


## REVIEW

# Developing a realist informed framework for cultural adaptation of lifestyle interventions for the prevention of type 2 diabetes in South Asian populations in Europe

Emma M. Davidson<sup>1</sup>  | Marta Krasuska<sup>1</sup> | Anne Karen Jenum<sup>2</sup> | Jason M. R. Gill<sup>3</sup> | Erik Beune<sup>4</sup> | Karien Stronks<sup>4</sup> | Irene G. M. van Valkengoed<sup>4</sup> | Esperanza Diaz<sup>5</sup> | Aziz Sheikh<sup>1</sup>

<sup>1</sup>Usher Institute, University of Edinburgh, Edinburgh, UK

<sup>2</sup>General Practice Research Unit (AFE), Department of General Practice, Institute of Health and Society, Faculty of Medicine, University of Oslo, Oslo, Norway

<sup>3</sup>Institute of Cardiovascular and Medical Sciences, University of Glasgow, Glasgow, UK

<sup>4</sup>Amsterdam UMC, Department of Public and Occupational Health, University of Amsterdam, Amsterdam Public Health Research Institute, Amsterdam, The Netherlands

<sup>5</sup>Department for Global Public Health and Primary Care, Faculty of Medicine, University of Bergen, Bergen, Norway

## Correspondence

Emma M. Davidson, Usher Institute, University of Edinburgh, Edinburgh, UK.  
Email: emma.davidson@ed.ac.uk

## Present address

Emma M. Davidson, Centre for Clinical Brain Sciences, University of Edinburgh, Edinburgh, UK

## Funding information

European Commission, Grant/Award Number: 664609 HP-PJ-2014

## Abstract

**Aims:** Selected lifestyle interventions proven effective for White-European populations have been culturally adapted for South Asian populations living in Europe, who are at higher risk of type 2 diabetes. However, a limited theoretical basis underpins how cultural adaptations are believed to augment intervention effectiveness. We undertook a realist review to synthesise existing literature on culturally adapted type 2 diabetes prevention interventions, to develop a framework that shows ‘how’ cultural adaptation works, for ‘whom’ and in ‘what contexts’.

**Methods:** We followed the stepped methodological approach of realist review. Our work concluded a European-wide project (EuroDHYAN), and core studies were identified from the preceding EuroDHYAN reviews. Data were extracted, coded into themes and synthesised to create ‘Context–Mechanism–Outcome’ configurations and to generate a refined explanatory framework.

**Results:** We identified eight core intervention papers. From this evidence, and supporting literature, we examined the ‘Team’ domain of cultural adaptation and identified a mechanism of shared cultural identity which we theorised as contributing to strong team-participant relationships. We also identified four key contexts which influenced intervention outcomes: ‘research setting’ and ‘heterogeneous populations’ (intrinsic to the intervention) and ‘broader environment’ and ‘socio-cultural stress’ (extrinsic barriers).

**Conclusions:** This work instigates research into the mechanisms of cultural adaptation which, if pursued, will allow a more nuanced understanding of how to apply adaptations, and for whom. In practice we recommend greater consideration of heterogeneous and intersecting population characteristics; how intervention design can safeguard sustainability; and how the four key contexts identified influence how, and whether, these interventions work.

## KEYWORDS

cultural adaptation, diabetes, diet, dietary, exercise, interventions, South Asian, realist review

This is an open access article under the terms of the Creative Commons Attribution-NonCommercial License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes.

© 2021 The Authors. *Diabetic Medicine* published by John Wiley & Sons Ltd on behalf of Diabetes UK

**What's new?**

- There is currently a lack of theoretically informed frameworks for developing culturally adapted lifestyle interventions for ethnic minority populations. Existing frameworks predominantly categorise approaches to adaptation, but provide scarce evidence of how these approaches are proposed to work, for whom and in what contexts.
- We used a realist approach to instigate examination of a mechanism of cultural adaptation and identified key contextual factors which influence intervention outcomes.
- Consequently, we propose a realist informed framework which provides a basis to further our understanding of culturally adapted interventions and which may be transferable to the consideration of other conditions and other minority populations.

**1 | INTRODUCTION**

Obesogenic lifestyles, characterised by insufficient physical activity and high caloric intake, are a major driving force for the rapid increase in type 2 diabetes prevalence seen globally over the last few decades.<sup>1</sup> Type 2 diabetes has become a leading cause of morbidity and mortality, adversely impacting people's quality of life and imposing a vast, potentially overwhelming, economic burden on health systems.<sup>1-3</sup> Consequently, the World Health Organization, in 2013, declared type 2 diabetes as one of four priority non-communicable diseases (NCDs) targeted in their global NCD action plan.<sup>4</sup> In accordance with this action plan, identifying and implementing effective lifestyle interventions to prevent type 2 diabetes has been identified as a public health priority.<sup>3</sup>

People of South Asian-origin (with ancestry in countries of the Indian subcontinent, including Bangladesh, India, Pakistan and Sri Lanka)<sup>5</sup> are at particularly high risk of type 2 diabetes,<sup>6</sup> which often develops at a younger age and lower weight compared with White European-origin populations (with ancestral origins in Europe).<sup>7</sup> This applies to both South Asian people living in the Indian subcontinent and to those living elsewhere.<sup>6</sup> In Europe, a recent meta-analysis found South Asian populations to have the highest risk of developing type 2 diabetes of all ethnic groups in the countries in which they were living, being over three times more likely to have type 2 diabetes than the European-origin population (odds ratio for type 2 diabetes 3.7, 95% CI 2.7–5.1).<sup>8</sup> This high susceptibility has been hypothesised to arise from the complex interaction of many factors including lifestyle, physiological processes, and socio-cultural influences.<sup>9</sup> Of these, addressing modifiable risk factors such as physical activity and diet, through lifestyle interventions, currently offers the greatest potential to reduce the risk, or delay the onset, of type 2 diabetes for South Asian populations living in Europe.<sup>10</sup>

Several lifestyle interventions, with proven success in preventing type 2 diabetes for White European-origin populations, have been specifically culturally adapted for South

Asian populations and evaluated, with mixed results regarding their effectiveness.<sup>11-13</sup> While these interventions did have some effect on the risk factors for type 2 diabetes such as low levels of physical activity, high calorie diet, high Body Mass Index and high blood glucose, they require further development and enhancement in order to render them as effective as the mainstream trials on which they were based.<sup>7</sup> Unfortunately, there is sparse evidence regarding how cultural adaptation is actually meant to augment the effectiveness of these interventions and this lack of theoretical underpinning currently hinders progress. To advance our thinking, we need to develop a more nuanced understanding of the culturally adapted type 2 diabetes prevention interventions for South Asian populations in Europe that have been developed and evaluated to date. This deeper understanding is crucial to inform recommendations on how to design and deliver future lifestyle interventions for this large and growing population, and to ensure they are applicable to a population which is extremely heterogeneous and now resides across a multitude of settings within Europe.<sup>9</sup>

Realist review (also called realist synthesis) is a systematic approach to synthesising available evidence related to, for example, social or behavioural interventions that can provide in-depth insights into *how* interventions produce outcomes. This is in contrast with other approaches to evidence synthesis, such as systematic reviews and meta-analysis, that typically focus on establishing the effectiveness of interventions (e.g., by calculating effect sizes). Realist review seeks to address the question: 'What works, for whom and in what contexts?'.<sup>14</sup> In doing so, the realist approach also acknowledges that lifestyle interventions attempt to achieve behaviour change within a social reality; as such, the lifestyle interventions provide multiple resources (e.g., information about healthy diet and access to sports facilities), which have a potential to trigger changes in participant behaviour (anticipated or unanticipated), but only operate according to participant's reasoning and response to these resources.<sup>15</sup> In this interpretation, it is apparent that participant responses to the same intervention resources will vary, and may do so in

accordance with a variety of contextual influences.<sup>16</sup> A realist review therefore seeks to extend the basic evaluation question ('Does the intervention work?') to a much broader enquiry; seeking to establish the underlying causal 'Mechanisms' (resources and reasoning) of interventions and observing how the 'Outcomes' of these 'Mechanisms' differ across multiple 'Contexts'.<sup>16</sup>

We undertook a realist review of culturally adapted lifestyle interventions for the prevention of type 2 diabetes for South Asian populations in Europe. Specifically, we aimed to address two research questions which might improve theoretical understanding of these interventions:

1. What are the mechanisms through which culturally adapted lifestyle interventions are operating to improve type 2 diabetes prevention activities for South Asian migrant populations in Europe?
2. What contextual influences on these lifestyle interventions might contribute to both intended and unintended outcomes?

## 2 | METHODS

Our review was conducted as part of EuroDHYAN, a European-wide research project, which was designed to inform the development of novel and targeted health promotion strategies to reduce the risk of type 2 diabetes for South Asian populations in Europe. Therefore, our aim was to synthesise

and build on the evidence generated by EuroDHYAN.<sup>17</sup> More information on the EuroDHYAN project and its component parts is presented in Appendix S1 (Box S1). Our review followed a stepped approach commonly used in realist reviews (Box 1).<sup>14,16,18</sup>

### 2.1 | Clarify scope

The scope of our review was largely determined by the aims of the EuroDHYAN project. The research questions were developed through consultations with the EuroDHYAN team and external stakeholders with domain expertise. Further clarification and focusing of the review was also carried out throughout the project with ongoing input from these stakeholders.<sup>16</sup>

### 2.2 | Initial explanatory framework

We developed an initial explanatory framework. This is an extra step to those commonly used in realist review, particularly advocated for large, multifaceted interventions by Shearn et al.,<sup>19</sup> which attempted to make explicit the main theoretical assumptions behind how these interventions work, and also provided a basis for abstracting data. The initial explanatory framework was produced by the core team involved in the review (ED, MK and AS) and involved familiarising themselves with the identified body of evidence

#### BOX 1 Steps of a realist review

Step 1: Clarify scope

- Additional step: Create broad explanatory framework\*

Step 2: Search for evidence

Step 3: Appraise primary studies and extract data

Step 4: Synthesise data and draw conclusions

Step 5: Disseminate, implement and evaluate

Iterative non-linear process

\*Shearn K, Allmark P, Piercy H, Hirst J. Building Realist Program Theory for Large Complex and Messy Interventions. *Int J Qual Meth.* 2017;16(1):11.

to identify the key theoretical assumptions of the interventions' designers about how the interventions were intended to work. These assumptions were then summarised in the IF..., THEN..., BECAUSE...' format as indicated by recommendations on conducting realist reviews.<sup>14</sup>

## 2.3 | Search for evidence

A narrative review, a systematic review, and a meta-analysis of randomised controlled trials (RCTs) had been conducted by EuroDHYAN to identify all culturally adapted type 2 diabetes prevention interventions for South Asian populations internationally.<sup>20-22</sup> The searches for these reviews included literature from the start of the databases until August 2016, September 2017, and September 2018, respectively (see Appendix S1 'Searches for EuroDHYAN reviews' for details). From this body of literature, we selected all studies of migrant South Asian populations living in countries (in Europe or elsewhere) where they were a minority population, as this was our context of interest. We felt that the findings from studies in South Asia would not necessarily translate to a minority setting and these studies were therefore excluded. To supplement these core papers, we searched for sibling publications, using citations and by contacting authors, and reviewed the outputs from all our preceding EuroDHYAN work packages. We sought a theoretical structure for our review by identifying existing literature on frameworks of adaptation by consulting experts in this field. Lastly, as realist review is an iterative, non-linear, process,<sup>23</sup> we continued to seek additional papers from grey literature with a depth of investigation into cultural adaptation that could provide greater understanding to test and refine our initial theory.

## 2.4 | Appraise primary studies and extracting data

We used a data extraction form recommended by the Centre for Advancement in Realist Evaluation and Synthesis training workshop, which included quality appraisal. Data were extracted and tabulated according to context, mechanism, and outcome; in particular, identifying any patterns and their link to positive and negative outcomes. A realist approach to quality appraisal was followed, which focuses on assessing the 'rigour' of the methods used in a paper and also the 'relevance' of the paper to theory development and/or testing.<sup>16</sup>

## 2.5 | Synthesising the evidence and drawing conclusions

Extracted data were coded into themes, constructed around our initial explanatory framework, and were synthesised

to create initial programme theories. Programme theories in realist reviews are usually illustrated by the formulaic construction of 'Context'—'Mechanism'—'Outcome' configurations (CMOc)<sup>19</sup> and are used to explore varying patterns of outcomes. Multiple CMOc were discussed with the entire EuroDHYAN project team, and the review was focused towards both the prominent themes arising in these data and those themes likely to be of most practical relevance to potential end-users of the review (e.g., to operationalise in designing/commissioning health promotion interventions).<sup>16,24</sup> Lastly, we synthesised our findings to produce a refined explanatory framework and summary CMOc.

## 3 | RESULTS

### 3.1 | Core studies identified

There were eight core intervention studies.<sup>11-13,25-29</sup> Seven of these studies were identified from the existing EuroDHYAN reviews,<sup>20-22</sup> and one further core study<sup>28</sup> was identified from the EuroDHYAN qualitative publication.<sup>30</sup> Table S1 details the wider supporting and theoretical literature we identified to inform our review. Fifteen sibling studies, to the core publications, were found (Supporting Information References S1–S15). We also examined three EuroDHYAN publications and one report (S16–S19). Five papers were found, which could inform our theoretical approach (S20–S24), and lastly, one paper was identified from grey literature (S25).

### 3.2 | Study details

The core intervention studies that were the focus of this review are summarised in Table 1. Of these, there were five RCTs,<sup>11-13,25,29</sup> one quasi-experimental study,<sup>26</sup> and two before-and-after trials.<sup>27,28</sup> Four studies were conducted in Europe (Scotland,<sup>12</sup> the Netherlands,<sup>13</sup> and Norway<sup>25,29</sup>) and four outside Europe (Australia,<sup>27</sup> United States,<sup>11,26</sup> and New Zealand<sup>28</sup>). All studies were carried out with South Asian participants living in a minority context, but with different subgroups (and population definitions). The majority of lifestyle interventions included both dietary and physical activity components, except one RCT which focused purely on physical activity.<sup>25</sup> Intervention duration varied from 3 to 36 months. Reporting of the theoretical basis of these studies and how they were assumed to operate varied greatly between publications. For four studies,<sup>12,13,25,26</sup> we found sibling studies which added greater depth to our understanding, but for the other four studies<sup>11,27-29</sup> there were no additional publications found.

TABLE 1 Details of selected core intervention studies

| Study name (reference)                                 | Design                     | Setting        | Population             | Intervention  | Duration (months) |
|--|----------------------------|----------------|------------------------|---|-------------------|
| Admiraal et al. (DHIAAN) <sup>13</sup>                 | RCT                        | Netherlands    | Hindustani Surinamese  | Individual lifestyle counselling, (plus a family session, cooking classes and supervised physical activity programme)         | 12                |
| Andersen et al. (PAMH) <sup>25</sup>                   | RCT                        | Norway         | Pakistani (men only)   | Physical activity based intervention (group sessions and individual counselling)  | 5                 |
| Bhopal et al. (PODOSA) <sup>12</sup>                   | RCT                        | Scotland       | Pakistani and Indian   | Family-based, dietitian-delivered lifestyle modification intervention   | 36                |
| Islam et al. (RICE) <sup>26</sup>                      | Quasi-experimental         | USA (New York) | Sikh Asian Indian      | 6-workshop lifestyle modification and diabetes prevention intervention led by community health workers                        | 6                 |
| Kousar et al. <sup>27</sup>                            | Before and after/ pre-post | Australia      | Pakistani (women only) | Peer education delivering weekly modules on healthy diet and lifestyle (individual or small groups, including family members) | 3 (12 weeks)      |
| Patel et al. <sup>11</sup>                             | RCT                        | USA            | Gujarati Asian Indians | Group based lifestyle intervention  | 3 (12 weeks)      |
| Rush et al. <sup>28</sup>                              | Before and after           | New Zealand    | Asian Indian           | Monthly group diet and physical activity intervention   | 5                 |
| Telle-Hjelset et al. (InnvaDIab-DE-PLAN) <sup>29</sup> | RCT                        | Norway         | Pakistani (women only) | Group based lifestyle education programme   | 7                 |

Abbreviation: RCT, randomised controlled trial.

### 3.3 | Initial explanatory framework

Our initial explanatory framework outlined that:

**IF** lifestyle interventions for the prevention of type 2 diabetes (proven effective for White European-origin populations) are culturally adapted for South Asian populations living in Europe **THEN** they will be equally/or more effective than un-adapted interventions **BECAUSE** they are culturally appropriate/relevant for the target populations.

### 3.4 | Evidence synthesis

#### 3.4.1 | Mechanisms of culturally adapted lifestyle interventions (Research Question 1)

Examining this literature, it became apparent that our first research question was not straightforward as there are a multiplicity of mechanisms (and thereby CMOc) operating within culturally adapted lifestyle interventions—modifying, or augmenting, the underlying programme resources and potentially eliciting a multitude of intended, and unintended, responses from participants. In order to clarify our approach to this question, we therefore sought existing frameworks of cultural adaptation to structure our enquiry. Several

theoretical frameworks were identified which could provide an overarching structure.<sup>31–33</sup> These frameworks inherently focus on ‘what’ cultural adaptation entails, categorising its constituent parts, and therefore enabled us to ‘unpack’ cultural adaptation into these discrete parts for more detailed exploration.

We selected the ‘Toolkit of Adaptation Approaches’, which provided the most granular framework with a typology of 46 approaches to adaptation divided across six domains<sup>31</sup>—Collaborative Working, Team, Endorsement, Materials, Messages, and Delivery. For the purpose of this review, we selected one domain—‘Team’—to explore in depth due to the constraints of our project timeline and also because, within our eight papers, this was one of the domains most frequently referred to.

#### ‘Team’ domain

All core studies involved consideration of the ‘Team’ domain,<sup>31</sup> which includes approaches such as employing ethnically matched staff; involving ethnically matched individuals and community members throughout planning, directing, reviewing and implementing stages; having ethnically matched leadership within the study; and cultural competency training for study personnel. We sought evidence for what mechanisms may operate within these ‘Team’ approaches, and what responses they triggered within study participants. Despite the pervasive use of the ‘Team’ approach across the core interventions, there was minimal evidence to explore



as only four intervention papers<sup>12,13,25,26</sup> had accompanying qualitative publications describing the intervention and its components in more detail. Nevertheless, based on the available evidence, we identified a mechanism of shared cultural identity, which we theorised as contributing to strong team-participant relationships. This mechanism is illustrated by the following quotes describing details of the interventions:

Ethnically matched researchers (interviewers) have more understanding and empathy towards the participant's situation, culture and experience compare with non-matched interviewers. The same strategy seemed to be important to community recruiters in this study...<sup>34</sup>

Another positive aspect of the program that a few participants commented upon was their relationship with the CHWs (Community Health Workers), some of these comments described this relationship in warm, familial terms: "She was very, very good. She explained things in a way that made me feel like a family member"<sup>26</sup>

This mechanism of shared cultural identity could be observed to positively influence study recruitment, retention and adherence and, thereby, also would impact intervention effectiveness:

...members of the target group offered assistance in the recruitment phase and this may have been essential for the interest in the project that was created in the milieu.<sup>35</sup>

Trusting relationships between participants and dietitians contributed to the high retention rate...In some cases it seemed that participant loyalty was to the dietitian rather than the trial.<sup>36</sup>

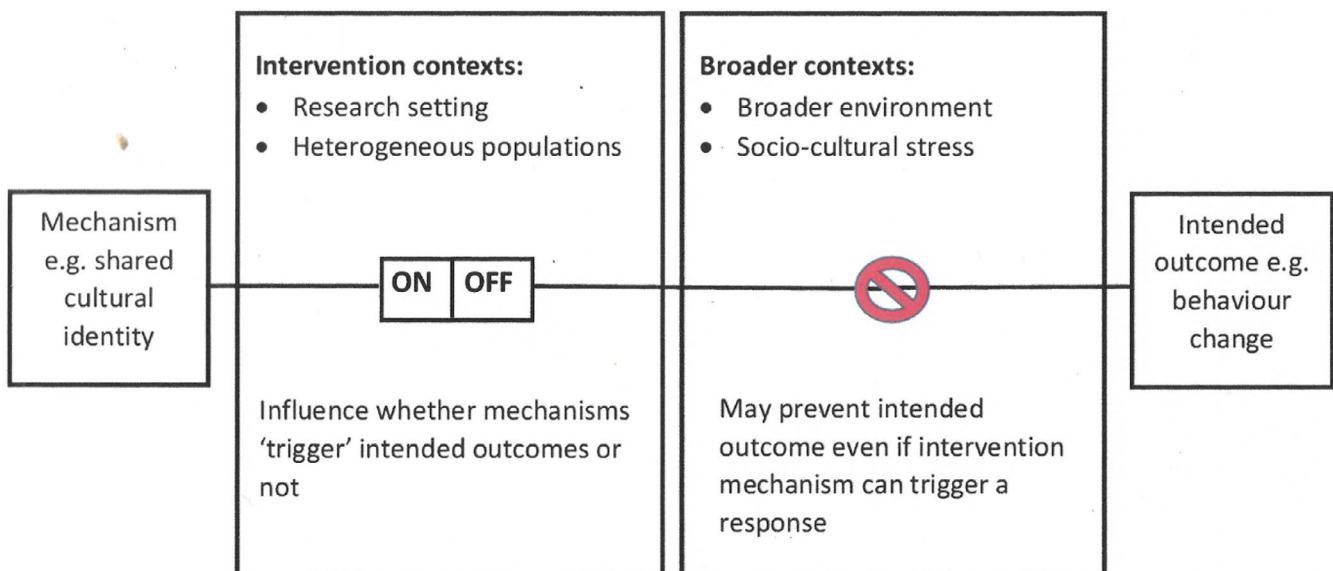
In these examples, we see the mechanism of shared cultural identity, but a similar mechanism could have simultaneously been operating through other social identities shared with team members. We explored this further in the following intervention context of heterogeneous populations.

### 3.4.2 | Contextual influences on culturally adapted lifestyle interventions (Research Question 2)

We identified four main contextual influences, two were inherent to the intervention and another two constituted extrinsic barriers needing to be overcome for the intervention to produce the desired behaviour change. These four contexts (CMOc) are summarised in Figure 1 and are discussed below with examples relating to their influence on the proposed 'shared cultural identity' mechanism:

#### *Intervention context 1: Heterogeneous populations*

The participants in culturally adapted type 2 diabetes prevention interventions are extremely heterogeneous (Context). Heterogeneity may include aspects such as specific ethnic group, generation of migration/acclimatisation and, as with any population, aspects such as age, gender, religion, geographical location and socio-economic status. If interventions are designed without taking this heterogeneity into consideration



**FIGURE 1** Summary of CMOc categorised as intervention or broader contextual influence. CMOc, 'Context'—'Mechanism'—'Outcome' configurations

and overgeneralising, then this may create a mismatch of the resources (Mechanisms) provided to participants and there will be differential effectiveness (Outcomes) as for some participants the intervention becomes not relevant.

Supporting this CMOC is the finding from the EuroDHYAN qualitative analysis<sup>30</sup> that a key challenge to the effectiveness of the interventions occurred when the focus of adaptation was cultural differences, without taking into consideration the specific nuances of participants and intersecting identities. This finding was also expressed in the paper by Morrison et al.<sup>36</sup>:

While culturally sensitive adaptations are essential and were achieved within this trial they should avoid reinforcing stereotypes<sup>36</sup>

In the example of shared cultural identity, for some participants (particularly those more acculturated), the adaptation for ethnically matched staff may not have been as important as matching other social characteristics of team members, for example, gender or age. Gender was considered in three of our primary papers, which were conducted in gender-specific groups.<sup>25,27,29</sup> Additionally, studies have reported specific situations where an ethnically-matched background may in fact impede participation, particularly in small close-knit communities, as participants may want to keep their health behaviours or status private.<sup>37,38</sup>

This context of 'heterogeneous populations' necessitates an approach to designing interventions, which strives to recognise and reach the needs of individuals and populations with diverse and intersecting identities,<sup>39</sup> and this example highlights the importance of identifying which social characteristics are most pertinent to the target population to trigger a sense of shared identity.

#### *Intervention context 2: Research setting*

Interventions designed, and implemented, within a research setting (Context) were not as likely to become embedded within existing health service or community structures and the resources (Mechanisms) provided were typically not sustainable. This resulted in changes in physical activity and dietary behaviour (intended Outcomes) which were short lived.

In the example of the 'shared cultural identity' mechanism, participants may develop strong relationships with team members, but this support is lost when the project conducted in the context of a research setting ends and the intervention is no longer available to the community. This problem with sustainability was recognised in several of the core studies:

Another limitation was that sustainability of the intervention program was not addressed directly as part of this study. In the future, the mandir's [Hindu temple] leadership and the research

team plan to explore sustainability and scalability issues including use of trained CHWs [Community Health Workers] or health coaches to provide the intervention.<sup>11</sup>

This community has undertaken to continue to work together to maintain these lifestyle changes...<sup>28</sup>

This context was also sometimes detrimental to relationships with the participant community who felt let-down by the lack of on-going commitment (unintended Outcome).

Researchers come and go and use people when they want. One does not hear of the outcome later on<sup>34</sup>

#### *Broader context 1: Broader environment*

The lifestyle approach to type 2 diabetes prevention is an approach, which, on the whole, is not able to alter the broader environment (Context). This means that for some participants the intervention resources (Mechanisms) cannot achieve the desired outcome, in face of the broader environmental influences and no behaviour change will result (unintended Outcome).

The mechanism of shared cultural identity may increase participants desire to change behaviour, but broader environmental influences may be too pervasive for people to overcome even with this strong support. Some interventions tried to tackle the immediate social environment of participants<sup>41</sup> and others taught participants to resist external pressures.<sup>42</sup> However, there remained broader environmental influences in the core papers which impeded behaviour change.

First, there was an interaction between cultural beliefs and the climate that impacted on physical activity and diet. A cold climate is perhaps more pertinent to first generation South Asian populations, used to a warmer climate; however, beliefs about the 'right' weather to be physically active outdoors and the properties and role of food in certain climates were felt to be commonly held beliefs that were maintained over successive generations.<sup>36</sup>

The climate was a consideration for South Asians living in Scotland as participants found recommended exercise such as walking problematic in the cold and food was described as a cultural representation of warmth. It therefore seemed counterintuitive to increase one without the other<sup>36</sup>

There was also evidence of the influence of food marketing and the 'Western diet', including interactions between

cultural beliefs (the role of food in hospitality and nurturing) and food choices. An in-depth study of food and eating practices, sourced to help refine our theories,<sup>43</sup> found that these influences also varied by generation as well as by gender. This led to older generations wanting to include traditional food, making richer more calorie-laden dishes to compete with takeaway food:

Once a week they have children all come so we feel that the food should be much nicer according to the tradition and also children don't like ordinary vegetables they fancy food like from McDonald' so just to compete with that kind of food we try to make our old Indo-Pakistani dishes.<sup>36</sup>

There were also situations where children, in particular, were fed multiple meals to accommodate their Western preferences and still include traditional dishes.

Children are the endpoints of multiple feeding practices, which when combined with their own food preferences have the potential to cause weight gain and health problems in future<sup>43</sup>

#### *Broader context 2: Socio-cultural stress*

South Asian populations living in Europe may be exposed to varying degrees of sociocultural stress (Context) which intersects with heterogeneous characteristics such as gender and socio-economic status. This context may mean that, for some participants, the intervention resources (Mechanism) cannot achieve the desired outcome because participants do not have access to the resources needed to participate or because socio-cultural stress limits their ability to participate and no behaviour change will result (unintended Outcome).

Once again, this broader context means that although the intervention mechanisms may be operating, participant's responses may be constrained despite strong support. In the core papers, this was particularly evident for women who were often isolated and coping with multiple roles within the family:

...some female participants felt unable to get enough time out of the house<sup>36</sup>

Some interventions purposefully took this into consideration and tried to moderate the influence of this context:

The programme was tailored to meet the participants' everyday lives and challenges as mothers and providers of food for their families. Any lifestyle change they might choose would have to fit their cultural, social and family situation...<sup>29</sup>

...individualised challenges, strategies, and action plans for improving diet and physical activity and reducing stress were discussed.<sup>26</sup>

One intervention<sup>29</sup> also provided material resources such as childcare and walking shoes for participants.

### 3.4.3 | Refined explanatory framework

As a final step to synthesising our evidence, we summarised our findings as a refined explanatory framework which states:

**IF** lifestyle interventions for the prevention of type 2 diabetes (proven effective for White European-origin populations) are culturally adapted for South Asian migrant populations in Europe *using approaches to adaptation of which the underlying mechanisms are understood and known to match the participant population characteristics and in which the predominant contextual influences on these interventions are identified and accounted for* **THEN** they may be equally or more effective **BECAUSE** they are more likely to be relevant and create the desired participant responses and intended outcomes

In light of this refined explanatory framework, the remaining mechanisms of cultural adaptation need to be further 'unpacked' in order to advance our understanding of how they work, how they can be appropriately matched to the participant population and to discover what may be the main contextual factors influencing them.

## 4 | DISCUSSION

### 4.1 | Summary of main findings

The main outputs of this realist review of type 2 diabetes prevention lifestyle interventions for South Asian populations living in Europe are the development of an explanatory framework for these interventions; exploration of the mechanisms of the 'Team' approach to adaptation; development of four CMOc, which illustrate the most prominent contextual influences emerging from our core papers; and organisation of these CMOc according to whether these contextual factors are inherent to the intervention (influencing whether the mechanisms trigger intended outcomes) or are broader contexts (which may prevent the intended outcomes even if the mechanisms are triggered).



## 4.2 | What this adds to existing knowledge

The EuroDHYAN project was conceptualised as a means of synthesising existing evidence about the prevention of type 2 diabetes for South Asian populations in Europe and distilling lessons from this work into recommendations for future, more effective, interventions. The preceding EuroDHYAN work proved that existing interventions can reduce the incidence of type 2 diabetes.<sup>20</sup> However, this study concurrently highlighted the great complexity of the reviewed interventions, which not only utilised behavioural components (e.g., goal setting or developing social support) but also incorporated adaptations applied to, and intertwined with, the behavioural components to render them culturally appropriate. It also revealed an absence of theoretical justification regarding the use of both the behavioural and cultural intervention components within these interventions,<sup>22</sup> which made it impossible to identify patterns of effect and understand what components of these interventions worked and how they may translate to different settings. Adopting realist methodology for this review enabled us to interpret evidence from these inherently complex interventions,<sup>15,16,19</sup> attempt to make theory explicit where it was absent,<sup>15</sup> and thereby provide a structured approach to support further research and also intervention design.

Existing frameworks of cultural adaptation developed for South Asian populations, and also in the broader literature including other ethnic-minority populations, have primarily undertaken the categorisation of approaches to cultural adaptation.<sup>31-33</sup> Our realist synthesis adds to this current knowledge base by utilising an existing typology to guide the investigation of how these approaches are working, and attempting to unpack the mechanism of one selected domain of cultural adaptation. There have been few previous realist explorations in this area. A previous realist review to understand the efficacy of culturally appropriate diabetes education programmes<sup>44</sup> defined 'process factors' which either enhanced or reduced the efficacy of these programmes, but didn't further explicate these factors in terms of mechanisms. Wilkinson et al.<sup>45</sup> also undertook a realist approach to synthesising the literature on diabetes amongst ageing and diverse populations, particularly focusing on older people of South Asian origin. They recognised the complexity of the 'multi-dimensional influence of ethnicity and culture on health' and mapped specific areas of the literature to identify context, mechanism and related explanatory theoretical concepts; the latter included cultural competency, but there was not a specific focus on identifying the mechanisms within cultural adaptation.

Within the broader health promotion literature, McMahon and Ward<sup>46</sup> carried out a realist review of evidence to guide targeted approaches to behavioural HIV prevention. Their focus was with immigrant populations within high income

countries. They firstly classified seven 'adaptation activities' that they identified in the literature, and then translated these into seven 'candidate mechanisms'. They then focused on exploring four 'adaptation activities' and their mechanisms (in brackets) in more depth—content of interventions (consonance), language (understanding), ethnic diversity (specificity) and settings (embeddedness). These adaptation activities reflect, and intersect with, some of the domains of the typology of adaptation,<sup>31</sup> which we utilised in our synthesis. One of the activities that they identified as 'staffing' relates to the domain of 'team' that we explored; however, they did not explore this aspect in depth as they found mixed supporting evidence for this activity in their study.

Therefore, our review supplements existing knowledge in the field of cultural adaptation by utilising an existing framework to structure our approach to examining intervention mechanisms; in particular, finding a mechanism of shared cultural identity operating within the 'Team' domain of adaptation and subsequently taking a more in depth examination of the contextual factors (both intervention and broad contexts) that influenced this mechanism. This takes a step towards improving the evidence base upon which culturally adapted interventions can be developed.

## 4.3 | Strength and limitations

This is an emergent field of enquiry,<sup>47</sup> with a limited amount of literature available to inform our realist investigation. Focusing on South Asian populations in Europe and lifestyle interventions, we only identified eight core studies and, consequently, were only able to explore one domain of the typology of adaptation. Further exploration to shed light on the mechanisms of cultural adaptation, including the examination of theoretical approaches from other populations and other chronic health conditions, for example, asthma,<sup>48</sup> is imperative and our work provides a good framework to base this on. For example, social cultural stress is likely to be contributed to by people's experience of both institutional and interpersonal racism that will impact significantly on their health and their capacity to engage with lifestyle interventions,<sup>49</sup> and this is an area warranting further exploration. Also limited by our project scope, we were not able to consult end-users to generate additional insights to enrich our data and future research incorporating stakeholder engagement would add value to the findings.

Another potential limitation, is that existing interventions are based largely on dietary and physical activity guidelines developed for the White European-origin populations,<sup>21</sup> but with no evidence of specific strategies for particular ethnic groups. We have examined the cultural adaptation of these interventions with an assumption that the

underlying approaches and theory of lifestyle interventions are appropriate for South Asian populations; however, this may not be the case, for all or for some sub-groups of participants. The appropriateness of the underlying guidelines may warrant further examination along with any supplemental risk factors for type 2 diabetes that we do not fully understand for South Asian populations living in Europe. Without a clear understanding of the cause of the excess risk of type 2 diabetes for this population, we may not be targeting the right approaches and, therefore, regardless of how well we adapt the lifestyle modification intervention, we will not achieve as good outcomes as with mainstream populations.

The realist approach to researching health interventions remains relatively nascent. However, an intrinsic part of realist review is the recognition that evidence is cumulative and ‘the best we know to date’.<sup>50</sup> The realist approach is designed to enable improved understanding over time by developing theories and hypotheses which can then be incorporated into, and tested by, further research; thus identifying new questions for study<sup>51</sup> and allowing for theory-informed advancements. A strength of this work is that it can assist in advancing the field by clarifying the areas which still need to be addressed and by offering a structured approach to address them. Further questions we propose would be to examine the other domains of adaptation and any additional contexts which are of importance to these mechanisms.<sup>31</sup> This work would complete a more comprehensive understanding of how the full range of cultural adaptations work, for which populations, and in which contexts it is appropriate to use particular approaches.

## 5 | CONCLUSIONS

A structured approach to understand and advance cultural adaptation is important to develop effective health promotion programmes to tackle inequities in health, and it is currently imperative to accelerate these programmes in light of the disproportionate impact of COVID-19, and its long-term effects, on both ethnic minority populations and people with diabetes.<sup>52</sup> Our key findings do not fully unpack ‘how’ these interventions work, for ‘whom’ and in ‘what contexts’, but they do assist in proposing a structured approach to undertake further ‘sense-making’<sup>23</sup> of existing approaches to adaptation, and also highlight some of the key contextual considerations which influence the outcomes of these interventions. Societies are becoming increasingly complex in their diversity<sup>53</sup> and pursuing more contextually grounded methods, to try to appropriately meet peoples’ health and preventative healthcare needs, corresponds with recent conceptual moves away from focusing simply on pre-defined population groups. In accordance with realist enquiry, we

anticipate that this work provides a theoretical stepping-stone to future research to unpack the mechanisms of discrete adaptations and to begin to observe patterns of interactions between intervention resources (both behavioural and adaptation) and participant responses and how these vary across multiple dimensions of context. This addresses an evident knowledge gap surrounding the mechanistic underpinnings of these interventions, and would also assist us in developing more nuanced approaches to designing lifestyle interventions for super-diverse<sup>53</sup> populations. In particular, our findings suggest that when designing culturally adapted lifestyle interventions for South Asian populations in Europe greater consideration should be taken of how adaptations fit with heterogeneous and intersecting population characteristics; how intervention design can safeguard sustainability beyond any investigative phase, to become embedded in established health service or community structures; and lastly, what broader contextual influences may limit participant’s capacity for behaviour change and if there is any way to address or mitigate these influences.

## ACKNOWLEDGMENTS

This study was conducted as part of the ‘EuroDHYAN: Innovative Prevention Strategies for type 2 Diabetes in South Asians Living in Europe’ project and was funded by a health Programme 2014-2020 from the European Commission Grant (number 664609 HP-PJ-2014). We gratefully acknowledge the input of the wider EuroDHYAN team members and external stakeholders to this review especially with regards to clarifying the research questions and scope of the review.

## CONFLICT OF INTEREST

We have no conflicts of interest to declare.

## ORCID

Emma M. Davidson  <https://orcid.org/0000-0002-5182-8495>

## REFERENCES

1. Zheng Y, Ley SH, Hu FB. Global aetiology and epidemiology of type 2 diabetes mellitus and its complications. *Nat Rev Endocrinol.* 2018;14(2):88-98.
2. Jaacks LM, Siegel KR, Gujral UP, Narayan KMV. Type 2 diabetes: a 21st century epidemic. *Best Pract Res Clin Endoc Metab.* 2016;30(3):331-343.
3. da Rocha Fernandes JD, Ogurtsova K, Linnenkamp U, et al. IDF Diabetes Atlas estimates of 2014 global health expenditures on diabetes. *Diabetes Res Clin Pract.* 2016;117:48-54.
4. World Health Organization. *Global action plan for the prevention and control of noncommunicable diseases 2013–2020.* Geneva, Switzerland: World Health Organization; 2013:2013.
5. Johnson MRD, Bhopal RS, Ingleby JD, Gruer L, Petrova-Benedict RS. A glossary for the first World Congress on Migration, Ethnicity, Race and Health. *Public Health.* 2019;172:85-88.

6. Bhopal RS. A four-stage model explaining the higher risk of Type 2 diabetes mellitus in South Asians compared with European populations. *Diabetic Med.* 2013;30(1):35-42.
7. Sattar N, Gill JMR. Type 2 diabetes in migrant south Asians: mechanisms, mitigation, and management. *Lancet Diabetes Endocrinol.* 2015;3(12):1004-1016.
8. Meeks KAC, Freitas-Da-Silva D, Adeyemo A, et al. Disparities in type 2 diabetes prevalence among ethnic minority groups resident in Europe: a systematic review and meta-analysis. *Intern Emerg Med.* 2016;11(3):327-340.
9. Bhopal RS. *Epidemic of Cardiovascular Disease and Diabetes: Explaining the Phenomenon in South Asians Worldwide.* 1st ed., Oxford: Oxford University Press; 2019. <https://doi.org/10.1093/med/9780198833246.001.0001>
10. NICE. *Type 2 Diabetes: Prevention in People at High Risk.* Public health guideline PH38. National Institute for Health and Care Excellence. 2012. <https://www.nice.org.uk/guidance/ph38>. Accessed April 21, 2021.
11. Patel RM, Misra R, Raj S, Balasubramanyam A. Effectiveness of a group-based culturally Tailored lifestyle intervention program on changes in Risk factors for type 2 diabetes among Asian Indians in the United States. *J Diabetes Res.* 2017;2017:13.
12. Bhopal RS, Douglas A, Wallia S, et al. Effect of a lifestyle intervention on weight change in south Asian individuals in the UK at high risk of type 2 diabetes: a family-cluster randomised controlled trial. *Lancet Diabetes Endocrinol.* 2014;2(3):218-227.
13. Admiraal WM, Vlaar EM, Nierkens V, et al. Intensive lifestyle intervention in general practice to prevent type 2 diabetes among 18 to 60-year-old South Asians: 1-year effects on the weight status and metabolic profile of participants in a randomized controlled trial. *PLoS One.* 2013;8(7):e68605.
14. Wong G, Greenhalgh T, Westhorp G, Buckingham J, Pawson R. RAMESES publication standards: realist syntheses. *BMC Med.* 2013;11:14.
15. Cheyne H, Abhyankar P, McCourt C. Empowering change: realist evaluation of a Scottish Government programme to support normal birth. *Midwifery.* 2013;29(10):1110-1121.
16. Wong G, Westhorp G, Pawson R, Greenhalgh T. Realist Synthesis. RAMESES training materials; 2013. [http://ramesesproject.org/media/Realist\\_reviews\\_training\\_materials.pdf](http://ramesesproject.org/media/Realist_reviews_training_materials.pdf). Accessed April 21, 2021.
17. EuroDHYAN. Deliverables of the EuroDHYAN-project [cited 2020 29th May]. Available from <https://www.eurodhyan.eu/deliverables/>
18. Pawson R, Greenhalgh T, Harvey G, Walshe K. Realist review—a new method of systematic review designed for complex policy interventions. *J Health Serv Res Pol.* 2005; ;10(1\_suppl):21-34.
19. Shearn K, Allmark P, Piercy H, Hirst J. Building realist program theory for large complex and messy interventions. *Int J Qual Meth.* 2017;16(1):11.
20. Jennum AK, Brekke I, Mdala I, et al. Effects of dietary and physical activity interventions on the risk of type 2 diabetes in South Asians: meta-analysis of individual participant data from randomised controlled trials. *Diabetologia.* 2019;62(8):1337-1348.
21. Muilwijk M, Nicolaou M, Qureshi SA, et al. Dietary and physical activity recommendations to prevent type 2 diabetes in South Asian adults: a systematic review. *PLoS One.* 2018;13(7):22.
22. EuroDHYAN. D4.3 Final report intervention elements: optimizing strategies for prevention of type 2 diabetes among South Asians living in Europe ANNEX 1: EuroDHYAN WP 4.1: a narrative synthesis of dietary and physical activity strategies to prevent type 2 diabetes in South Asian adults 2018 [cited 10 May 2020]. Available from [https://www.eurodhyan.eu/wp-content/uploads/2018/06/Del9\\_D4.3\\_Final-report-intervention-elements.pdf](https://www.eurodhyan.eu/wp-content/uploads/2018/06/Del9_D4.3_Final-report-intervention-elements.pdf)
23. Pawson R, Greenhalgh T, Harvey G, Walshe K. *Realist Synthesis: An Introduction.* Research methods: an ESRC research programme. Manchester: University of Manchester; 2004.
24. Punton M, Vogel I, Lloyd R. *Reflections from a Realist Evaluation in Progress: Scaling Ladders and Stitching Theory,* CDI Practice Paper 18. Brighton: IDS. <https://www.cdimpact.org/publications/reflections-realist-evaluation-progress-scaling-ladders-and-stitching-theory-0>. Accessed April 21, 2021.
25. Andersen E, Høstmark AT, Holme I, Anderssen SA. Intervention effects on physical activity and insulin levels in men of Pakistani origin living in Oslo: a randomised controlled trial. *J Immigr Minor Health.* 2013;15(1):101-110.
26. Islam N, Zanoziak J, Wyatt L, et al. Diabetes prevention in the New York City Sikh Asian Indian community: a pilot study. *Int J Environ Res Public Health.* 2014;11(5):5462-5486.
27. Kousar R, Burns C, Lewandowski P. A culturally appropriate diet and lifestyle intervention can successfully treat the components of metabolic syndrome in female Pakistani immigrants residing in Melbourne, Australia. *Metabolism.* 2008;57(11):1502-1508.
28. Rush EC, Chandu V, Plank LD. Reduction of abdominal fat and chronic disease factors by lifestyle change in migrant Asian Indians older than 50 years. *Asia Pac J Clin Nutr.* 2007;16(4):671-676.
29. Telle-Hjellset V, Kjøllesdal MKR, Bjørge B, et al. The InnvaDiab-DE-PLAN study: a randomised controlled trial with a culturally adapted education programme improved the risk profile for type 2 diabetes in Pakistani immigrant women. *Br J Nutr.* 2012;109(3):529-538.
30. Terragni L, Beune E, Stronks K, et al. Developing culturally adapted lifestyle interventions for South Asian migrant populations: a qualitative study of the key success factors and main challenges. *Public Health.* 2018;161:50-58.
31. Davidson EM, Liu JJ, Bhopal R, et al. Behavior change Interventions to improve the health of racial and ethnic minority populations: a tool kit of adaptation approaches. *Milbank Q.* 2013;91(4):811-851.
32. Netto G, Bhopal R, Lederle N, Khatoon J, Jackson A. How can health promotion interventions be adapted for minority ethnic communities? Five principles for guiding the development of behavioural interventions. *Health Promot Int.* 2010;25(2):248-257.
33. Resnicow K, Baranowski T, Ahluwalia JS, Braithwaite RL. Cultural sensitivity in public Health defined and demystified. 1999. 10-21 pp.
34. Samsudeen BS, Douglas A, Bhopal RS. Challenges in recruiting South Asians into prevention trials: health professional and community recruiters' perceptions on the PODOSA trial. *Public Health.* 2011;125(4):201-209.
35. Andersen E, Burton NW, Anderssen SA. Physical activity levels six months after a randomised controlled physical activity intervention for Pakistani immigrant men living in Norway. *Int J Behav Nutr Phys Act.* 2012;9(1):47.
36. Morrison Z, Douglas A, Bhopal R, et al. Understanding experiences of participating in a weight loss lifestyle intervention trial: a qualitative evaluation of South Asians at high risk of diabetes. *BMJ Open.* 2014;4(6):e004736.
37. Liu JJ, Davidson E, Bhopal RS, et al. Adapting health promotion interventions to meet the needs of ethnic minority groups: mixed-methods evidence synthesis. *Health Technol Assess.* 2012;16(44):1-469. <https://doi.org/10.3310/hta16440>

38. Liu JJ, Davidson E, Bhopal R, et al. Adapting health promotion interventions for ethnic minority groups: a qualitative study. *Health Promot Int*. 2015;31(2):325-334.
39. Heard E, Fitzgerald L, Wigginton B, Mutch A. Applying intersectionality theory in health promotion research and practice. *Health Promot Int*. 2019;35(4):866-876.
40. Douglas A, Bhopal RS, Bhopal R, et al. Recruiting South Asians to a lifestyle intervention trial: experiences and lessons from PODOSA (Prevention of Diabetes & Obesity in South Asians). *Trials*. 2011;12(1):220.
41. Douglas A, Bhopal RS, Bhopal R, et al. Design and baseline characteristics of the PODOSA (Prevention of Diabetes & Obesity in South Asians) trial: a cluster, randomised lifestyle intervention in Indian and Pakistani adults with impaired glycaemia at high risk of developing type 2 diabetes. *BMJ Open*. 2013;3(2):e002226.
42. Nicolaou M, Vlaar E, van Valkengoed I, Middelkoop B, Stronks K, Nierkens V. Development of a diabetes prevention program for Surinamese South Asians in the Netherlands. *Health Promot Int*. 2013;29(4):680-691.
43. Juneda S. *Food and Eating Practices in Multigenerational, Pakistani, Muslim Families Living in Edinburgh; A Qualitative Study*. Edinburgh, UK: University of Edinburgh; 2015.
44. Pottie K, Hadi A, Chen J, Welch V, Hawthorne K. Realist review to understand the efficacy of culturally appropriate diabetes education programmes. *Diabetic Med*. 2013;30(9):1017-1025.
45. Wilkinson E, Waqar M, Sinclair A, Randhawa G. Meeting the challenge of diabetes in ageing and diverse populations: a review of the literature from the UK. *J Diabetes Res*. 2016;2016:1-15.
46. McMahon T, Ward PR. HIV among immigrants living in high-income countries: a realist review of evidence to guide targeted approaches to behavioural HIV prevention. *Syst Rev*. 2012;1(1):56.
47. Brown T, Smith S, Bhopal R, Kasim A, Summerbell C. Diet and physical activity interventions to prevent or treat obesity in South Asian children and adults: a systematic review and meta-analysis. *Int J Environ Res Public Health*. 2015;12(1):566-594.
48. Lakhapaul M, Culley L, Robertson N, et al. A structured collaborative approach to intervention design using a modified intervention mapping approach: a case study using the Management and Interventions for Asthma (MIA) project for South Asian children. *BMC Med Res Methodol*. 2020;20(1):271.
49. Jones CP. Levels of racism: a theoretic framework and a gardener's tale. *Am J Public Health*. 2000;90(8):1212-1215.
50. Westhorp G, Prins E, Kusters C, Hultink M, Guijt I, Brouwers J. Realist Evaluation: an overview. 2011. [http://www.managingforimpact.org/sites/default/files/resource/2011\\_wp\\_realistevaluati onseminar\\_cecilekusters\\_2x.pdf](http://www.managingforimpact.org/sites/default/files/resource/2011_wp_realistevaluati onseminar_cecilekusters_2x.pdf). Accessed April 21, 2021.
51. Kirsh SR, Aron DC, Johnson KD, et al. A realist review of shared medical appointments: how, for whom, and under what circumstances do they work? *BMC Health Serv Res*. 2017;17(1):113.
52. Razai MS, Kankam HKN, Majeed A, Esmail A, Williams DR. Mitigating ethnic disparities in covid-19 and beyond. *BMJ*. 2021;372:m4921.
53. Phillimore J, Bradby H, Knecht M, et al. Understanding healthcare practices in superdiverse neighbourhoods and developing the concept of welfare bricolage: Protocol of a cross-national mixed-methods study. *BMC Int Health Hum Rights*. 2015;15(1):16.

## SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

**How to cite this article:** Davidson EM, Krasuska M, Jennum AK, et al. Developing a realist informed framework for cultural adaptation of lifestyle interventions for the prevention of type 2 diabetes in South Asian populations in Europe. *Diabet Med*. 2021;38:e14584. <https://doi.org/10.1111/dme.14584>