the review findings regarding how health beliefs around type 2 diabetes influence engagement in secondary prevention services amongst pre-diabetic populations, and tertiary prevention services amongst those already diagnosed with type 2 diabetes.

As beliefs and perspectives were likely to vary between those with pre-diabetes, those diagnosed with type 2 diabetes and healthcare professionals, populations of interest were synthesised separately and then similarities and differences between groups compared in the discussion section.

Figure 1: The Health Belief Model, developed by Becker (1974) and later amended by Rosenstock (1988). Diagram taken from Glanz et al. (2008).

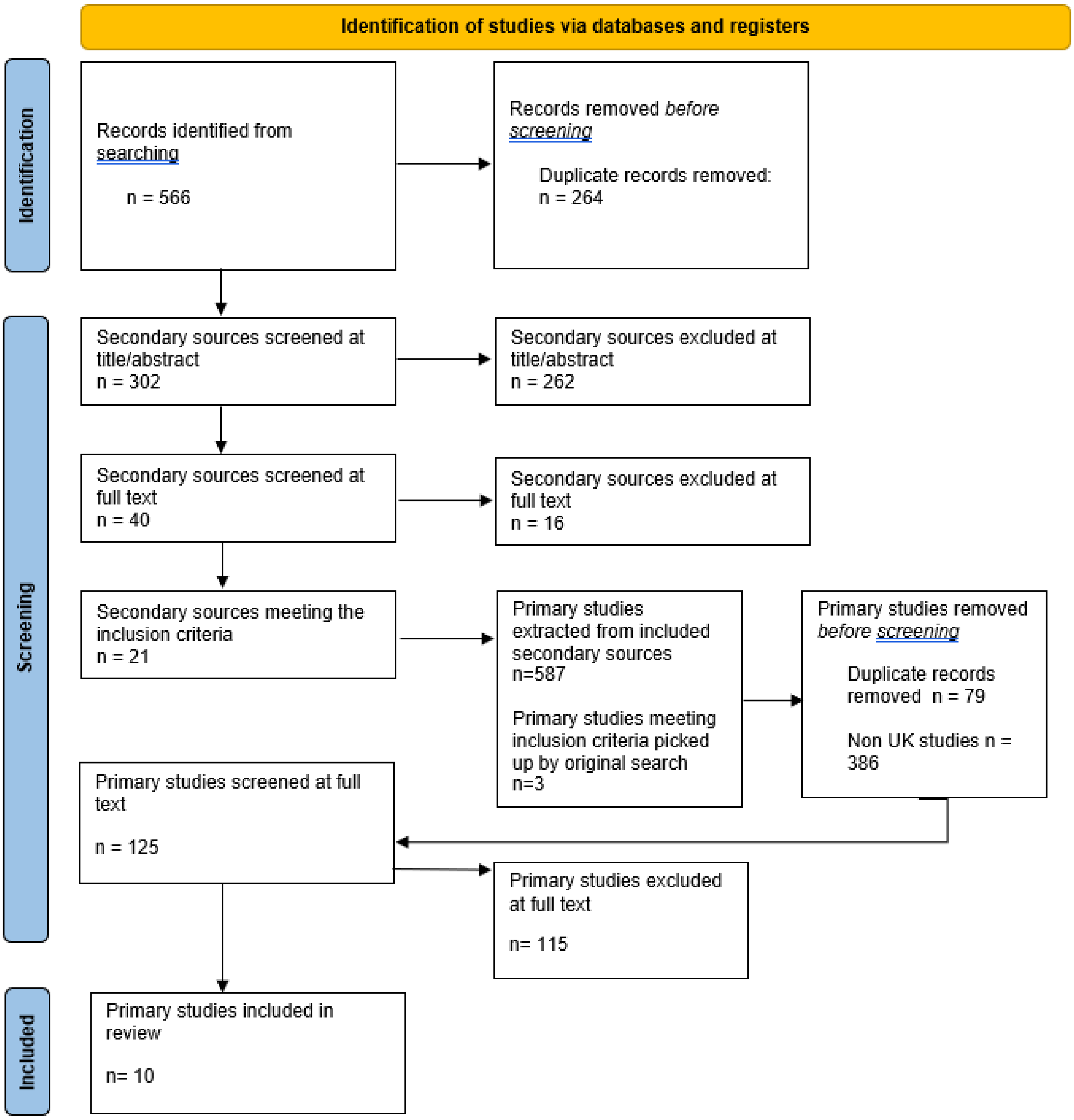


# 4. Results

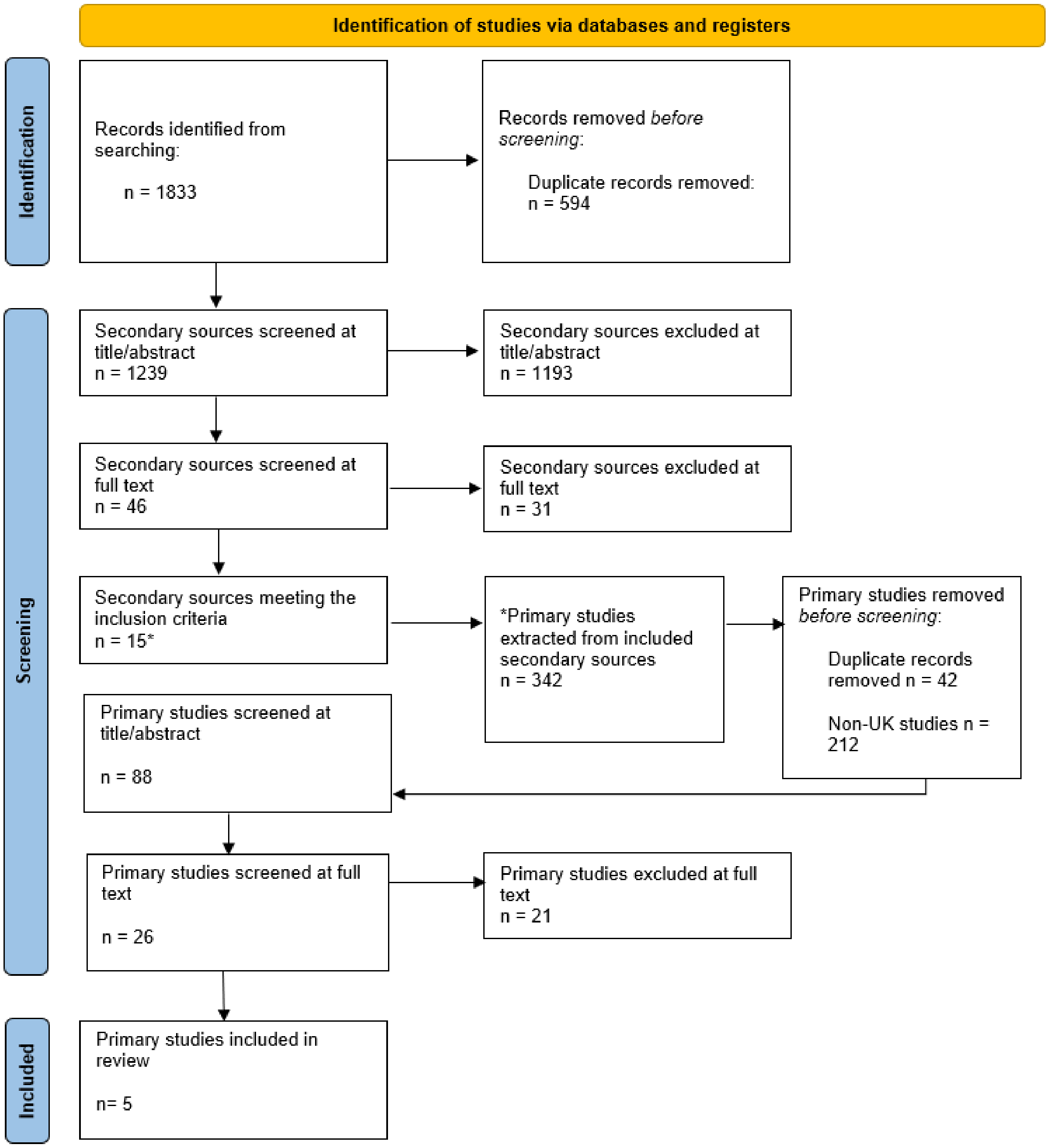
## 4.1. Study Selection

Overall, 15 primary studies were included in this rapid review: 10 primary studies met the inclusion criteria for question 1 and five met the inclusion criteria for question 2. Flow diagrams of the search and study selection results are displayed in figures 2 and 3 below.

Figure 2: Search and selection flow diagram for review question 1



## Figure 3: Search and selection flow diagram for review question 2



* Note: One of the secondary sources meeting the inclusion criteria at full text was a review of systematic reviews. The SRs included in this that were not picked up in the original search were also screened. One SR from this review of reviews met the inclusion criteria for our review, and so the primary studies from this were extracted and added to the primary studies list for further screening. The remaining systematic reviews included in the review of reviews did not meet our inclusion criteria and were excluded. The total in 'primary studies extracted from included secondary sources' includes the extracted primary studies from the relevant systematic review.

## 4.2. Study characteristics

As per the inclusion criteria, all the included studies took place across the UK or Ireland. Ten were specifically in England, one in Wales, one in Scotland, one in the Republic of Ireland, and one across two sites in England and Wales. The final study did not specify which exact region of the UK it was undertaken in. Twelve of the included studies were qualitative, one was a cross-sectional design and two were mixed methods.

The ten studies relevant to question 1 all examined diabetes prevention programmes in people at high risk of type 2 diabetes. The views of service users were examined in seven studies, one study examined the views of health professionals (Cotterill, et al. 2016), and two studies included the views of both service users and healthcare professionals (Parsons, et al. 2024; Rodrigues, et al. 2020). One study (Borek, et al. 2019) also included a small sample of people already diagnosed with type 2 diabetes, and one study (Morrison, et al. 2014) included participants of South Asian ethnicity.

The five studies relevant to question 2 all included people already diagnosed with type 2 diabetes. One also included healthcare professionals (Hipwell, et al. 2014). One study (Choudhary, et al. 2009) was undertaken in participants of Bangladeshi origin. Services examined included diabetes education programmes (n=2), diabetic retinopathy screening programmes (n=2) and combined education & physical exercise programmes (n=1).

Table 3 provides characteristics of the included studies for each question. Further details are also included in the data extraction tables in appendix B.

Table 3: Study characteristics table

**Characteristics of studies relating to Q1:** How do health beliefs around type 2 diabetes influence engagement with secondary prevention services in people at risk type 2 diabetes?

| Reference | Location | Study design | Study participants | Intervention / Service | Methods |
|---|---|---|---|---|---|
| Aujla, et al. (2019) | East Midlands, England | Qualitative | 22 people at high risk of type 2 diabetes | Let's Prevent Diabetes | Semi structured interviews |
| Begum, et al. (2022) | South London, England | Qualitative | 35 adults classified as having non-diabetic hyperglycemia (pre-diabetes) | The Healthier You: NHS diabetes prevention programme (NHSDPP) | Semi structured interviews |
| Borek, et al. (2019) | Norfolk, England | Qualitative | 20 adults (fifteen at risk of diabetes, five with newly diagnosed | Norfolk diabetes prevention study (NDPS) | Semi structured telephone |

| | | | | | |
|---|---|---|---|---|---|
| | | | diabetes) | | interviews |
| Cotterill, et al. (2016) | Salford, England | Qualitative | 32 key informants, including health professionals | National Health Service diabetes prevention programme (NHSDPP) | Semi structured interviews |
| Katangwe, et al. (2020) | Norfolk, England | Mixed methods: Qualitative and quantitative. | Quantitative: 962 adults with pre-diabetes referred to the NHS DPP within the previous 12 months<br>Qualitative: 16 adults as described above | National Health Service diabetes prevention programme (NHSDPP) | Questionnaires, semi structured interviews and focus groups |
| Morrison, et al. (2014) | Scotland | Qualitative | 20 participants of South Asian ethnicity, diagnosed with impaired glucose tolerance. Four family volunteers. | A complex dietician led, dietary and physical activity intervention aiming to reduce obesity and prevent type 2 diabetes in people of Indian and Pakistani origin | Narrative interviews |
| Parsons, et al. (2024) | Wales | Mixed methods | 187 people including service users, healthcare professionals and key stakeholders | All Wales Diabetes Prevention Programme (AWDPP) | Document review, focus groups, interviews, observations, surveys, and analyses of anonymized routinely collected data |
| Rodrigues, et al. (2020) | England | Qualitative | 20 service users with non-diabetic hyperglycemia, 7 programme commissioners, 8 programme referrers and 15 intervention delivery personnel | NHS diabetes prevention programme (NHSDPP) | Semi structured telephone interviews |
| Ross, et al. (2023) | England | Qualitative | 32 service users diagnosed with non-diabetic hyperglycemia | NHS Digital diabetes prevention programme (NHS-Digital-DPP) | Semi structured interviews |

| | | | | | |
|---|---|---|---|---|---|
| Twohig, et al. (2019) | England | Qualitative | 23 adults diagnosed with pre-diabetes | NHS Diabetes prevention programme (NHS DPP) | Semi-structured interviews |
| | | | | | |
| **Characteristics of studies relating to Q2:** How do health beliefs around type 2 diabetes influence engagement with tertiary prevention services in people diagnosed with type 2 diabetes? | | | | | |
| **Reference** | **Location** | **Study design** | **Study participants** | **Intervention / Service** | **Methods** |
| Choudhury, et al. (2009) | Swansea, Wales & Birmingham, England | Qualitative | 14 Bangladeshi participants with type 2 diabetes | Diabetes peer educational programme | Structured interviews |
| Dervan, et al. (2008) | Dublin, Ireland | Cross sectional (questionnaire based) | All adults invited to attend general diabetes clinics in two centers between 01/11/2001-06/12/2001 and 15/04/2002-02/05/2002 | Diabetic retinopathy screening service | Telephone questionnaire |
| Hipwell, et al. (2014) | UK | Qualitative | 38 patients with diabetes (34 with type 2 diabetes and 4 with type 1 diabetes), & 24 health professionals | Diabetic retinopathy screening | Semi structured interviews |
| Visram, et al. (2008) | Newcastle-upon-Tyne, England | Qualitative | 21 patients with type 2 diabetes | Newcastle education and physical activity programme for newly diagnosed type 2 diabetes | Focus groups and semi structured interviews |
| Winkley, et al. (2015) | South London, England | Qualitative | 30 patients with newly diagnosed type 2 diabetes | Diabetes education for ongoing and newly diagnosed diabetes (DESMOND) programme | Semi structured interviews |

## 4.3. Critical appraisal

Generally, the included qualitative studies were of acceptable quality. However, many did not report reflexivity statements or address the influence of the researchers on the research. In five studies (Begum, et al. 2022; Twohig, et al. 2019, Aujla, et al. 2019; Borek, et al. 2019; Morrison, et al. 2014), greater consideration of the authors beliefs, perspectives, position and how this could have affected their interpretation of the data was acknowledged and/or considered to some degree. The majority of the qualitative studies adequately represented the voices of the participants; however, it is unclear in two studies (Cotterill, et al. 2016; Visram, et al. 2008) if quotes were representative of all participant groups. The cross-sectional study (Dervan, et al. 2008) which explored diabetic retinopathy eye screening did not discuss confounding factors and the exposure (self-reported eye examination) was measured subjectively, which could be subject to recall bias.

The two mixed methods studies (Katangwe, et al. 2020; Parsons, et al. 2024) varied in methodological quality. Concerns included the lack of pre-testing of the questionnaires prior to data collection. Further methodological limitations such as a low response rate, and a lack of integration of the findings from the qualitative and quantitative components of the study were also identified in Katangwe, et al. (2020).

## 4.4. Findings of syntheses

In order to identify how health beliefs around type 2 diabetes influence engagement with secondary and tertiary prevention services, a deductive thematic synthesis approach was used. The included studies were coded individually and these codes were grouped against the components of the Health Belief Model to construct the themes below. The results of the synthesis are reported separately for the two research questions, and direct quotes from the included studies are provided to support the findings of the synthesis.

### Q1: How do health beliefs around type 2 diabetes influence engagement with secondary prevention services in people at risk type 2 diabetes?

Across the ten included studies, all components of the health belief model were identified as influencing the decision to engage with secondary prevention programmes to varying degrees. Modifying factors were also identified for the health belief components ‘perceived barriers’ and ‘self-efficacy’. Both health beliefs relating to initial engagement and those relating to ongoing engagement are included in the synthesis.

One study (Cotterill, et al. 2016) presented the views of health professionals in relation to why they believed patients chose to engage or not engage with prevention services and these are also highlighted. The findings from health professionals appear to support some of the findings from the study participants, suggesting that engagement with prevention services may be influenced by the perceived severity of type 2 diabetes; the perceived barriers to engagement; and self-efficacy to manage pre-diabetes.

Perceived susceptibility to type 2 diabetes:

Participants’ beliefs about their perceived susceptibility to type 2 diabetes were found to influence their decision to engage with secondary prevention services in five studies (Aujla, et al. 2019; Begum, et al. 2022; Katangwe, et al. 2020; Ross, et al. 2023; Twohig, et al. 2019), both positively and negatively.

#### *Family history of diabetes*

Across three studies, study participants described their family history of diabetes as a motivating factor for engaging with a prevention programme, as they believed they were more susceptible to developing type 2 diabetes (Aujla, et al. 2019; Begum, et al. 2022; Katangwe, et al. 2020).

#### *Type 2 diabetes seen as inevitable*

Conversely, in another study, one participant who had a family history of diabetes expressed their belief that developing type 2 diabetes was inevitable because of their 'genetic nature of risk'. Consequently, they believed that any lifestyle modifications would not be enough to reduce this risk (Ross, et al. 2023). Likewise, in two studies, low levels of motivation to engage were said to be linked with the belief that developing type 2 diabetes was inevitable, even if there was no family history (Ross, et al. 2023; Twohig, et al. 2019).

### Perceived severity of pre-diabetes:

Pre-diabetes was viewed with varying levels of severity by study participants, with some seeing the condition as severe enough to engage, but others taking the opposite view. This health belief was identified across seven studies (Aujla, et al. 2019; Begum, et al. 2022; Cotterill, et al. 2016; Katangwe, et al. 2020; Rodrigues, et al. 2020; Ross, et al. 2023; Twohig, et al. 2019).

#### *Asymptomatic nature of pre-diabetes*

Study participants felt that the fact that they did not feel unwell, their blood sugars were down or their pre-diabetes was under control, meant that they did not need to attend or engage with a prevention service (Twohig, et al. 2019; Aujla, et al. 2019; Begum, et al. 2022). The way in which pre-diabetes was viewed as a pre-condition and asymptomatic also led some study participants to find it hard to believe they were at risk (Twohig, et al. 2019; Aujla, et al. 2019). One study participant felt that they had a 'way to go' before they reached type 2 diabetes, and it was only at that point that they believed they would need to act (Ross, et al. 2023). Another believed that not being overweight meant that they did not need to engage with a prevention programme as they were not part of the target population (Ross, et al. 2023).

#### *Perceived seriousness of disease progression*

Study participants who had seen friends or family members go on to develop diabetes, sometimes with complications or who had even passed away, were fearful that this could happen to them and this drove them to engage in a prevention programme (Begum, et al. 2022; Cotterill, et al. 2016; Katangwe, et al. 2020; Ross, et al. 2023; Twohig, et al. 2019). Two study participants explained:

> *'My brother has it [type 2 diabetes]. It's a nuisance and it affects him in a way which I thought well I don't want to be in that situation. In fact, I thought I am not going to be in that situation full stop' [attending participant]* (Katangwe, et al. 2020).

> *'To be honest, I would hate to be diabetic. If I had to give myself injections I just don't know how I could handle that. I know people who have had it affect other parts of your health and that frightens me [attending participant]* (Twohig, et al. 2019).

Health professionals reported that ensuring patients had an understanding of the risks associated with type 2 diabetes increased engagement with secondary services. This is described in the following quotes:

> *"Most of our patients take it up because we emphasise about not becoming diabetic and I think a lot of people have heard about problems with diabetes. I'd say probably 95% of our patients take up the referral." [healthcare professional]* (Cotterill, et al. 2016).

However, Aujla, et al. (2019) found that study participants who had been told via letter about their high risk of type 2 diabetes, as opposed to over the phone or face-to-face with their GP, believed that the problem was not serious enough to warrant attending a prevention programme.

*Diagnosis is overwhelming*

In two studies, participants described how being diagnosed with pre-diabetes and labelled as 'high risk' had overwhelmed them to such an extent that they felt unable to take preventative action (Rodrigues, et al. 2020; Ross, et al. 2023).

*Reversible nature of pre-diabetes*

The way in which pre-diabetes was seen as a reversible condition which individuals could influence was seen by some as a motivator to take action (Begum, et al. 2022; Twohig, et al. 2019). For instance, one study participant explained:

> *'You've been given an early sign that something, diabetes, the first stages of diabetes is going to set in, so obviously got to do something about it. Obviously start making subtle changes to your food and all that and your lifestyle' [attending participant; male; age 50-54; White British; unemployed; family history]* (Twohig, et al. 2019).

Perceived benefits of engaging with secondary prevention services:

In nine studies (Aujla, et al. 2019; Begum, et al. 2022; Borek, et al. 2019; Katangwe, et al. 2020; Morrison, et al. 2014; Parsons, et al. 2024; Ross, et al. 2023; Rodrigues, et al. 2020; Twohig, et al. 2019), study participants discussed various benefits of secondary prevention services, which were associated with their decision to engage.

*Obtain knowledge and support to improve health*

Across a number of studies, participants linked their reasons for attending a diabetes prevention programme with the benefit of gaining knowledge and professional support to improve their health and prevent diabetes (Aujla, et al. 2019; Begum, et al. 2022; Borek, et al. 2019; Katangwe, et al. 2020; Morrison, et al. 2014; Parsons, et al. 2024; Ross, et al. 2023; Twohig, et al. 2019). For instance, Twohig, et al. (2019) found that study participants wanted to make lifestyle changes but needed information on how to do so. Obtaining information that was medically-sound was also of importance, as explained by one study participant:

> *'In a way I was happy to wait for more expert advice, because whilst I obviously used internet and google to check things out, you get a lot of information, some of which is conflicting. So it's not always the best source' [attending participant]* (Katangwe, et al. 2020).

In two studies (Katangwe, et al. 2020; Morrison, et al. 2014), some participants stated that their main reason behind the decision to engage with the prevention programme was the desire to lose weight, rather than prevent diabetes:

> *'I've got to be fair and say I went more with the idea of trying to lose some weight than actually preventing diabetes. I've got to be honest about that' [participant completed programme]* (Katangwe, et al. 2020).

In another study, some participants saw the programme as a way to show others that they could improve their health behaviours (Rodrigues, et al. 2020). Participants also identified their desire to improve their health and fitness for their children as a motivating factor to engage in a prevention programme (Begum, et al. 2022).

*Visible changes in health and wellbeing drives motivation to continue engagement*

Some participants stated that they continued engaging in a diabetes prevention programme as they noticed that their health and wellbeing had improved and they wanted to keep these changes up. As explained by one participant:

> *'I wouldn't like to think that now I've started, to stop everything (…) I said I would like to keep it going because I found so much improvement in myself. (…) I feel more confident than I did when I started' [attending participant]* (Rodrigues, et al. 2020).

*Group sessions provide opportunity for peer support*

Across a number of studies, the peer support which individuals could access as part of a prevention programme was found to be a motivating factor to attend (Begum, et al. 2022; Borek, et al. 2019; Ross, et al. 2023; Katangwe, et al. 2020; Rodrigues, et al. 2020). One study participant described how:

> *'a big benefit of the course was the group meetings. It wouldn't have meant anything to me if it hadn't have been for that. I actually look forward to going every week and listening to what other people have done that week; what they found easy what they found difficult. I thought that was brilliant I think that interaction was what made it for me' [participant completed programme]* (Katangwe, et al. 2020).

### Perceived barriers to engaging with secondary prevention services:

Numerous perceived barriers were also identified by participants across nine studies (Aujla, et al. 2019; Begum, et al. 2022; Cotterill, et al. 2016; Katangwe, et al. 2020; Morrison, et al. 2014; Parsons, et al. 2024; Rodrigues, et al. 2020; Ross, et al. 2023; Twohig, et al. 2019). These barriers could potentially make individuals feel wary about signing up to a programme or even prevent them from engaging with secondary prevention services altogether.

*Accessibility issues*

Issues with accessing the programme venue were identified as a barrier to engagement across several studies. Issues with access ranged from a lack of available transport if individuals did not drive (Katangwe, et al. 2020), dislike of having to travel to a far-away venue (Begum, et al. 2022; Cotterill, et al. 2016), and difficulty with using public transport because of painful comorbidities, and safety concerns associated with using public transport (Twohig, et al. 2019). Accessibility was also specifically identified as a potential barrier from one health professional, who explained:

> *'they don't like to travel; they like it close to home' [healthcare professional]* (Cotterill, et al. 2016).

Individuals reported making the decision to attend a programme if it took place in a community venue, such as a library with easy parking, or was close to home (Aujla, et al. 2019; Katangwe, et al. 2020; Parsons, et al. 2024). A digital diabetes prevention service was preferrable to some, as it was seen as more accessible and allowed participants to take part in a programme at a time of their choosing, and around caring and work responsibilities (Ross, et al. 2023).

*Cost*

Issues around the affordability of engaging with a diabetes prevention programme were raised across two studies. These were in relation to the high cost associated with eating healthily (Twohig, et al. 2019), the high cost of gym memberships (Rodrigues, et al. 2020), and the cost of public transport to attend an in-person programme (Towhig, et al. 2019).

Income was identified as a **modifying factor,** with one study participant, whose benefits had recently been changed or reduced, describing potential affordability issues. These prevented him from attending a programme:

> *'It all depends on where it is and like if I've got money to get there because at the moment, my DLA [Disability Living Allowance]'s been stopped so I'm on PIP [Personal Independence Payment]' [participant declined invitation; male; age 55-59; White British; unemployed; family history]* (Twohig, et al. 2019).

*Co-morbidities*

Study participants noted pre-existing co-morbidities as barrier to engagement (Katangwe, et al. 2020; Ross, et al. 2023; Twohig, et al. 2019). For instance, they could be experiencing mental health issues, with one participant explaining how they were not in the 'right headspace' to engage with the programme at that moment in time (Ross, et al. 2023). Engagement in some of the physical activity elements of the programme was also sometimes prevented by physical co-morbidities, such as arthritis (Katwangwe, et al. 2020). Another study participant, who declined the invitation to the programme, gave the following account of why physical activity was difficult:

> *'At the moment I'm suffering with severe psoriasis on my feet and every time I walk the skin's just breaking and it's so painful to walk and plus I get breathless when I'm walking' [participant declined; female; aged 55-59; White British; unemployed; family history]* (Twohig, et al. 2019).

*Negative attitude of health professionals towards the programme and lack of communication*

The attitude of health professionals towards a prevention programme was also found to influence some study participants' decisions to engage. This is illustrated by one participant, who had originally planned to attend the programme following an enthusiastic conversation about its benefits with the nurse, but later met with their GP who advised 'if I'd have been here and these blood tests came back I wouldn't have sent for you'. Ultimately, they were swayed by their GP's comment and decided not to attend (Twohig, et al. 2019). Likewise, study participants described basing their decision on the views of health professionals who thought that the programme was not beneficial (Katangwe, et al. 2020).

Participants also expressed that the lack of information about the programme made them hesitant to sign up (Aujla, et al. 2019; Parsons, et al. 2024; Rodrigues, et al. 2020). One participant felt that it had been made out to be more of a weight management programme as opposed to a diabetes prevention programme, which was off-putting (Parsons, et al. 2024). The lack of information and what was expected of participants also made people hesitant, as illustrated by one participant:

> *'The hard part I think is signing up to it because you don't know what it's all about. I was a bit wary because I thought, "is it going to be very grim or very intensive or are they going to make me do all sorts of activities I don't want to do?" but it wasn't like that at all…' [attending participant]* (Rodrigues, et al. 2020).

The method of communication about the programme could also influence whether an individual signed up, with some participants stating that they did not attend as they were only offered referral to the programme through a text message or letter (Aujla, et al. 2019). One study participant, who did not take up the offer immediately but after six months, stated that if they had been offered a referral personally by their GP, their behaviour may have been different:

> *'I suppose if the doctor had phoned me at that point and said, "Look…there's this programme that might be able to help," then I would certainly have said yes' [attending participant; female; aged 66]* (Ross, et al. 2023).

A lack of follow-up to check if the individual had signed up to the programme also reduced the importance of the programme, with one study participant stating that if they had received a follow-up call from their GP surgery asking why they hadn't signed up, they would have then done so (Ross, et al. 2023).

Health professionals' behaviour could instead act as a **cue to action** and influence individuals to attend a diabetes programme (Begum, et al. 2022; Twohig, et al. 2019). Aujla, et al. (2019) and Ross, et al. (2023) found that when practitioners discussed the programme in more detail, some participants were more likely to sign up. One study participant recalled a conversation with a nurse who praised the programme and the positive effect it had had on other patients, which swayed their decision to attend (Ross, et al. 2023). However, one participant said they had attended as they felt a sense of 'obligation' to their dietician (Morrison, et al. 2014), and another used the word 'pressurised' when describing why they agreed to meet a health professional to discuss diabetes prevention (Twohig, et al. 2019).

Programmes affiliated with the NHS were said by one study participant to give 'credibility' to the programme (Ross, et al. 2023). One health professional also described how participants place their trust in NHS-affiliated services, and believe they will deliver a high-quality programme. This was a key influencer on participants' decision to engage with a service:

> *'I think for the NHS diabetes checks, because we're saying it's a pilot programme, it's done by Public Health and NHS England, they accept that quality standard that goes along with the NHS' [healthcare professional]* (Cotterill, et al. 2016).

*Difficulties with enrolling into the programme*

In two studies, participants expressed difficulties with trying to get onto the prevention programme, sometimes making multiple calls with no reply (Begum, et al. 2022; Ross, et al. 2023).

*Competing responsibilities*

Caring for family members was cited as a barrier to attending a prevention programme (Parsons, et al. 2024; Twohig, et al. 2019). Other competing responsibilities described were work, volunteering, or health appointments (Aujla, et al. 2019; Begum, et al. 2022; Cotterill, et al. 2016; Katangwe, et al. 2020; Morrison, et al. 2014; Ross, et al. 2023). Some study participants did not attend a programme if the session was too long (Aujla, et al. 2019), or if it was held at an inconvenient time of day, as explained by one participant who had dropped out:

> *'It was a bad time of the day you know, effectively I lost a day's work by the time I got up there and got back' [participant dropped out]* (Katangwe, et al. 2020).

*Format of the programme can be off-putting*

A frequent barrier to engagement found across the primary studies was the off-putting nature of the programme format. Where a large group format was utilised for delivery of the programme, participants across four studies were found to be disinclined to attend (Aujla, et al. 2019; Cotterill, et al. 2016; Katangwe, et al. 2016; Ross, et al. 2023). Several study participants stated that they would have preferred a one-to-one session that was more tailored to their needs (Aujla, et al. 2019; Cotterill, et al. 2016; Katangwe, et al. 2020; Ross, et al. 2023). One study participant described:

> *'I didn't feel that I needed a day …, you know with a load of other people, you know a group session, it is not my way. If…they feel that there is something wrong with me, I expect them to ring me and say 'I want to see you' [participant declined invitation; female; age 71; White British]* (Aujla, et al. 2019).

One health professional also reported that group sessions were not popular, and patients preferred one-to-one sessions and receiving personalised feedback on their progress:

> *'[...] and they like one-to-one, they do not like group sessions… They liked it. They liked having 20 minutes to discuss their diabetes, their condition' [healthcare professional]* (Cotterill, et al. 2016).

Two participants in the study by Ross, et al. (2023) described how they chose to use a digital diabetes programme so they did not have to attend an in-person group format, which they likened to a 'self-help group'. Secondly, they saw the digital version as anonymous and it allowed them to avoid any potential stigma around weight:

> *'I feel it's different because it's not at all – and actually it's not about weight loss, there's no clapping, it's all secret, so we don't really know what people look like' [attending participant; female; age 58]* (Ross, et al. 2023).

There were also concerns about attending in-person sessions during the Covid-19 pandemic (Ross, et al. 2023).

### Self-efficacy to manage pre-diabetes:

Study participants' beliefs in their capacity to manage pre-diabetes were described in seven studies (Aujla, et al. 2019; Begum, et al. 2022; Borek, et al. 2014; Cotterill, et al. 2016; Katangwe, et al. 2020; Parsons, et al. 2024; Ross, et al. 2023). Both high and low self-efficacy meant decreased motivation to engage with prevention services amongst some study participants. For others, prevention programmes were a way to support their current lifestyle changes or boost self-efficacy.

#### *Prefer to take action by oneself*

Some study participants who had been invited to attend a prevention programme declined on the basis that they preferred to manage their pre-diabetes by themselves (Aujla, et al. 2019; Cotterill, et al. 2016; Katangwe, et al. 2019). Participants felt that they already had sufficient willpower to change their lifestyles, and attending a group programme would not increase this motivation (Borek, et al. 2014). Study participants also noted that they already had enough information about diabetes and how to reduce their risk, for example, from the radio or television, and that they were reluctant to attend as it was difficult to see the added value of a programme (Begum, et al. 2022; Katangwe, et al. 2020; Parsons, et al. 2024; Ross, et al. 2023). This was highlighted by one study participant, who was reluctant but did ultimately attend a programme:

> *'I'd like to think I'm a semi-intelligent individual who understands a little bit about what we should and shouldn't be eating and exercise and stuff and all that. So I wasn't so sure that I was going to learn a great deal' [attending participant; male; age 53]* (Ross, et al. 2023).

Health professionals also highlighted some patients' preferences for self-management of pre-diabetes:

> *'More often than not, I found that they've said, I'd rather do it myself first and see how it goes with a diet and exercise regime and I think the criteria is to check the HbA1c in six months, but we try more often than not to check it in three. So we don't mind because it means they are actually becoming more proactive themselves' [healthcare professional]* (Cotterill, et al. 2016).

Some study participants also described how, once they had reached certain goals, such as weight loss, or they felt that they had received sufficient information, they preferred to drop out of the programme and manage the condition themselves (Katangwe, et al. 2020; Ross, et al. 2023).

#### *Low self-efficacy decreases motivation*

Several participants in one study were found to be reluctant to join a prevention programme as they viewed previous efforts to change their lifestyle as unsuccessful. One participant described how:

> *'I probably have four weeks where I've been quite well-behaved, and then it'll just go off the rails again.' [attending participant; male; age 59 years]* (Ross, et al. 2023).

Morrison, et al. (2014) conducted a study with South Asians in Scotland, and found that ethnicity could be viewed as a **modifying factor,** whereby one study participant described how it could be difficult to maintain a healthy diet during cultural or religious celebrations:

> *'I know that if I lose more weight I'm going to put it back on at Ramadan because I just have to walk by food and it just adds onto my body, the fat just is invisible and it runs after you' [attending participant; female; Pakistani]* (Morrison, et al. 2014).

*Prevention programmes seen as a way to support or boost self-efficacy*

Study participants explained how a diabetes prevention programme was seen as a way to support their current efforts to make lifestyle changes, having already made considerable changes following their pre-diabetes diagnosis (Ross, et al. 2023). Another study participant explained how they had signed up to a prevention programme as it would help them improve their self-efficacy, and in turn they would be less of a burden to the NHS:

> *'It's a dreadful thing to think that I might be costing the NHS money because I am ill-disciplined, and that is really why I want to take it more seriously' [participant waiting to attend]* (Katangwe, et al. 2020).

Some felt that they were unable to keep up engagement with the programme and engage in meaningful behaviour change on their own and would require regular support or input from a health coach, as illustrated in the following quote:

> *'this is just literally logging. I don't feel any kind of support or any benefit, you know' [attending participant; female; age 53]* (Ross, et al. 2023).

Programmes which included an element of monitoring could be a **cue to action** and was said to increase accountability and promote engagement in a prevention programme. For instance, programmes which included health coaches were described as particularly motivating as recounted by one participant:

> *'It was like "great, there'll be someone that I can be accountable to", and it was the accountability that attracted me to it with what I thought would be some good advice' [attending participant; female; age 53]* (Ross, et al. 2023).

The tracking aspect of some programmes was also noted as a way to keep participants engaged with the weight and physical activity components of a programme, as illustrated by the following quote:

> *'It's accountability. I know what I need to do…I just don't do it…I think for me it's accountability. The weight metrics and the step metrics' [attending participant; male; age 44]* (Ross, et al. 2023).

Support from family was found to be a **cue to action** and enable participants to maintain engagement. For instance, through implementing lifestyle changes along with the participant, such as eating healthily at home (Rodrigues, et al. 2020), providing encouragement to exercise (Begum et al., 2024), providing transport to sessions (Twohig, et al. 2019), or accompanying the participant to the programme sessions for encouragement (Parsons, et al. 2024).

In terms of the format of the programme, digital prevention programmes were viewed as more useful for those who were already 'self-motivated', whereas face-to-face programmes were seen as more important for those who needed 'external motivation' to enact behaviour change (Ross, et al. 2023).

## Q2: How do health beliefs around type 2 diabetes influence engagement with tertiary prevention services in people diagnosed with type 2 diabetes?

Across the five included studies, all components of the health belief model were identified as influencing the decision to engage with tertiary prevention services. Where identified, any modifying factors or cues to action will be highlighted throughout the results.

Only one of the included studies explored the perceptions of healthcare professionals on what they thought influenced patient engagement with tertiary prevention services, specifically diabetic retinopathy screening (Hipwell, et al. 2014). The findings from healthcare professionals support the findings from those who have type 2 diabetes, and suggests that engagement with tertiary prevention services is influenced by the perceived susceptibility to type 2 diabetes complications; the perceived severity of type 2 diabetes complications and the perceived barriers of engagement. Where identified, healthcare professional views will be highlighted throughout the results.

### Perceived susceptibility to type 2 diabetes complications:

*Information provided by healthcare professionals*

One study explored individuals' perceived susceptibility to type 2 diabetes complications and how this impacted the uptake of diabetic retinopathy screening (Hipwell, et al. 2014). One study participant, who was classed as a non-regular attender and who had developed retinopathy, shared how they would have liked to have been provided with a better explanation of the complications that could occur in someone with type 2 diabetes when they were first diagnosed. They highlighted how the information they were provided with at the time of diagnosis did not increase their perceived susceptibility.

*'As soon as I had diabetes diagnosed somebody should have explained to me more fully what the implications are. Because it's alright them giving you a leaflet and sending you home...but even though you read it, there's this kind of silly thing, 'oh it won't happen to me', attitude.' [Patient 15 Region 3, Non-regular]* (Hipwell, et al. 2014).

A lack of perceived risk or susceptibility of diabetes was also highlighted by a healthcare professional as a reason for the lack of engagement with diabetic retinopathy screening.

*'Some people just… have their head in the… like the ostrich, they don't have diabetes or they're not taking any notice of it and they will just… yes, not come'. [Screening Programme 1, Region 1]* (Hipwell, et al. 2014).

### Perceived severity of type 2 diabetes complications:

The perceived severity of type 2 diabetes complications was found to influence engagement with tertiary prevention services in three studies (Dervan, et al. 2008; Hipwell, et al. 2014; Visram, et al. 2008). Perceptions of severity were found to be influenced by the information provided by healthcare professionals, and a family history of type 2 diabetes.

#### *Information provided by healthcare professionals*

Individuals' perceptions of the severity of type 2 diabetes complications were reported to be related to information provided by healthcare professionals. Visram, et al. (2008) found that attenders of an education and physical activity programme reported their perceived severity of diabetes was increased by the fear of complications associated with type 2 diabetes. Information about the severity of diabetes complications provided by healthcare professionals resulted in a **cue to action** to attend, in one case this was due to a practice nurse showing pictures of the complications which led the individual to want to take action, and therefore engage with the service.

*'Well, my practice nurse, I mean from day one showed me photographs of these absolutely disgusting things that happen to you. It really frightened the living daylights out of me and I thought "no, I'm going, I'm not having that".' [Participant]* (Visram, et al. 2008).

However, non-attenders of the same education and physical activity programme reported healthcare professionals describing type 2 diabetes as being a 'minor ailment' and described the education and physical activity programme as being voluntary, both of which reduced their perceptions of the severity of diabetes and therefore the importance of the programme (Visram, et al. 2008). This is supported by Dervanm et al. (2008) who reported that simply having healthcare professionals recommend regular eye examinations resulted in a **cue to action** and was found to significantly improve diabetic retinopathy screening rates (72% in screened group vs. 40% in unscreened group; p<0.001).

One healthcare professional highlighted how delegating the role of signing up for diabetic retinopathy screening to patients could hinder uptake, as patients may perceive this as the programme being less important. Another healthcare professional supported this perception stating that patients are not required to take on this responsibility to receive other important services.

*'I think if it's left to the patient a lot of the time they don't think, because they have to do it, it's not that important' [Health Professional 4, Region 3]* (Hipwell, et al. 2014).

*'Why should a patient… if it was a blood test… would the GP just say, go and sort it out yourself, and the patient is just registering himself at the hospital, getting a blood test and making sure the GP gets it? That's ridiculous.' [Screening Programme 1, Region 3]* (Hipwell, et al. 2014).

*Family history of type 2 diabetes*

A family history of type 2 diabetes was identified as a **modifying factor** in one study and was found to influence an individuals' perception of the severity of type 2 diabetes complications (Hipwell, et al. 2014). One attender described how their family member having diabetes directly impacted their choice to attend diabetic retinopathy screening, as they had seen the complications the family member had faced. This increased the perceived severity and threat of diabetes complications and encouraged engagement with the screening service.

*'I: So what is it that encourages you to come [to screening] then?*
*P: My brother-in-law he was a very bad diabetic...He actually died from it. He went blind first.' [Patient 13, Region 3, Non-regular]* (Hipwell, et al. 2014).

### Perceived benefits of engaging with prevention services:

The perceived benefits of engaging with tertiary prevention services encouraged people to attend in three studies (Winkley, et al. 2015; Visram, et al. 2008; Hipwell, et al. 2014). Perceived benefits included medical reassurance; increased knowledge about how to effectively manage type 2 diabetes and prevent complications; and increased support through communication with others who have type 2 diabetes.

*Medical reassurance*

When looking at engagement with diabetic retinopathy screening, some study participants reported that attending was reassuring, as protecting their eyes was a priority (Hipwell, et al. 2014). A regular attender highlighted the benefit of being able to receive the results instantly.

> *'I like the fact that you instantly see and can get a decent steer on if there is anything negative; it's complete peace of mind – well my results anyway. [Patient 3, Region 2, Regular]* (Hipwell, et al. 2014).

*Increased knowledge about how to effectively manage type 2 diabetes and prevent complications*

Some study participants who had not been previously informed about the education programme described wanting to attend as they felt they would learn more about diabetes, which would allow them to effectively self-manage and prevent complications. One study participant stated they specifically found food labels confusing and perceived the education session would help with this (Winkley, et al. 2015).

> *'I would like to go. It's really confusing with [food] labels I think. Food labelling, yeah I would. Yes. Yes. It is a bit confusing.' [pt27WLew, White European female, age group ≥60 years]* (Winkley, et al. 2015).

*Increased support from others with type 2 diabetes*

Two studies reported the perceived benefit of increased support from others with type 2 diabetes that could be gained by attending tertiary prevention services (Visram, et al. 2008; Winkley, et al. 2015). This benefit was highlighted by non-attenders who were previously unaware that they could attend an education programme (Winkley, et al. 2015) and attenders of a combined education and exercise programme, where the desire to meet others who were 'in the same boat' was a motivating factor to attend (Visram, et al. 2008).

### Perceived barriers to engaging with prevention services:

Barriers to engaging with tertiary prevention services were identified across four studies (Dervan, et al. 2008; Hipwell, et al. 2014; Visram, et al. 2008; Winkley, et al. 2015). Barriers included accessibility issues; a lack of information about the prevention service; the format or delivery method of the service; competing responsibilities; co-morbidities; and concerns around stigma.

*Accessibility issues*

Accessibility issues were reported across three studies (Dervan, et al. 2008; Hipwell, et al. 2014; Winkley, et al. 2015). This included difficulty getting an appointment to attend tertiary prevention services and difficulty accessing the venue where the service was being delivered.

Two studies looking at engagement with diabetic retinopathy screening highlighted difficulties participants faced when trying to obtain an appointment. Dervan, et al. (2008) found that 7.5% of those who were unscreened reported a lack of an available appointment as a barrier. Hipwell, et al. (2014) also reported a lack of available appointments with one participant describing how on multiple occasions they had to wait three months for the next available appointment.

> *'Well before the appointment I phoned and they said no, they'd got no appointments for the next three months...The following year again the same thing, I phoned when I had the letter, they said three months' waiting. [Patient 5, Region 3, Non-regular]* (Hipwell, et al. 2014).

Homelessness was identified as a **modifying factor** and acted as a barrier to engagement with diabetic retinopathy screening. One non-regular attender who tried to book an appointment for diabetic retinopathy screening reported how they had been refused at their GP practice, as they were in temporary housing waiting to be rehoused and as such were not considered to be within the GPs catchment area (Hipwell, et al. 2014).

> *'Well, with being homeless for 8 weeks...But they [GP practice] didn't want to know. 'Oh you're not in our area.' I'm in nobody's area because we were in a bed and breakfast; they were my last doctors.' [Patient 10, Region 1, Non-regular]* (Hipwell, et al. 2014).

Non-attenders of an education programme also reported difficulties accessing the service, with one non-attender describing how they had booked to attend a session but were unable to on the day, as they had a disability and the venue did not have suitable parking options (Winkely, et al. 2015).

> *'...no parking....so you're talking an hour and a half on the bus.' [pt14WS, White European male, age group 46–59 years]* (Winkley, et al. 2015).

Accessibility issues were also reported by one healthcare professional with transport and proximity to the service mentioned as a barrier to patients engaging with diabetic retinopathy screening (Hipwell, et al. 2014).

> *'Most patients around here like to go to things that are within walking distance or within a bus stop, if that. So, transport is an issue. …they know the surgery, 'oh the surgery is next door, I know the girls there, they're always there'...So maybe I need to have the retinopathy screening done at the surgery and they'd all come [laughs].' [Health Professional 1, Region 3]* (Hipwell, et al. 2014).

*Lack of information about the prevention service*

A lack of information was identified as a barrier to engaging with tertiary prevention services in four studies (Dervan, et al. 2008; Hipwell, et al. 2014; Winkley, et al. 2015; Visram, et al. 2008). This was due to a lack of information about the existence or availability of the service, a lack of information around what the service would consist of, or a lack of information on the importance of or need to attend the service.

When looking at engagement with diabetic retinopathy screening programmes, one study highlighted that 17% of those who did not attend screening reported a lack of knowledge about needing an eye examination (Dervan, et al. 2008). In another study, non- attenders or non-regular attenders were unaware that the photographs taken during routine eye checks at high street opticians were not the same as diabetic retinopathy screening even when the optician did not provide this service. This led to the perception that they did not need to attend screening if already attending the opticians (Hipwell, et al. 2014).

> *'I'm with [high street optometry chain] so I've always, always had my eyes screened…So when I was diagnosed and I told the optician she said, well we can do that here for an extra £10 and we will just email the surgery. So I thought fine, that's fine. So I just bypass it completely…' [Patient 4, Region 2, Non-regular]* (Hipwell, et al. 2014).

A lack of knowledge about the availability of a diabetes education programme was reported as a barrier by over 60% of non-attenders in one study stating that they had not been informed (Winkley, et al. 2015). When non-attenders had heard about the education programme, a lack of knowledge about what the programme would involve or any potential benefits, also acted as a barrier to engagement.

> *'I heard about it [DESMOND] but not told about it directly [from health professional]. I don't know about the [the benefits of the] programme so I can't decide.' [pt13BS, Gambian male, age group 46–59 years]* (Winkley, et al. 2015).

Some non-attenders felt the programme would be useful, but felt they had been informed about it too late after their diagnosis.

> *'I might have been more likely to attend something after the diagnosis than over a year later.' [pt7WL, White European male, age group ≤45 years]* (Winkley, et al. 2015).

Among non-attenders of an education and physical activity programme, there was a misconception that the programme was mainly an exercise programme, and they were unaware that they would receive further education, which directly impacted the decision not to attend (Visram, et al. 2008).

*The format or delivery of the service*

The tertiary prevention service itself, including how it was delivered was highlighted as a barrier across four studies (Dervan, et al. 2008; Hipwell, et al. 2014; Visram, et al. 2008; Winkley, et al. 2015).

Two studies reported barriers to diabetic retinopathy screening which included the invasive nature of the screening process in general (Hipwell, et al. 2014), and the need for dilating eye drops which can result in mydriasis causing blurred vision and restricting patients from being able to drive after the appointment (Dervan, et al. 2008).

*'It's just the thought of somebody coming close to my eye.' [Patient 15, Region 3, Non-regular]* (Hipwell, et al. 2014).

Non-attenders of an education and physical activity programme reported perceiving that the programme was too long, being spread over eight weeks, and expressed they did not want to attend a leisure centre or exercise as part of a group (Visram, et al. 2008). Similar findings of the service being too time-consuming and not wanting to participate in a group programme were found by Winkley, et al. (2015) when looking at attendance at a diabetes education programme. Some non-attenders expressed that the information provided by the service should be available online.

*' I don't want [a course that is] so long. If everything is on the internet [it would help]' [pt10AL, female South Asian, age group ≥60 years]* (Winkley, et al. 2015).

Age was highlighted as a **modifying factor** and acted as a barrier to engagement with an education and physical activity programme, as some non-attenders perceived that the exercise would be more suited for younger people.

*'She [the practice nurse] just said there would be exercises…"bring your shorts"…I just wasn't very sure that it was the age for me to go to or not.' [Non-attender]* (Visram, et al. 2008).

*Competing responsibilities*

Two studies reported how an individuals' competing responsibilities acted as a barrier to engaging with tertiary prevention services (Hipwell, et al. 2014; Winkley, et al. 2015). Non-attenders of a diabetic retinopathy screening programme raised work commitments as a potential barrier to engagement (Hipwell, et al. 2014). Non-attenders also reported a lack of time to engage with an education programme due to work schedules, responsibilities caring for family members, or other personal responsibilities (Winkley, et al. 2015).

*'Because I work nights, because my wife is disabled, I haven't even got time to go to the foot clinic. The answer would be no.' [pt26WLew, White European male, age group 46–59]* (Winkley, et al. 2015).

A healthcare professional also reported conflicts with work as one of the reasons they believed patients do not engage with diabetic retinopathy screening (Hipwell, et al. 2014).

*'Because they [patients] think they can't have the time off work, you know?' [Screening Programme 1,*

*Region 1]* (Hipwell, et al. 2014).

*Comorbidities*

Three studies reported how individuals' comorbidities acted as a barrier to engaging with tertiary prevention services (Visram, et al. 2008; Winkley, et al. 2015; Hipwell, et al. 2014). Non-attenders of an education and physical activity programme had existing comorbidities that directly impacted their decision not to attend. Some non-attenders expressed that they did not attend, due to a fear that the exercise element of the programme would make their comorbidity worse (Visram, et al. 2008).

> *'With the angina problem I am not quite frankly capable of doing any sort of exercise…soon as they mentioned exercises and that I…no way.' [Non-attender]* (Visram, et al. 2008).

One non-attender of an education programme discussed how they did not think they would have attended an education programme if they had been informed about it at the time of their diagnosis as they were experiencing difficulties with depression (Winkley, et al. 2015). Lastly, one non-attender described how they had not attended diabetic retinopathy screening as they were scheduled to have an operation (Hipwell, et al. 2014).

> *'I missed once, because I had an abscess in an awkward place, and I had to have an operation. But the following year I made sure.' [Patient 5, Region 3, Non-regular]* (Hipwell, et al. 2014).

*Concerns around stigma*

Two studies reported how the perceived stigma around having diabetes may act as a barrier to engagement with tertiary prevention services (Visram, et al. 2008; Winkley, et al. 2015). Non-attenders of an education and physical activity programme described feeling shame and concerns that they would be judged by others (Visram, et al. 2008).

> *'I don't want everybody else to know I've got diabetes…it's like letting the world know, oh I'm handicapped or I'm disabled, you know.' [Non-attender]* (Visram, et al. 2008).

This is supported by Winkley, et al. (2015) who identified shame and stigma as barriers to engaging with a diabetes education programme. It was noted that concerns around stigmas were more commonly reported by Nigerian study participants, stating that they had not told their friends or family about their diabetes diagnosis. The belief that diabetes would affect their fertility or virility increased their concerns that attending an education programme would lead to others finding out or fears that they may see someone they know at the site where the session was being held (Winkley, et al. 2015).

> *'I didn't tell anybody [family, friends, including partner]. I keep it to myself. I don't want it [diabetes]…. I*

*don't want to go [to the DESMOND course] because I might see someone I know.' [pt23BLew, Nigerian female, age group 46–59 years]* (Winkley, et al. 2015).

### Self-efficacy to prevent type 2 diabetes complications:

Individuals perceived self-efficacy to engage in health behaviours to prevent type 2 diabetes complications was found to negatively impact engagement with tertiary prevention services in two studies (Choudhury, et al. 2009; Winkley, et al. 2015).

#### *Self-efficacy to self-manage type 2 diabetes*

Choudhury, et al. (2009) interviewed individuals from the Bangladeshi community living in England and Wales and found that one non-attender reported that they did not feel the need to attend a peer educational programme as they had been receiving information about type 2 diabetes from their healthcare provider and felt this was enough. Another non-attender felt that the programme would not be very useful despite their challenges with effectively self-managing their diet and sugar levels, in this case the perceived lack of self-efficacy to self-manage was also found to negatively impact engagement.

*'I am fine the way I am. I have a bit of eye problem and my (blood) pressure but nothing else. Mmh…I am doing things… I go to the clinic and the lady in the clinic tells me all this' [Participant 12]* (Choudhury, et al. 2009).

Similar findings were reported by Winkley, et al. (2015) with non-attenders feeling as though they were capable of managing their condition without the need for an education session or receiving what they perceived to be enough information about diabetes from other sources and therefore did not see any value in attending the session.

*'Nothing puts me off, but I, I just feel that I can manage it myself. I don't really need... help.' [pt8AL, South-Asian male, age group 46–59 years]* (Winkley, et al. 2015).

#### *Family history of type 2 diabetes*

A family history of type 2 diabetes was identified as a **modifying factor** that influenced individuals' perceptions of self-efficacy in one study (Winkley, et al. 2015). One non-attender did not attend a diabetes education programme as they had family and friends who had diabetes and felt that they knew enough about the condition. However, another non-attender reflected on this influence suggesting that as their mother had type 2 diabetes, they may have refused the education programme when they were first diagnosed under the assumption that they knew enough about the condition. However, after three years of self-management, they described the experience as being hard and suggested that what is needed is psychological support.

*'I don't know if I would take it or not [at diagnosis] because I know what I have to do because of my mum....I know I have to do the diet...Now it's about 3 years after [diagnosis]. Why is it so hard? I have to follow the rules but....what you need is like psychological support.' [pt20WS, White European female, age group ≤45 years]* (Winkley, et al. 2015).

## 5. Discussion

### 5.1. Summary of evidence

Identifying individual health beliefs around type 2 diabetes is an important step in understanding why people do or do not engage with services. The findings from our thematic synthesis highlight that all components of the Health Belief Model influence the decision to engage with type 2 diabetes secondary and tertiary prevention services. All 15 included studies were critically appraised and determined to be of acceptable quality and all were conducted in the UK or Ireland, which may increase the generalisability of the findings to the Welsh context. Despite the two research questions looking at different population groups and a range of prevention services, similarities were identified in relation to how health beliefs influence engagement, providing further support that the Health Belief Model can be used to explain and predict health behaviours.

The evidence from both research questions highlights that decreased perceptions of susceptibility and severity reduce engagement with prevention services, while increased perceptions of susceptibility and severity increase engagement. Perceived self-efficacy was found to have a negative impact on engagement for question 2, however the findings from question 1 highlight how self-efficacy can have a positive or negative influence on engagement. This difference could be due to differing perceptions among those with prediabetes and those with type 2 diabetes or could be a result of the limited evidence base available for question 2.

Similarities were identified across the two research questions showing how increased knowledge and support from others were perceived benefits of engaging with either secondary or tertiary prevention services. However, many barriers were also consistently reported across both research questions including accessibility issues; comorbidities; competing responsibilities; difficulties with enrolling in the programme; off-putting format of the programme; and the value of the programme not being communicated by healthcare professionals. The evidence for both questions highlights that the information provided by healthcare professionals can lead to a cue to action for patients, and increase engagement with prevention services. This suggests healthcare professionals have an important role to play in supporting engagement.

Similar barriers and facilitators to engagement were found by Tseng, et al. (2024) in their diabetes prevention programme study undertaken in USA (Tseng, et al. 2024). This mixed-methods development process was undertaken using the TRiP framework to develop and implement a systematic approach to diabetes prevention in primary care within the USA, utilising both service users and clinical staff. They also identified barriers to engagement as a lack of information provision at time of diagnosis, competing demands on time, affordability of healthy foods and lack of nutritional information. Identified facilitators were: finding creative ways to incorporate lifestyle change, personal accountability, primary care physicians emphasising severity of the condition and the use of apps, online tools, and websites as facilitators.

Summary of the evidence for question 1:

Amongst people with pre-diabetes, engagement with secondary prevention services was found to be influenced by all components of the Health Belief model across the ten studies. Firstly, there is evidence to suggest that having a family history of diabetes may be influential on both an individual's perceived severity of pre-diabetes and their perceived susceptibility to developing diabetes. The knowledge that family members had developed type 2 diabetes, as well as witnessing family members experience this condition and its associated complications, meant that some participants were more likely to engage with a secondary prevention service. On the other hand, a family history of diabetes was found to lead some individuals to disengage with preventative services, as they believed that the development of diabetes was inevitable, regardless of lifestyle changes. The asymptomatic nature of pre-diabetes was also linked with less motivation to engage. Linked to the health belief 'perceived severity', being overwhelmed by a diagnosis of pre-diabetes was linked to a lack of engagement.

Numerous benefits and barriers to engaging with preventative services were identified across the ten studies. One of the main benefits was to obtain knowledge and support to improve health. However, some participants were more motivated to attend to lose weight as opposed to preventing diabetes. The format of delivery may also influence decisions to engage, and there were mixed opinions as to the preferred format of a session, with preferences given for both in-person, digital, group, and individual sessions.

Health professionals' attitudes were found to be particularly influential on study participants' decisions to engage. When health professionals took a positive stance towards the programme, it was a cue to action for some. The method with which participants were invited to the programme also played a part in their decision-making, with invitation letters found to provide less motivation to attend than a phone call or conversation with their GP or nurse. Study participants highlighted that it was important to provide sufficient information about the programme, and for some, programme affiliation with the NHS meant that they viewed the programme as more credible.

Lastly, self-efficacy had varying degrees of influence on an individuals' decisions to engage. Opposing views were found; some study participants had high self-efficacy to prevent diabetes and preferred to manage their condition independently, whereas for others, low self-efficacy to achieve lifestyle change meant they were also less likely to engage. However, some study participants also recognised that they had low self-efficacy and saw the programme as a way in which to boost this.  Ethnicity was found to act as a modifying variable on some study participants' self-efficacy, with participants describing lower self-efficacy to maintain healthy eating during religious and cultural events. Finally, support from friends to engage in healthy eating, exercise, and to attend sessions was highlighted as a cue to action for some study participants.

### Summary of the evidence for question 2:

Amongst people with type 2 diabetes, engagement with tertiary prevention services was found to be influenced by all components of the Health Belief Model. However, as there were only five included studies, evaluating a small number of specific tertiary prevention services, the evidence base is limited and the findings should be interpreted with caution.

An individuals' perceived susceptibility to, and perceived severity of, type 2 diabetes complications was found to be influenced by the information provided by healthcare professionals. When the information provided decreased individuals' perceptions of susceptibility and severity this decreased engagement. However, when the information provided by healthcare professionals increased the perceived severity of complications this resulted in a cue to action to engage. This was supported by research in healthcare professionals, who suggested some non-attenders may not perceive that they are susceptible to the complications and that requiring patients to sign up for diabetic retinopathy screening themselves may reduce the perceived importance of screening and therefore the perceived severity of complications. Perceived self-efficacy to prevent type 2 diabetes complications was also found to negatively impact engagement with education programmes, as study participants felt they were capable of self-managing their condition.

Perceived benefits of engaging with tertiary prevention services included medical reassurance, increased knowledge, and increased support from others with type 2 diabetes. However, perceived barriers included a lack of information about the services; the format or delivery method of the service; accessibility issues with a lack of available appointments or challenges with transport; competing responsibilities such as work schedules or caring responsibilities; having comorbidities; and concerns around stigma.

Several modifying factors were identified. A family history of diabetes increased engagement with diabetic retinopathy screening as the perceived severity of complications was increased, however a family history of diabetes was also found to decrease engagement with an education programme by increasing individuals perceived self-efficacy to effectively self-manage. Age was found to decrease engagement with an education and physical activity programme, as it was perceived to be aimed at younger people. Lastly, homelessness was found to be a barrier to engagement with diabetic retinopathy screening as this caused challenges accessing appointments.

Cultural influences that may impact engagement were also identified, with one study highlighting that Nigerian study participants were more likely to report concerns around stigmas which negatively influenced engagement with an education programme. However, concerns around stigmas was not a unique finding to this population, with others also reporting similar concerns in relation to an education and physical activity programme, so further research could help confirm this.

Overall, the findings suggest that in order to increase engagement with tertiary prevention services, healthcare professionals need to ensure information about type 2 diabetes complications and prevention services available are effectively communicated to patients. It is important that this information allows patients to accurately perceive their susceptibility to and the severity of complications without causing unnecessary fear or anxiety. There are several barriers that can be addressed by ensuring patients are informed about the availability of tertiary prevention services; including what the services would involve; the potential benefits of engagement; and by making the services more readily available or easily accessible. However, considerations should be made around any potential modifying factors that may affect engagement.

## 5.2. Strengths and limitations

The ten studies included for question 1 were found to be of mostly good quality and appeared to adequately represent the voices of study participants. Five different diabetes prevention programmes were covered across the ten studies, although six studies explored the NHS diabetes prevention programme in England. As the inclusion criteria was limited to studies conducted in the UK and Ireland, findings are likely to be generalisable to the Welsh population. However, in four studies (Borek, et al. 2019; Morrison, et al. 2014; Parsons, et al. 2024; Rodrigues, et al. 2020) only participants who had attended the prevention programme were included, and for four studies (Aujla, et al. 2019; Begum, et al. 2022; Katangwe, et al. 2020; Ross, et al. 2023) the majority of participants had attended the programme, suggesting possible recruitment bias, whereby non-attenders may have been reluctant to take part in these types of studies.

While the evidence base for question 2 is limited, all included studies were deemed to be of acceptable quality and were conducted in the UK or Ireland which increases the generalisability of the findings to the Welsh context. However, only three tertiary prevention services were studied, highlighting a gap in the evidence on the full range of tertiary prevention services available. As some of the findings were specific to the individual tertiary prevention services (for example medical reassurance was only identified as a perceived benefit in relation to diabetic retinopathy screening), further evidence on the other tertiary prevention services available may identify additional findings around how health beliefs influence engagement.

As all of the included studies for both questions were identified primarily from a search for secondary sources, any primary evidence published since the most recent review was conducted will not have been included in the synthesis. However, some of the included studies were published in early 2024, suggesting the approach utilised to identify studies for inclusion has included the most recent evidence available.

## 6. Conclusions

This review has highlighted evidence on how health beliefs influence adults' engagement with type 2 diabetes secondary and tertiary prevention services. The decision to engage with these services was influenced by aspects across all components of the Health Belief Model. These included beliefs that act as barriers and facilitators to engagement, as well as perceptions of diabetes.

For secondary and tertiary prevention services, health professionals were identified as important influencers who can have a positive impact on service engagement. In addition, friends and family can play an important part in motivating people to attend secondary prevention services by adopting the healthier behaviours alongside participants and driving people to the sessions. Behavioural monitoring during secondary prevention service sessions was also found to increase accountability and improve engagement.

Our synthesis also highlighted that further research is needed in some tertiary preventive services, and in those who choose not to attend secondary prevention services, to provide new insights into the decision making behind non-engagement. The evidence was also very limited among ethnic minority populations. Capturing the voices of these groups may provide important and unique insights into engagement.

Several implications for practice were identified. The Health Belief Model is an ideal framework in which to organise people's perceptions and beliefs about secondary and tertiary diabetes prevention services to clearly outline what changes can be made in order to increase engagement.

## 7. References

Abraham, C., and Sheeran, P. (2015). *The Health Belief Model.* In: Conner and Norman. eds. Predicting and Changing Health Behavior. 3rd ed. UK: McGraw-Hill

Aujla, N. et al. (2018). Users' experiences of a pragmatic diabetes prevention intervention implemented in primary care: qualitative study. *BMJ Open*; 9: e028491. DOI: 10.1136/bmjopen-2018-028491

Barry, E., Greenhalgh, T., and Fahy, N. (2018). How are health-related behaviours influenced by a diagnosis of pre-diabetes? A meta-narrative review. *BMC Medicine*; 16(1). DOI:10.1186/s12916-018-1107-6

Becker, M. (1974). The Health Belief Model and Sick Role Behavior*. *Health Education Monographs*; 2(4): 409-419. DOI: 10.1177/109019817400200407

Begum, S. et al. (2022). Influences of decisions to attend a national diabetes prevention programme from people living in a socioeconomically deprived area. *Diabetic Medicine;* 39: e14804. DOI: 10.1111/dme.14804

Borek, A. et al. (2019). 'We're all in the same boat': A qualitative study on how groups work in a diabetes prevention and management programme. *British Journal of Health Psychology*; 24: 787-805. DOI: 10.1111/bjhp.12379

Choudhury, S., Brophy, S,. and Williams, R. (2009). Education and Psychological Aspects. Understanding and beliefs of diabetes in the UK Bangladeshi population. *Diabetic Medicine;* 26: 636-640. DOI: 10.1111/j-1464-5491.2009.02741.x

Coffey, L., Mahon, C., and Gallagher, P. (2019). Perceptions and experiences of diabetic foot ulceration and foot care in people with diabetes: A qualitative meta-synthesis. *International Wound Journal*; 16(1):183–210. DOI:10.1111/iwj.13010

Cotterill, S. et al. (2016). *Identifying the roles of community and enhanced GP referral services in the recruitment and retention of people to diabetes prevention programmes in Salford.* National Institute for Health Research CLAHRC for Greater Manchester. http://www.clahrc-gm.nihr.ac.uk/wp-content/uploads/CLAHRC-NDPP-Report-2-FINAL.pdf

Dervan, E. et al. (2008). Factors that influence the patient uptake of diabetic retinopathy screening. *Irish Journal of Medical Science;* 177: 303-308. DOI: 10.1007/s11845-008-0192-5

Glanz, K., Rimer, B., and Viswanath, K. (2008). *Health behaviour and health education: Theory, Research and Practice. 4th Ed.* San Francisco: Jossey-Bass. https://smartlibrary.elayanan.info/ebook-file/ebook/91eea070-4bba-4f62-9f89-272a67ab43ca.pdf

Hipwell, A. et al. (2014). Attitudes, access and anguish: a qualitative interview study of staff and patients' experiences of diabetic retinopathy screening. *BMJ Open;* 4: e005498. DOI: 10.1136/bmjopen-2014-005498.

Hong, Q. et al. (2018). *Mixed Methods Appraisal Tool (MMAT), version 2018*. Registration of Copyright (#1148552), Canadian Intellectual Property Office, Industry Canada.

Hossain, M., Al-Mamun, M., and Islam, M. (2024). Diabetes mellitus, the fastest growing global public health concern: Early detection should be focused. *Health Science Reports*; 7(3): e2004. DOI: 10.1002/hsr2.2004.

Johnson, M. et al. (2011). *Views, barriers, and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change*. ScHARR, University of Sheffield. https://www.nice.org.uk/guidance/ph38/evidence/r4-views-barriers-and-facilitators-pdf-435074945

Katangwe, T. et al. (2020). The community pharmacy setting for diabetes prevention: A mixed methods study in people with 'pre-diabetes'. *Research in Social and Administrative Pharmacy*; 16(8): 1067-1080. DOI: 10.1016/j.sapharm.2019.11.001

Lockwood, C., Munn, Z., and Porritt, K. (2015). Qualitative research synthesis: methodological guidance for systematic reviewers utilizing meta-aggregation. *International Journal of Evidence Based Healthcare;* 13(3): 179–187. DOI:10.1097/XEB.0000000000000062

McMullen, B. et al. (2024). A systematic review of the mechanisms influencing engagement in diabetes prevention programmes for people with pre-diabetes. *Diabetic Medicine;* 41(8): e15323. DOI: 10.1111/dme.15323

Moola, S., Munn, Z., and Tufanaru, C. et al. (2020). *Chapter 7: Systematic reviews of etiology and risk.* In: Aromataris, E., and Munn, Z. (Editors). JBI Manual for Evidence Synthesis. JBI; 2024. DOI: 10.46658/JBIMES-24-01

Morrison, Z. et al. (2014). Understanding experiences of participating in a weight loss lifestyle intervention trial: a qualitative evaluation of South Asians at high risk of diabetes. *BMJ Open*; 4: e004736. DOI: 10.1136/bmjopen-2013-004736

Ouzzani, M. et al. (2016). Rayyan — a web and mobile app for systematic reviews. *Systematic Reviews;* 5: 210. DOI: 10.1186/s13643-016-0384-4

Parsons, S. et al. (2024). The challenges and lessons from a formative process and value-based evaluation of the wave 1 roll-out of the all Wales Diabetes Prevention Programme. *BMC Public Health;* 24: 2499. DOI: 10.1186/s-12889-024-19946-0

Poudel, P. et al. (2018). Oral health knowledge, attitudes, and care practices of people with diabetes: A systematic review. *BMC Public Health*; 18(1): DOI: 10.1186/s12889-018-5485-7

Public Health Wales, (2023). *Diabetes prevalence – trends, risk factors and 10-year projection*. Public Health Wales [online]. Retrieved from: https://phw.nhs.wales/services-and-teams/observatory/data-and-analysis/diabetes-prevalence-trends-risk-factors-and-10-year-projection/ [last accessed: 06/12/2024]

Rodrigues, A. et al. (2020). Stakeholders' perceptions and experiences of the National Health Service diabetes prevention programme in England: qualitative study with service users, intervention providers and deliverers, commissioners and referrers. *BMC Health Services Research*; 20: 307. DOI: 10.1186/s12913-020-05160-2

Rosenstock, I., Stretcher, V., and Becker, M. (1988). Social Learning Theory and the Health Belief Model. *Health Education Quarterly*; 15(2): 175-173

Ross, J. et al. (2023). Influences on patient uptake of and engagement with the National Health Service Digital Diabetes Prevention Programme: qualitative interview study. *Journal of Medical Internet Research;* 25:e40961. DOI: 10.2196/40961

Sibounheuang, P., Olson, P., and Kittiboonyakun, P. (2020). Patients' and healthcare providers' perspectives on diabetes management: A systematic review of qualitative studies. *Research in Social and Administrative Pharmacy*; 16(7): 854–874. DOI:10.1016/J.SAPHARM.2019.09.001

Tseng, E., Smith, K., and Clark, J. et al. (2024). Using the translating research into practice framework to develop a diabetes prevention intervention in primary care: a mixed-methods study. *BMJ Open Quality;* 13: e002752. DOI:10.1136/bmjoq-2024-002752

Twohig, H. et al. (2019). Response to diagnosis of pre-diabetes in socioeconomically deprived areas: a qualitative study. *BJGP Open*; 3(3). DOI: 10.3399/bjgpopen19X101661

Visram, S. et al. (2008). Factors affecting uptake of an education and physical activity programme for newly diagnosed type 2 diabetes. *European Diabetes Nursing*; 5: 17-22. DOI: 10.1002/edn.97

Winkley, K. et al. (2014). Patient explanations for non-attendance at structured diabetes education sessions for newly diagnosed Type 2 diabetes: a qualitative study. *Diabetic Medicine;* 32(1): 120-128. DOI: 10.1111/dme.12556

# 8. Additional information

## 8.1. Competing interests

The authors declare no competing interests for this review.

## 8.2. Appendix A: Resources searched and search strategies

Question 1:

| Electronic Bibliographic Databases: | | |
|---|---|---|
| Database details | Date searched | Number of Results |
| Medline (Ovid) | 21/08/2024 | 211 |
| PsycINFO (Ovid) | 21/08/2024 | 18 |
| CINAHL (EBSCO) | 27/08/2024 | 155 |
| Scopus (Elsevier) | 27/08/2024 | 163 |
| Supplementary Searching (scoping & websites of key organisations): | | |
| Organisation | Date Searched | Number of Results |
| From initial Scoping | 24/07/2024 | 5 |
| Diabetes UK | 20/08/2024 | 0 |
| Diabetes research & Wellness foundation | 21/08/2024 | 1 |
| The InDependent Diabetes Trust | 21/08/2024 | 0 |
| Department of Health and Social Care | 21/08/2024 | 0 |
| Public Health Agency (Northern Ireland) | 21/08/2024 | 0 |
| Public Health Scotland | 21/08/2024 | 0 |
| Public Health Wales | 21/08/2024 | 3 |
| UK Health Security Agency | 20/08/2024 | 0 |
| Targeted search in Google | 21/08/2024 | 3 |

Search strategy:

Ovid MEDLINE(R) ALL <1946 to August 21, 2024>

1 ("Pre-diabet*" or prediabet*).ti,ab. 14877
2 Prediabetic State/ and Diabetes Mellitus, Type 2/ 3722
3 "borderline diabet*".ti,ab. 131
4 "early stage diabet*".ti,ab. 322
5 ("non-diabetic hyperglyc?emia" or "nondiabetic hyperglyc?emia").ti,ab. 98
6 ("impaired fasting glucose" or "impaired fasting glyc?emia" or "impaired glucose tolerance").ti,ab. 15148
7 ((risk or risks) adj5 (DMT2 or T2D or T2DM or diabet*)).ti,ab. 78253
8 (IFG or IGT).ti,ab. 9034
9 or/1-8 104988
10 Secondary Prevention/ 23052
11 Weight Loss/ 45853
12 weight reduction programs/ or obesity management/ 3235
13 exercise/ or running/ or swimming/ or walking/ 228895
14 risk reduction behavior/ 14499
15 exp Diet Therapy/ 64406
16 smoking cessation/ or smoking reduction/ or "tobacco use cessation"/ 34975
17 Harm Reduction/ 4459
18 "risk reduction".ti,ab. 25232
19 (diabet* adj5 (prevent* or program* or educat* or course* or service* or manag*)).ti,ab. 71736
20 (secondary adj1 (prevent* or healthcare or care or service* or treatment* or intervention*)).ti,ab. 42195
21 or/10-20 519090
22 exp attitude to health/ 482843
23 health belief model/ 329
24 Motivation/ 83002
25 exp "treatment adherence and compliance"/ 283533
26 (engag* or believ* or belief* or attitude* or uptak* or barrier* or accept* or challeng* or adher* or participat* or facilitat* or enabl* or perspective* or perception* or perceiv* or motivat*).ti,ab. 5816318
27 or/22-26 6073471
28 ("systematic review*" or metasynthesis or meta-synthesis).ti. or "systematic review".pt. 338528
29 9 and 21 and 27 and 28 211
30 limit 29 to (english language and yr="2000 -Current") 211

Question 2:

| Electronic Bibliographic Databases: | | |
|---|---|---|
| **Database details** | **Date searched** | **Number of Results** |
| Medline (Ovid) | 22/08/2024 | 794 |
| PsycINFO (Ovid) | 23/08/2024 | 83 |
| CINAHL (EBSCO) | 27/08/2024 | 595 |
| Scopus (Elsevier) | 27/08/2024 | 351 |
| **Supplementary Searching (scoping & websites of key organisations):** | | |
| **Organisation** | **Date Searched** | **Number of Results** |
| From initial Scoping | 24/07/2024 | 5 |
| Diabetes UK | 21/08/2024 | 3 |
| Diabetes research & Wellness foundation | 22/08/2024 | 2 |
| The InDependent Diabetes Trust | 22/08/2024 | 2 |
| Department of Health and Social Care | 23/08/2024 | 0 |
| Public Health Agency (Northern Ireland) | 21/08/2024 | 1 |
| Public Health Scotland | 22/08/2024 | 1 |
| Public Health Wales | 22/08/2024 | 1 |
| UK Health Security Agency | 21/08/2024 | 0 |
| Targeted search in Google | 21/08/2024 | 0 |

Search strategy:

Ovid MEDLINE(R) ALL <1946 to August 21, 2024>

1 diabet*.ti,ab. 820406
2 Diabetes Mellitus/ or Diabetes Mellitus, Type 2/323430
3 1 or 2 857473
4 (("glycated h?emoglobin" or "glycosylated h?emoglobin" or "h?emoglobin a1c" or ("blood glucose" adj2 control) or hba1c or a1c or "blood pressure high BP" or "elevated BP" or "raised BP" or hypertensi* or "CVD risk factor*" or "cardiovascular risk factor*" or cholesterol or "lipid profil*" or "lidoprotein profil*" or retin* or vision or eye or eyes or ophthalmolog* or foot or feet or toe or toes or "peripheral arter* disease" or neuropathy or isch?emia or ulcer* or cellulitis or gangren* or "urinary albumin" or albuminuria or "kidney disease" or "serum creatine" or weight or "waist circumference*" or BMI or "body mass index" or "smoking status") adj3 (screen* or check* or test* or monitor* or measure* or assess* or manag* or promot* or support*)).ti,ab. 221634
5 ((tertiary adj1 (prevent* or healthcare or care or service* or treatment* or intervention*)) or (diabet* adj5 (service* or treatment* or intervention* or program* or educat* or course*))).ti,ab. 167242
6 Tertiary Healthcare/ or Tertiary Prevention/ 2205
7 or/4-6 381605
8 ("people with diabetes" or "diabetic people" or "individual* with diabetes" or "diabetic individual*" or patient* or (health* adj (provider* or professional* or worker*))).ti,ab. 8730816
9 (engag* or uptak* or barrier* or accept* or challeng* or participat* or facilitat* or enabl* or adhere* or perception* or perceiv* or opinion* or perspective* or attitude* or awareness* or belief* or believ* or understand* or conviction* or feeling* or sentiment* or idea or ideas or view* or stance* or standpoint* or comprehension or comprehend or grasp* or persuasion* or recogni* or appreciat* or cogni?ance or cognition*).ti,ab.8217484
10 8 and 9 2307181
11 exp "Attitude to Health"/ or Health Knowledge, Attitudes, Practice/ or Knowledge/ or Awareness/ or Attitude/ or "Attitude of Health Personnel"/ or Health Behavior/ or Health Belief Model/ or "Treatment Adherence and Compliance"/ or Patient Satisfaction/ or Patient Preference/ or Motivation/ 774166
12 10 or 11 2880308
13 3 and 7 and 12 27864
14 ("systematic review*" or metasynthesis or meta-synthesis).ti. or "systematic review".pt. 338528
15 13 and 14 802
16 limit 15 to (english language and yr="2000 -Current") 794

## 8.3. Appendix B: Data Extraction Tables

### Data extraction: Q1

| Author, year of publication, country | Study design | Aim | Population incl. Diagnosis and type e.g. patient/health professional | Methods | Intervention or service (if described) | Health belief themes identified | Author limitations | Reviewer comments (limitations/quality/generalisability etc): |
|---|---|---|---|---|---|---|---|---|
| Aujla, et al. (2019)<br>East Midlands, England | Qualitative | To explore what helped or hindered engagement with the *Let's Prevent Diabetes* intervention, its perceived value and acceptability in practice from the perspectives of those receiving or implementing the intervention. | **Population:**<br>People at high risk of type 2 diabetes.<br>**Sample**:<br>22 participants: 15 had attended the programme; 7 either booked but did not attend or declined the invitation. | One to one Semi-structured interviews facilitated using a topic guide to explore views and experiences of the intervention, barriers and facilitators to participating and the impact of attending the education session. Conducted face to face or via telephone lasting approximately 30 minutes. | Let's Prevent Diabetes | Perceived susceptibility<br>Perceived severity<br>Perceived benefits<br>Perceived barriers<br>Self-efficacy | Ethnic composition of the sample was almost 80% white, limiting ethnic diversity. | No reflexivity statements in paper. Authors do not address influence researcher may have on research. However, mentioned in the discussion is that the data were generated and analysed by two researchers of different disciplinary backgrounds who were not involved in developing or implementing the intervention itself. Authors highlight that a strength of the paper is the inclusion of non-attenders. |
| Begum, et al. (2022)<br>South London, | Qualitative | To explore key influences of participants' decisions to | **Population:**<br>Adults classified as having non-diabetic hyperglycaemia (prediabetes). | Semi-structured interview. Questions explored participants perceptions of type 2 diabetes, risk of type 2 | The Healthier You: NHS Diabetes Prevention Programme | Perceived susceptibility<br>Perceived severity | Limitations in English speaking were a drawback in some cases, however | Authors highlight that a strength of this study was the collection of data from a high number of non- |

| Author, year of publication, country | Study design | Aim | Population incl. Diagnosis and type e.g. patient/health professional | Methods | Intervention or service (if described) | Health belief themes identified | Author limitations | Reviewer comments (limitations/quality/generalisability etc): |
|---|---|---|---|---|---|---|---|---|
| England | | attend the NHSDPP. | **Sample:**<br>35 adults recruited via opportunistic sampling. | diabetes and their experience of the NHSDPP referral process.<br>Interview schedule was piloted with 11 participants after attending their initial assessment and minor changes were made including simplifying wording for non-native English speakers. | (NHSDPP) | Perceived benefits<br>Perceived barriers<br>Self-efficacy | researchers piloted interview schedule with a subgroup of participants beforehand to ensure questions were easily understood.<br>Those recruited for this study may not represent part of the population who is under-served. | attenders who are usually difficult to recruit.<br>Reflexivity was acknowledged by the researchers and their beliefs, past experiences, and interests in health psychology and how these could have influenced interpretation of data were considered during analysis. |
| Borek, et al. (2019)<br>Norfolk, England | Qualitative | To explore the experiences of participants attending group sessions in the Norfolk Diabetes Prevention Study (NDPS) to identify their experiences of group participation, | **Population:**<br>Adults at risk of diabetes, or with newly diagnosed diabetes.<br>**Sample:**<br>20 adults; 15 at risk of diabetes and 5 with newly diagnosed diabetes. Majority of sample overweight/obese (mean BMI 29.5). Purposive sampling to recruit an equal number of men and | Semi-structured telephone interview. Topics discussed included motivations to participate in, and expectations of the group; what happened in sessions' perceptions of the group/facilitator, impact of the programme, helpful/unhelpful aspects, and suggestions for improvements. | Norfolk Diabetes Prevention Study (NDPS): Group lifestyle intervention. | Perceived benefits<br>Self-efficacy | Only those who attended intervention were interviewed. Researchers unable to interview non-attendees therefore possibility respondents were more motivated to make behaviour changes etc.<br>Small, relatively homogeneous sample limited authors in | Authors do loosely identify influences affecting them/the research. |

| Author, year of publication, country | Study design | Aim | Population incl. Diagnosis and type e.g. patient/health professional | Methods | Intervention or service (if described) | Health belief themes identified | Author limitations | Reviewer comments (limitations/quality/generalisability etc): |
|---|---|---|---|---|---|---|---|---|
| | | their perceptions of how groups can generate lasting behaviour change, and to contribute to process evaluation of the NDPS | women from a range of different groups. | | | | identifying for whom certain change processes in groups may be most effective. | |
| Cotterill, et al. (2016)<br>Salford, England | Qualitative | To identify what the role of community referral service and an enhanced GP referral service can play in recruitment and retention of lifestyle support services for people at risk of diabetes. | **Population:**<br>Key informants including decision makers/service leads, frontline workers, community champions and volunteers, health improvement service officers, neighbourhood workers, nurse practitioners and staff working in GP practices.<br>**Sample:**<br>32 purposively selected key informants, identified via liaison with service leads, to | Qualitative scoping interviews and focus groups were used to gather info describing referral routes, understanding the implementation of the routes and acceptability to staff, investigating perceived acceptability to the public, identifying benefits and risks associated with each route and suggestions for improvement. | National Health Service Diabetes Prevention Programme | Perceived severity<br>Perceived barriers<br>Self-efficacy | Not all staff interviewed had experienced the full facilitated service, and consequently there was limited data on the acceptability of the model from staff themselves. | No mention of reflexivity. Authors do not address influence researcher may have had on research.<br>Unsure if the quotes through the review are representative of all participants, as some are just labelled with the focus group from which they originated and we are unsure the mix of participants in each focus group. |

| Author, year of publication, country | Study design | Aim | Population incl. Diagnosis and type e.g. patient/health professional | Methods | Intervention or service (if described) | Health belief themes identified | Author limitations | Reviewer comments (limitations/quality/generalisability etc): |
|---|---|---|---|---|---|---|---|---|
| | | | provide representation from all stages of the referral pathway. | | | | | |
| Katangwe, et al. (2020)<br>Norfolk, England | Mixed methods: quantitative and qualitative | To explore factors influencing engagement with the National Health Service (NHS) DPP and the role of community pharmacy in diabetes prevention support (DPS). | **Population:**<br>Adults with pre-diabetes referred to the NHS DPP in the previous 12 months.<br>**Sample:**<br>962 Questionnaires issued and analysed as part of the quantitative research.<br>16 participants for the qualitative research. Six attended a focus group and 10 undertook semi-structured interviews. Selection of participants was an interactive, ongoing process whereby selection criteria for subsequent interviews were constantly modified to ensure intended diversity of participants was achieved. | Questionnaires (n=962), semi-structured interviews (n=10) and a focus group (n=6).<br>Questionnaires were posted to eligible participants, and participants were given the option to express an interest in interview or focus group participation. They consisted of four sections including NHS DPP participation, feedback (inc accessibility), community pharmacy use and community pharmacy based DPS and expression to participate in further research. Likert scale questions and open ended questions were included.<br>Participants expressing willingness to be | National Health Service Diabetes Prevention Programme | Perceived susceptibility<br>Perceived severity<br>Perceived benefits<br>Perceived barriers<br>Self-efficacy | | Can't tell whether the sample of the quantitative study was representative of the target population as response rate was very low (18.8%) and no information on non-responders reported.<br>Questionnaires were not pre-tested prior to data collection.<br>Findings from quantitative and qualitative studies were not integrated.<br>No divergences and inconsistencies between the results of the two methods explored.<br>Participating GP practices were reimbursed a one off payment of £75 for |

| Author, year of publication, country | Study design | Aim | Population incl. Diagnosis and type e.g. patient/health professional | Methods | Intervention or service (if described) | Health belief themes identified | Author limitations | Reviewer comments (limitations/quality/generalisability etc): |
|---|---|---|---|---|---|---|---|---|
|  |  |  |  | contacted for qualitative research were identified from returned questionnaires. Selection of participants was based on NHS DPP engagement status and diversity was further sought by selecting participants according to employment status and community pharmacy use. Younger, male and employed participants were also targeted as most NHS DPP participants were female and retired.<br>Interviews were conducted either face to face or via telephone, lasting up 1hr. Focus group lasted approx. 90 mins. Semi-structured topic guide was used based on the COM-B model. Topics included experiences with pre-diabetes diagnosis, influence behind engagement/non engagement, |  |  |  | identifying patients and posting questionnaires. Qualitative research participants were offered a £10 voucher as a thank you for participation and had their travel expenses reimbursed. |

| Author, year of publication, country | Study design | Aim | Population incl. Diagnosis and type e.g. patient/health professional | Methods | Intervention or service (if described) | Health belief themes identified | Author limitations | Reviewer comments (limitations/quality/generalisability etc): |
|---|---|---|---|---|---|---|---|---|
| | | | | experiences with NHS DPP, experiences with community pharmacy. | | | | |
| Morrison, et al. (2014)<br>Glasgow & Edinburgh, Scotland | Qualitative | To explore the reasons for enrolling, experiences of participating and reasons for remaining in a family-based, cluster randomised controlled trial of a dietitian-delivered lifestyle modification intervention aiming to reduce obesity in South Asians at high risk of developing diabetes. | **Population:**<br>South Asian adults at high risk of diabetes.<br>**Sample**:<br>20 RCT participants of South Asian ethnicity diagnosed with impaired glucose tolerance (IGT) (65% were male and 35 % female. Ages not provided). Four family volunteers were also interviewed, who were related to one of the 20 RCT participants. | Narrative interviews. | Complex dietitian-led dietary-based and physical activity-based intervention for reducing obesity and preventing type II diabetes mellitus in people of Indian and Pakistani origin at high risk of developing diabetes. | Perceived benefits<br>Perceived barriers | 'One important limitation of this study was the use of interpreters during data generation. We sought to give participants the opportunity to participate in a language of their choosing and could not achieve this without synchronous translation. During the initial stages of the study retrospective quality checking of interview audio and transcripts highlighted that the interpreter was not accurately reporting the views of the participants. We addressed this by recruiting a new interpreter and | Researchers mention they actively considered alternative explanation of cases and allowed for this within interpretation. |

| Author, year of publication, country | Study design | Aim | Population incl. Diagnosis and type e.g. patient/health professional | Methods | Intervention or service (if described) | Health belief themes identified | Author limitations | Reviewer comments (limitations/quality/generalisability etc): |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | providing training as to the exact nature and purpose of the services required. To ensure that the data from the three affected interviews were not lost we had the original audio recording retranslated. We note, however, that the conduct of these interviews was compromised to a small extent by this limitation. A further limitation is the lack of inclusion of Indian Hindu participants and the small sample of family volunteers. For practical reasons (such as interview cancellation by participants) we could not achieve this within our sample during the time available.' | |
| Parsons, et al. | Mixed | To examine | **Population:** | Data collection was | All Wales | Perceived benefits | Limited by the | Purposive sampling |

| Author, year of publication, country | Study design | Aim | Population incl. Diagnosis and type e.g. patient/health professional | Methods | Intervention or service (if described) | Health belief themes identified | Author limitations | Reviewer comments (limitations/quality/generalisability etc): |
|---|---|---|---|---|---|---|---|---|
| (2024)<br>Wales (across all HBs) | methods | the implementation of the All Wales Diabetes Prevention programme in 14 primary care cluster areas across Wales during the initial roll-out. | Service users (age 18+ and eligible for, or participating in the AWDPP), healthcare professionals involved in development, implementation, delivery, management, or support of AWFPP and key stakeholders.<br>**Sample:**<br>187 people took part in the evaluation, which included service users, healthcare professionals and key stakeholders:<br>- 9 participants involved in stakeholder focus groups<br>- 13 participants undertook stakeholder interviews<br>- 10 participants undertook HCSW interviews | obtained from:<br>1) Document review<br>2) Observation of a AWDPP clinic<br>3) Service user survey<br>4) Interviews/focus groups with key stakeholders, HCPs and service users<br>5) Analysis of routine data<br>6) GP survey<br>Service user questionnaires consisted of 15 items exploring acceptability, accessibility, inclusivity, and usefulness of the intervention, along with reasons for agreeing to take part in the programme, barriers and facilitators to participation.<br>Questionnaires could be completed either in a paper format or online. | Diabetes Prevention Programme (AWDPP) | Perceived barriers<br>Self-efficacy | number of participants who took part in the AWDPP during the data collection period, and the number of HCSWs that could contribute to interviews and focus groups due to delays in staff recruitment.<br>Because of delays to recruitment of staff and local programme start-ups, the time available to carry out the evaluation was reduced.<br>Potential for bias in the reporting as it was focused on those attending the AWDPP rather than those who did not engage.<br>Unable to analyse differences in how | used in an attempt to ensure representation from communities across Wales.<br>Questionnaire not tested/validated prior to data collection.<br>Statistical analysis of quantitative data not reported.<br>Qualitative and quantitative results integrated into one narrative using fair representation from both. |

| Author, year of publication, country | Study design | Aim | Population incl. Diagnosis and type e.g. patient/health professional | Methods | Intervention or service (if described) | Health belief themes identified | Author limitations | Reviewer comments (limitations/quality/generalisability etc): |
|---|---|---|---|---|---|---|---|---|
| | | | - 8 participants undertook service user interviews<br>- 116 participants completed the service user survey<br>- 25 GPs completed the GP survey<br>- 6 participants were observed in clinic. | Service users who completed the questionnaire and expressed an interest to be involved in further research were invited to participate in focus groups or 1-2-1 interviews. No incentives offered.<br><br>General practices were invited to complete an online survey. | | | the programme was delivered across ethnicities and disability status, due to lack of data. Therefore unable to comment on equity concerns. | |
| Rodrigues, et al. (2020)<br><br>England (Multiple sites across Birmingham, Bradford, Durham, Herefordshire, Medway, Salford and Southwark) | Qualitative | To elicit stakeholders' perceptions and experiences of the factors influencing implementation of, and participation in, the NHS diabetes prevention (NHS DPP) programme during the development phase. | **Population:**<br>Service users at high risk of type 2 diabetes (pre-diabetic), programme commissioners, referrers, and intervention deliverers.<br><br>**Sample:**<br>- 50 service users<br>- 7 programme commissioners<br>- 8 referrers<br>- 15 intervention delivery staff<br><br>Purposive sampling used to achieve | Theoretically informed one-to-one semi structured telephone interviews.<br><br>Topic guides informed by the theoretical domains framework (TDF). These were iteratively developed in response to feedback from early participant interactions.<br><br>Interviews lasted between 15 and 60 minutes. | NHS Diabetes Prevention Programme (NHS DPP) | Perceived severity<br><br>Perceived benefits<br><br>Perceived barriers | Service users all completed or engaged with the NHS DPP, non-engagers were not interviewed which could be a limitation as unable to identify reasons why the intervention was not appealing or achievable in some individuals.<br><br>Lack of representation of ethnic minorities in the study is not representative of | No mention/discussion of reflexivity. Authors do not address influence researcher may have had on research. |

| Author, year of publication, country | Study design | Aim | Population incl. Diagnosis and type e.g. patient/health professional | Methods | Intervention or service (if described) | Health belief themes identified | Author limitations | Reviewer comments (limitations/quality/generalisability etc): |
|---|---|---|---|---|---|---|---|---|
| | | | maximum variation among participants with respect to professional grouping, age and gender as appropriate. Commissioners and deliverers interviewed represented each of the seven sites. Referrers interviewed represented four of the demonstrator sites. Sampling for service users ensured variation with respect to geographical location, age and gender. | | | | the overall population with diabetes and is not reflective of the overall participation in the demonstrator phase. | |
| Ross, et al. (2023)<br>North London, England | Qualitative | To explore the key influences on uptake and engagement decisions of individuals who were offered the National Health Service Healthier You: Digital | **Population:**<br>Adult service users diagnosed with non-diabetic hyperglycemia.<br>**Sample:**<br>32 participants (50% male, 50% female, average age 58yrs).<br>Contact made to recruit both those who had taken up the NHS-digital-DPP and those | Semi-structured interviews, lasting on average 42 minutes. Interview topic guides were based on constructs from the health belief model, along with specific questions related to the experiences with the NHS-DPP. | NHS Digital Diabetes Prevention Programme (NHS-Digital-DPP) | Perceived susceptibility<br>Perceived severity<br>Perceived benefits<br>Perceived barriers<br>Self-efficacy | Small numbers of participants who did not take up the digital intervention were interviewed, and there may therefore still be factors which remain obscured and could be explored further with further study's into non-update. | No mention/discussion of reflexivity. Authors do not address influence researcher may have had on research. |

| Author, year of publication, country | Study design | Aim | Population incl. Diagnosis and type e.g. patient/health professional | Methods | Intervention or service (if described) | Health belief themes identified | Author limitations | Reviewer comments (limitations/quality/generalisability etc): |
|---|---|---|---|---|---|---|---|---|
| | | Diabetes Prevention Programme (NHS-digital-DPP). | who had declined in favour of remote group delivery. | | | | Furthermore, because of the way in which the NHS-digital-DPP is offered to participants (usually not until participants have made contact with providers), it was difficult to isolate views on non-uptake that relate specifically to the digital delivery mode, as opposed to the NHS-DPP more broadly.<br>Although the sample was diverse in terms of ethnicity, age, and sex, there was less diversity represented in terms of other characteristics including socioeconomic status, education, digital access, and | |

| Author, year of publication, country | Study design | Aim | Population incl. Diagnosis and type e.g. patient/health professional | Methods | Intervention or service (if described) | Health belief themes identified | Author limitations | Reviewer comments (limitations/quality/generalisability etc): |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | computer skills. Thus, these findings are unlikely to fully represent the experiences of those on the other side of the so-called digital divide, which represents inequalities in accessing and using digital technologies. | |
| Twohig, et al. (2019)<br>Yorkshire & Humber region, England | Qualitative | To explore the experience of diagnosis of pre-diabetes, and understand the barriers and facilitators to uptake of the NHS DPP for people living in socioeconomically deprived areas. | **Population:** Adults diagnosed with pre-diabetes, who had been offered referral to the NHS DPP.<br>**Sample:** 23 prediabetic adults (13 female 10 male, mean age 61yrs, mean index of multiple deprivation score was 43.7). Mix of participants waiting for appointments, started programme, declined programme etc.<br>Recruited via the NIHR Yorkshire and Humber | Semi-structured interviews. Scoping literature review informed development of the interview topic guide. | NHS Diabetes Prevention Programme (NHS DPP) | Perceived severity<br>Perceived benefits<br>Perceived barriers | Having funded interpreters available for interviews could have increased the diversity of participants.<br>In some participants there was a time period of several months between pre-diabetes diagnosis and taking part in the study which could have influenced recall of events.<br>Only a small | Authors do acknowledge reflexivity in the discussion. Authors acknowledge the research teams inherent bias as clinicians towards the biomedical paradigm. Authors suggest this was mitigated to some degree by the fact that as well as being GPs, the team members had significant experience in qualitative research and regular discussions throughout the process to promote reflection.<br>Participants |

| Author, year of publication, country | Study design | Aim | Population incl. Diagnosis and type e.g. patient/health professional | Methods | Intervention or service (if described) | Health belief themes identified | Author limitations | Reviewer comments (limitations/quality/generalisability etc): |
|---|---|---|---|---|---|---|---|---|
| | | | CRN cluster, a group of research-active practices that are among the 100 most socioeconomically deprived practice areas in the region. Purposive sampling used to achieve a range of ages, sex and ethnic groups. | | | | minority of participants had attended the course by the time of interview, and so reasons for continued engagement/ disengagement could not be focused on. | compensated for their time with a £15 shopping voucher. |

## Data extraction: Q2

| Author, year of publication, country | Study design | Aim | Population incl. Diagnosis and type e.g. patient/health professional | Methods | Intervention or service (if described) | Health belief themes identified | Author limitations | Reviewer comments (limitations/quality/generalisability etc): |
|---|---|---|---|---|---|---|---|---|
| Choudhury, et al. (2009)<br>Swansea & Birmingham, UK | Qualitative study | To examine the understanding and beliefs of people with diabetes from the Bangladeshi community living in the UK | **Population:** Bangladeshi participants with type 2 diabetes recruited in either Swansea or Birmingham.<br>**Sample:** 14 participants (4=male; 10=female). Participants' ages | Structured interviews were carried out with participants on a one-to-one basis, in either English or in Sylheti. Interviews were audio recorded with consent. Recruitment was through word of mouth, asking local members of the community to participate, posters and | Peer educational programme | Self-efficacy to prevent type 2 diabetes complications. | Not stated | All participants were born in Bangladesh.<br>No mention/ discussion of reflexivity. Authors do not address influence researcher may have on research. |

| Author, year of publication, country | Study design | Aim | Population incl. Diagnosis and type e.g. patient/health professional | Methods | Intervention or service (if described) | Health belief themes identified | Author limitations | Reviewer comments (limitations/quality/generalisability etc): |
|---|---|---|---|---|---|---|---|---|
| | | | ranged from 26 to 67 years and diabetes duration ranged from 6 months to 27 years (five people < 5 years, two people 5–10 years, four people 10–15 years and three people ‡ 15 years). | announcements in the local mosque. Transcripts were analysed and coded by two independent researchers using Word and Excel following the preset questions.<br>The interviews examined the understanding and beliefs of Bangladeshi people about diabetes, its causes, prevention and management. | | | | |
| Dervan, et al. (2008)<br>Dublin, Ireland | Cross-sectional survey (questionnaire-based) | To assess whether patients were receiving regular diabetic retinopathy screening and to examine factors influencing the uptake of such screening. | **Population:**<br>All adults invited to attend general diabetes clinics in two centres (St. Vincent's University Hospital and St. Columcilles Hospital) in Dublin, Ireland between the 1st November 2001 and 6th December 2001 and between 15th April 2002 and 2nd May 2002.<br>**Sample:** | Questionnaire-based survey administered over the telephone.<br>The questionnaire consisted of two sections. Section 1 examined general demographics including age, sex, education level, type and duration of diabetes, and previous history of diabetic retinopathy or other ocular disease. Section 2 examined the participants knowledge of | Diabetic retinopathy screening | Perceived severity of type 2 diabetes complications.<br>Perceived barriers to engaging with prevention services. | The authors stated that the rate of 80% is likely to overestimate the true screening rate in the community.<br>Not included in the study would be undiagnosed diabetics and those attended primary care or a diabetiologist privately for their diabetes care. This | Of all the participants, 77% had type 2 DM not requiring insulin, 10% had type 2 DM requiring insulin, with the remainder having Type 1 DM.<br>Self-reported eye examination – could be subject to recall bias.<br>Confounding not discussed in paper. |

| Author, year of publication, country | Study design | Aim | Population incl. Diagnosis and type e.g. patient/health professional | Methods | Intervention or service (if described) | Health belief themes identified | Author limitations | Reviewer comments (limitations/quality/generalisability etc): |
|---|---|---|---|---|---|---|---|---|
|  |  |  | 209 participants completed the questionnaire. 169 (81%) received a dilated eye examination within the last year (screened group). Of those unscreened, 12 (30%) had not been examined within the last 12 months, 6 (15%) had never had their eyes examined and 21 (55%) had an undilated examination within the last 12 months so were screened inappropriately. The mean age of the study group was 61.6 ± 15 years. Male were 58%. | and their attitudes towards diabetic retinopathy. |  |  | can make comparisons with population based studies difficult.<br>Self reporting of a dilated eye exam was the measure used to evaluate screened versus unscreened in this study. Studies have suggested that eye examination rates may be falsely elevated in self-reported data. Also people with diabetes may incorrectly perceive that other eye examinations (e.g., for glasses) constitute dilated retinal exams. | Twenty eight percent of the participants had a history of diabetic retinopathy. |
| Hipwell, et al. (2014)<br>Four UK Primary Care Trusts | Qualitative study (Purposive, qualitative design | To examine the experiences of patients, health professionals and screeners; their | **Population:** Patients with diabetes & primary care and screening professionals with | Semi-structured interviews were conducted either face to face at the GP/optometry practice, in | Diabetic retinopathy screening | Perceived susceptibility to type 2 diabetes complications. | The authors highlighted that not every permutation between location type, deprivation and delivery mode | Of the 38 patients, 4 had type 1 diabetes and 34 had type 2 diabetes. |

| Author, year of publication, country | Study design | Aim | Population incl. Diagnosis and type e.g. patient/health professional | Methods | Intervention or service (if described) | Health belief themes identified | Author limitations | Reviewer comments (limitations/quality/generalisability etc): |
|---|---|---|---|---|---|---|---|---|
| across three regions, UK | using multi perspectival, semi-structured interviews and thematic analysis) | interactions with and understandings of diabetic retinopathy screening (DRS); and how these influence uptake | patient contact in differing roles around diabetic retinopathy screening.<br>**Sample:** 38 patients (mean age 49; 22 regular screening attenders, 16 non-regular attenders) and 24 professionals (mean age 50; 15 primary care professionals and 9 screeners). | patients' homes, or by telephone, at participants' discretion.<br>Questions aimed to capture the descriptions of participants' experiences before, during and after the screening appointment, from professionals' and patients' perspectives; identifying factors they believed influence screening attendance . All interviews were audio-recorded and transcribed verbatim, prior to analysis. | | Perceived severity of type 2 diabetes complications.<br>Perceived benefits of engaging with prevention services.<br>Perceived barriers to engaging with prevention services. | was studied. They did not recruit any practice that delivered screening in a mobile unit or hospital outpatients department; so did not interview Hospital Eye Service staff, and only two practices provided optometrist screening. | No mention/ discussion of reflexivity. Authors do not address influence researcher may have on research. |
| Visram, et al. (2008)<br>Newcastle-upon-Tyne, UK | Nested Qualitative study (Focus group discussions, Semi-Structured Interviews) | To explore factors affecting uptake of an education and physical activity programme for those diagnosed with type 2 diabetes. | **Population:** Patients with type 2 diabetes<br>**Sample:** 21 patients; 11 attenders (mean age 63; 7 male, 4 female) and 10 non-attenders (mean age 63; 3 male, 7 female). | Focus groups (11 participants) with programme participants, and semi-structured interviews (10 participants) with those who declined to attend the programme. | Newcastle Education and Physical Activity Programme for Newly Diagnosed type 2 diabetes | Perceived severity of type 2 diabetes complications.<br>Perceived benefits of engaging with prevention services.<br>Perceived barriers to engaging with prevention services. | Because of relatively small sample size and method of purposive sampling, the results may not be generalisable. | Two non-attenders who initially consented to be interviewed were excluded from the analyses: one subsequently attended the programme and the other could not be prompted to discuss the topic at hand.<br>No mention/ discussion of reflexivity. Authors |

| Author, year of publication, country | Study design | Aim | Population incl. Diagnosis and type e.g. patient/health professional | Methods | Intervention or service (if described) | Health belief themes identified | Author limitations | Reviewer comments (limitations/quality/generalisability etc): |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | do not address influence researcher may have had on research.<br>Quotes labelled as attendee or non-attendee but unclear on whether these could have been from the same or different participants. |
| Winkley, et al. (2015)<br>South London, UK | Qualitative (semi-structured interviews) | To determine the reasons for non-attendance at structured education sessions among people with a recent diagnosis of Type 2 diabetes. | **Population:**<br>Patients with newly diagnosed type 2 diabetes who had not attended structured Education.<br>**Sample:**<br>30 Patients (all non-attenders; mean age 54.5; 15 male, 15 female). | 30 participants from the South London Diabetes cohort (SOUL-D) study who had not attended the DESMOND programme were interviewed at the participant's GP surgery.<br>Semi-structured interviews were conducted to elicit key themes and explanations as to why participants had not attended structured education. | Structured education course: Diabetes education for ongoing and newly diagnosed diabetes (DESMOND) programme. | Perceived benefits of engaging with prevention services.<br>Perceived barriers to engaging with prevention services.<br>Self-efficacy to prevent type 2 diabetes complications. | If participants were unable to recall being informed of the programme, they were coded as not attending. This may be regarded as a treatment process failure due to lack of information, rather than an explanation of non-attendance by choice.<br>The authors also mention that the thematic framework method of qualitative analysis | Nine of the 39 people approached either declined (n = 5) or did not want to be interviewed, were unable to participate because of work or had by now attended the DESMOND programme (n = 4). Small sample size limits confidence in the findings.<br>No mention/discussion of reflexivity. Authors do not address the influence researcher may have had on research. |

| Author, year of publication, country | Study design | Aim | Population incl. Diagnosis and type e.g. patient/health professional | Methods | Intervention or service (if described) | Health belief themes identified | Author limitations | Reviewer comments (limitations/quality/generalisability etc): |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | does not stem from a particular theoretical approach, but that it remains true to the original data and allows constant comparison both within and between individuals. | |

ISBN: 978-1-83766-575-4

GIG CYMRU NHS WALES | Iechyd Cyhoeddus Cymru
Public Health Wales

# Gweithio gyda'n gilydd i greu Cymru iachach

# Working together for a healthier Wales