

PERSPECTIVES

Culturally adapting the prevention of diabetes and obesity in South Asians (PODOSA) trial

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SUMMARY

Type 2 diabetes is extremely common in South Asians, e.g. in men from Pakistani and Indian populations it is about three times as likely as in the general population in England, despite similarities in body mass index. Lifestyle interventions reduce the incidence of diabetes. Trials in Europe and North America have not, however, reported on the impact on South Asian populations separately or provided the details of their cross-cultural adaptation processes. Prevention of diabetes and obesity in South Asians (PODOSA) is a randomized, controlled trial in Scotland of an adapted, lifestyle intervention aimed at reducing weight and increasing physical activity to reduce type 2 diabetes in Indians and Pakistanis. The trial was adapted from the Finnish Diabetes Prevention Study. We describe, reflect on and discuss the following key issues:

- (i) The core adaptations to the trial design, particularly the delivery of the intervention in homes by dietitians rather than in clinics.
- (ii) The use of both a multilingual panel and professional translators to help translate and/or develop materials.
- (iii) The processes and challenges of phonetic translation.
- (iv) How intervention resources were adapted, modified, newly developed and translated into Urdu and Gurmukhi (written Punjabi).

The insights gained in PODOSA (including time pressures on investigators, imperfections in the adaptation process, the power of verbal rather than written information, the utilization of English and the mother-tongue languages simultaneously by participants and the costs) might help the research community, given the challenge of health promotion in multi-ethnic, urban societies.

Key words: South Asians; diabetes prevention; cultural adaptation; lifestyle modification

INTRODUCTION

Diabetes prevention studies and their adaptation for South Asian populations overseas

International studies have shown that lifestyle modifications can prevent diabetes (Tuomilehto *et al.*, 2001; Knowler *et al.*, 2002; Ramachandran *et al.*, 2006; Li *et al.*, 2008), but we do not know whether this approach would work with UK and other overseas-based South Asians. In the Indian Diabetes Prevention Study in Chennai in South India (Ramachandran *et al.*, 2006), the participants were not representative in terms of lifestyle of the Indians or Pakistanis settled in Europe and North America. Such interventions need adaptation as complex interventions may not have equivalent effects in different places and populations (Barrera *et al.*, 2012).

The research literature on cultural adaptation of interventions is sparse but expanding fast (Netto *et al.*, 2010; Bender and Clark, 2012; Liu *et al.*, 2012). Although general principles for providing adapted health promotion interventions in ethnic minority populations are long-standing (Bhopal and White, 1993), details on how to achieve this well are not. In their comprehensive review Barrera *et al.* (Barrera *et al.*, 2012) chart rapid progress since 1996, before which, they say, there was no agreed systematic approach. Adaptations aim to achieve similar outcomes across ethnic groups, although demonstrating that this occurs is problematic (Barrera *et al.*, 2012; Liu *et al.*, 2012). Liu *et al.*'s (Liu *et al.*, 2012) evidence synthesis has shown that most work on cross-cultural adaptation has been done in the USA and focused on African-American populations, but even there it is sparse on many topics (Barrera *et al.*, 2012), for example, as shown by a review of obesity interventions for children (Bender and Clark, 2012). A systematic review by White *et al.* (White *et al.*, 1998) on promoting healthy eating in minority ethnic groups reported 27 studies over 11 years; of these, two were from the UK and these did not describe the intervention from a cultural dimension. A systematic review on culturally adapted educational interventions for type 2 diabetes reported 10 trials where the outcome measures were HbA1c (glycated haemoglobin—an indicator of blood glucose) and knowledge about diabetes (Hawthorne *et al.*, 2010). Culturally adapted health education

interventions showed short-term improvements in blood glucose and knowledge compared with usual health education. Adaptation generally seems to succeed, though there are exceptions. Whilst the approach to adaptation is increasingly discussed, we are aware of few detailed accounts of how this is accomplished in practice. One good example is that of the US Lawrence Latino Diabetes Prevention Project (Ockene *et al.*, 2012). Similarly, recent work (Netto *et al.*, 2010) extracted five principles for adaptation from their systematic review but details of how to apply the principles in practice were not established. Such detail is important both for interventions in multicultural societies specifically, and the interpretation of evidence from trials of complex interventions more generally (Craig *et al.*, 2008; Glasziou *et al.*, 2008).

Minority ethnic communities are under-represented in trials (Hussain-Gambles, 2003). One reason for under-representation reported by researchers is the extra cost in arranging translators and interpreters and adapting questionnaires and recruitment approaches (Sheikh *et al.*, 2009). In the USA, nevertheless, NIH funded clinical trials must include ethnic minorities (Hohmann and Parron, 1996).

The Medical Research Council (MRC) complex interventions framework requests investigators to describe in detail the development of the intervention (Craig *et al.*, 2008). The present paper aims to augment scarce published work, especially from Europe.

Culture, eating, obesity and physical activity: brief background

Culture strongly influences attitudes and behaviours towards diet and physical activity, and lifestyle counselling is a greater challenge when there are cultural differences and a lack of shared language skills between patient and service provider (Sucher and Kittler, 1991). A review of the dietary habits of minority ethnic groups in Europe (Gilbert and Khokhar, 2008) concluded that most migrants alter their eating habits following migration, including the adoption of some unhealthy elements of the 'western' diet. Obesity has been identified as a risk factor in a wide range of diseases and illnesses, especially diabetes (Swanton, 2008) and South Asians are exquisitely sensitive to adverse metabolic consequences of adiposity

(Nyamdorj *et al.*, 2010). Physical activity has a major influence on obesity and diabetes (Butland *et al.*, 2007). Studies of UK South Asian populations have shown markedly lower levels of physical activity compared with the White population (Fischbacher *et al.*, 2004; Williams *et al.*, 2011).

Introduction to prevention of diabetes and obesity in South Asians in relation to the Finnish Diabetes Prevention Study

Prevention of diabetes and obesity in South Asians (PODOSA) was modelled on the Finnish Diabetes Prevention Study (FDPS), which is summarized in online Supplementary data, Appendix Box S1 (Tuomilehto *et al.*, 2001). We judged the study design and procedures of FDPS could not be directly applied to the South Asian population in Scotland and adaptation was needed. Table 1 summarizes the resultant main adaptations. The key changes, including the home setting of the intervention and use of dietitians rather than clinic staff, are discussed in detail in methods.

PODOSA is a family orientated, 3-year, life-style intervention trial aiming to reduce weight (2.5 kg or more) and increase physical activity (30 min/day or more) to, in the long-term, reduce the incidence of diabetes in people of Indian and Pakistani origin at high risk, as indicated by impaired glucose tolerance (IGT) or impaired fasting glucose (IFG), of developing type 2 diabetes (WHO, 1999). Participants reside either in Glasgow or Edinburgh, Scotland.

MRC funded trials must register with an international trials register complying with international guidelines from the WHO, ICMJE and CONSORT. Current Controlled Trials (CCT) Ltd administers the ISRCTN register. PODOSA's reference number is ISRCTN25729565 and some further general details about the trial are published on CCT's website (<http://www.controlled-trials.com/mrct/trial/2282879/podosa>; date accessed 18 March 2013).

The investigators and trial staff are supported by a Trial Steering Committee and a Data Monitoring Committee, and together comprise a mix of Indian, Pakistani and White British origin people and so possess relevant insights on the languages, religions, customs and lifestyles of trial participants.

The study was planned between 2004 and 2006 and, following funding in 2006, recruitment of participants commenced in July 2007 finishing in October 2009. (We have published on recruitment issues (Douglas *et al.*, 2011)). The intervention lasts for 3 years. The intervention for the last person recruited into the study will end in October 2012, and we will report the outcomes sometime in 2013. A total of 171 eligible participants from 156 families participated and fulfilled the study criteria (a), i.e. age ≥ 35 , (b) IFG and/or IGT, (c) waist measurement of ≥ 90 cm for men, ≥ 80 cm for women and (d) the participation of the main household cook. One hundred and twenty-four adult family volunteers supported these participants. The trial includes 50 families of Indian origin (31 Sikh, 14 Hindu, 2 Muslim, 2 Christian, 1 no reported religion) and 106 of Pakistani origin (104 Muslim, 2 Sikh). Thirteen families have more than one person with IGT/IFG. The families were randomly allocated to either 15 or 4 dietetic contacts over 3 years, the former being the intervention group, the latter the control.

The intervention materials used were obtained from sources including the Counterweight Programme (Gibbs *et al.*, 2004) and adapted as discussed in this paper. PODOSA emphasizes verbal discourse to increase acceptability of the messages of the intervention among South Asians. The dietitians' toolkit used in PODOSA contains tailored resources on diet and physical activity (see below).

The scope of this paper

This paper shows how we took an effective intervention (FDPS) (Tuomilehto *et al.*, 2001), developed and tested in a largely White Northern European population, and adapted it for a UK South Asian population. We have published on recruitment (Douglas *et al.*, 2011) and have not emphasized here adaptations relating to recruitment and other matters beyond the interventions. Our adaptations of interventions were pragmatic and based on the experiences of our investigators, collaborators and trial staff. Explicit theoretical guidance (Netto *et al.*, 2010; Barrera *et al.*, 2012; Harrington and Noar, 2012; Liu *et al.* 2012) was not published when PODOSA was developed in 2005/2006. In the discussion, we relate our work to recent guidance.

Table 1: Summary of cultural adaptations of Finnish DPS in PODOSA

Variable	DPS	PODOSA	Reasons for adaptation
Participants	First degree relatives of people living with type 2 diabetes	Not restricted to first degree relatives. Open to people of Pakistani and Indian origin. Main cook agreed to co-operate. Family volunteers	To recruit South Asians with high incidence of diabetes Encourage support from family members Encourage healthier lifestyles in the entire family
Setting	Clinic	Home setting	To encourage family involvement, appointment keeping and retention
Number of contacts and interventions	Four contacts with controls giving information about diet and exercise at baseline and annual visits Fifteen contacts with intervention group	Same as FDPS	Same approach
OGTT screening	Nurses	Dietitian	Encourage rapport with one professional throughout the trial
Age criteria	40–64	35 and over	South Asians are at risk at a younger age than White Europeans
Body mass index (BMI) criteria	>25 kg/m ²	Not measured at screening	Potential recruits may be centrally obese but have a low BMI
Waist criteria	Not measured at screening	≥80 cm for women ≥90 cm for men	To acknowledge important role of central adiposity
OGTT (WHO criteria)	IGT subjects only	IFG/IGT or both	Both associated with morbidity. IFG added due to lower than expected number of participants with IGT
Weight loss goals	≥5%	2.5 kg more in the intervention than control group.	Realistic for South Asians and still relevant to diabetes prevention
Physical activity	Moderate intensity ≥30 min/day	Moderate intensity ≥ 30 min/day	Most relevant, achievable recommendations, with encouragement of self-chosen outdoor or gym activity
Dietary intervention	Supervised physical activity training sessions and individually tailored circuit type resistance training Consultation with nutritionist Dietary fat ≤30% total energy	Emphasis on walking Consultation with registered dietitians in language of choice	Bilingual dietary counselling available Engage the available family in a domestic setting especially those who prepare the family meal
Dietary targets	Saturated fat ≤10% total energy reduction Fibre ≥15 g/1000 kcals VLCD considered for 2–3 weeks	Not specific in nutrients. Focus on cooking methods, portion size, food choices, amount of fat used in cooking and encouraging foods high in dietary fibre	This approach was considered more achievable

VLCD, very low-calorie diets.

METHODS OF ADAPTATION OF THE LIFESTYLE INTERVENTION

Identified needs in relation to adaptation

The identified needs of the trial, with relevance to adaptation, are described below.

- (i) Four registered dietitians who were aware of the relevant food and physical activity practices of South Asians were needed and recruited. One of the dietitians (A.H.) who worked for 2 years did not speak South Asian languages, so she dealt mostly with families who preferred English. The others were able to, collectively, speak English, Punjabi, Urdu and Hindi and knew about Sikhism, Islam and Hinduism. Staff training included a session on principles for achieving cross-cultural validity of self-report data (Hunt and Bhopal, 2003).
- (ii) Questionnaires for data collection of demographic, socio-economic, medical, personal, family history, diet and physical activity-related information (Table 2).
- (iii) The dietitians' toolkit (online Supplementary data, Appendix Table S1) with adapted and translated health promotion resources in English, Urdu, Hindi and Gurmukhi (written Punjabi).

The process involved reviewing, choosing and adapting existing resources such as the International Physical Activity Questionnaire (Craig *et al.*, 2003), eating habits questionnaire (Lean *et al.*, 2003) and relevant questions from the Health Survey England (Becker *et al.*, 2006). PODOSA seldom developed new materials, an exception being the dietitians' record booklet which collected information needed to deliver the intervention, including the stages of behaviour change model (Prochaska and DiClemente, 1992) for diet and physical activity.

Process of adapting materials

Table 2 shows the resources developed categorized as data collection, education and general communications and summarizes the approaches to adaptation. The key adapted outputs are summarized in the Box. We illustrate some of the main points below.

- Development of a short International Physical Activity Questionnaire (IPAQ) phonetically translated from English into Urdu, Hindi and Punjabi.
- PAR-Q in English, Urdu, Punjabi and Hindi.
- Dietitians' record booklet to collect information on stages of change for physical activity and diet.
- Counterweight leaflets in English, Urdu and Gurmukhi (written Punjabi).
- Physical activity poster in English.
- Eating Habits Questionnaire in English, Urdu, Gurmukhi and Hindi.
- Food diaries (with visual cultural foods and portion size estimates) in English, Urdu and Gurmukhi.

Data collection materials

The key data collection forms were translated and examined for face validity by a panel of four PODOSA members and four lay community members, fluent in everyday spoken English, Hindi, Urdu and Punjabi. The panel discussed the cross-linguistic and cross-cultural face validity of the materials (Hunt and Bhopal, 2003).

The draft materials were then tested with volunteers. Corrections were made to words or sentences that were not translated or adapted well; mostly due to variations in spoken Urdu, Hindi and Punjabi. (Hindi translations were limited to phonetic translations of key words/phrases because most Hindi speakers in our cities are proficient in English.) This process aimed to elicit the same response in all four languages.

The Physical Activity Readiness Questionnaire (PAR-Q) was translated phonetically, i.e. the words were written in English script. For example, for the question 'Do you feel pain in your chest when you do physical activity?', the Punjabi translation was 'Jad tusi physical activity kardey ho tan kadi tuhadey seenay vich dard hoonda hai?'

Educational materials

The Counterweight food diaries were, first, culturally adapted and then translated into Gurmukhi and Urdu (Gibbs *et al.*, 2004). Traditional dishes prepared at home were photographed in small, medium and large portions to guide participants in reporting their dietary intake. The food diary modifications included the replacement of foods

Table 2: Adaptation and development of resources for data collection, education and general communications

Resource/material	Description	Cross-cultural adaptation or translation	Reflections on cultural adaptation/modification
Research data collection instruments			
Consent forms		Translated into Urdu and Gurumukhi	The dietitian read out the consent form before obtaining the signed consent
Case record forms	Some questions adopted from HSE 2004 which focused on ethnic minority groups	Phonetic translations in Hindi, Urdu and Punjabi	Simple terminology was used
Food habits questionnaire	Consumption of foods from food groups and limited food frequency questionnaire	Adapted from several instruments. Phonetically translated into Hindi, Urdu and Punjabi	Appropriate questions were added on South Asian foods, e.g. chapatti, ghee
Short IPAQ	Physical activity in the previous 7 days.	Phonetic translations in Hindi, Urdu and Punjabi	Face validity was apparently achieved
PAR-Q	Seven-question screening tool before planning an exercise programme	Phonetically translated in Hindi, Urdu and Punjabi	As above
Trans theoretical model of stages of change (Prochaska and DiClemente, 1992)	Exercise and eating behaviour questions	Phonetically translated into Hindi, Urdu and Punjabi	The questions had face validity and worked in the field
Dietitian Record Booklet	Diet/social history with diet/physical activity behaviour, goals achieved, barriers identified and targets agreed	English for dietitians' records	
Educational and other information materials			
Physical activity poster	Pictorial and written examples of physical activity	Modified from pyramid to circular layout with more familiar examples of physical activities and emphasis on cutting down sitting more than 30 min at a time	Pictorial images of yoga, Bollywood dancing and people in South Asian clothes etc. made it more engaging
South Asian Balance of Good Health Poster	Pictorial and written description of food groups	Existing resource made available in Hindi, Urdu and Gurumukhi	Images as well as translation in everyday South Asian languages was successful
Counterweight leaflets	11 leaflets on eating and physical activity	Adapted by swapping some 'Western foods' with traditional South Asian dishes. Translated by official translation service into Urdu and Gurmukhi	We did not get many people reading these leaflets. The translation was done by professional translators. The main drawback was literal translation that many people did not understand
Counterweight food diary	3 day food diary with instructions	Modified with pictures of South Asian foods and portion size. Translated into Urdu, and Gurumukhi by PODOSA dietitians	The food diary received good feedback
IGT and IFG leaflets	Explains the terminology with brief lifestyle advice	Drafted and adapted by the dietitians. Translated into Urdu and Gurmukhi	Helpful in discussing the diagnosis and treating the condition seriously
PODOSA posters/flyers	Information for raising awareness and recruitment including entry criteria	Translated into Urdu, Gurmukhi	

PODOSA patient information leaflets	Information on diabetes, IGT/IFG and the trial	Changed from literal to spoken language, e.g. diabetes also called sugar disease. Translated into Urdu, Gurmukhi	Not all participants read the leaflet
Group information and newsletters	Information to raise awareness of the trial and encourage recruitment	Talks delivered in places of worship, community organizations in Hindi, Urdu, Punjabi and English	These talks were successful, raising much interest
Newsletters for the study participants, community organizations and healthcare professionals	Annual news and thanks to participants for their continued support	As translation was not done, we ensured that user-friendly English was used	Many families read this with interest and felt engaged with the study

like minced beef lasagne by traditional combinations such as chapati with lamb and spinach. Other adaptations included deletion of foods taboo to Muslims like pork and ham.

Verbal and written communications

PODOSA emphasized face-to-face communication, which, according to dietitians' judgements, was good for delivering interventions. Newsletters, in English, were used to update professionals and participants.

The dietitians' toolkit

The dietitians' toolkit is summarized in online Supplementary data, Appendix Table S1, and the main adaptations are described above and indicated in the tables. (The toolkit will be available on the trial website before 31 March 2013 for open access downloading <http://www.podosa.org/index.html>; website accessed 29 January 2013.) The South Asian Balance of Good Health poster, with images of home-cooked dishes ([Nutrition and Diet Resources Initiative \(NDR\), 2004](#)), was the main diet education resource. For PODOSA the 'wheel of fitness' with pictorial and written English language information was developed to promote physical activity. The Counterweight resources helped promote change in eating habits, activity levels, sedentary behaviours and related thinking processes ([Gibbs et al., 2004](#)). Pedometers were given to the intervention group (and some family volunteers) with pedometer log sheets. Other resources included a South Asian recipe book ([British Heart Foundation, 2008](#)) and a Bollywood style drama DVD on the prevention of diabetes ([South Asian Health Foundation and Pink Sequins Productions, 2009](#)). Intervention group families were invited to annual group sessions consisting of a food shopping tour, understanding food labels, exchange of recipes, food tasting and brisk walking. All families received small, annual gifts such as a South Asian Balance of Good Health food placemat ([Nutrition and Diet Resources Initiative \(NDR\), 2004](#)).

Role of the trial dietitians: comparison with Finnish DPS

The most important changes to the FDPS model were delivery of the intervention in homes and more reliance on dietitians (Table 1). In the

Finnish trial, the intervention team consisted of a physician, study nurse, nutritionist and exercise instructor or physiotherapist but in PODOSA only dietitians were in direct contact with participants. The dietitians were trained in venepuncture procedures, anthropometric measurements, blood pressure monitoring, the Chester Step Test and motivational skills training in behaviour change for physical activity and diet. We chose dietitians because we knew changing eating behaviour (arguably, the critical issue for diabetes control) is challenging in South Asians as food is the focus of good living and social etiquette (Bush *et al.*, 1998). For this reason, the cooperation of the household's main cook was required. Dietitians modified several traditional high-calorie dishes to meet nutritional recommendations while retaining their original appearance, flavour and textures (more details on such practical actions are in PODOSA toolkit.)

Home visits were flexible, including on weekends, and avoiding Muslim or Hindu fasting periods. With home visits we anticipated easier recruitment and retention, and greater potential to involve families. Participants were also seen, at their preference, in NHS premises, and in voluntary organizations and workplaces. Visits by the same dietitian fostered a trusting relationship with recruits and their families. The strength of this relationship is partly reflected in the 97.7% retention rate of our participants at the end of the trial.

Non-staff costs of adaptation

Our non-core-staff costs were modest, e.g. the cost for professional translations of the Counterweight resources, trial information sheets, consent forms and running the multilingual panel (excluding PODOSA staff time) was approximately £8000.

DISCUSSION

Overview

Developing lifestyle interventions is complex, expensive and slow (Craig *et al.*, 2008). Ideally specific interventions would be available for subgroups of the population, including minority ethnic groups, but this is unlikely to be achieved (Barrera *et al.*, 2012). Adaptation of interventions provides a pragmatic approach to serving ethnic

minority populations in multicultural societies where interventions are usually created for a general population, which, in practice, means the numerically dominant population (Netto *et al.*, 2010; Liu *et al.*, 2012). The cross-cultural adaptation of material from another language is, however, a challenging and time-consuming process and not merely straightforward linguistic translation (Guillemin *et al.*, 1993; Hunt and Bhopal, 2003).

The FDPS served as a design template for PODOSA. PODOSA originally aimed to recruit about the same number of participants (600) as FDPS but this was not achieved (Douglas *et al.*, 2011). FDPS encouraged relations to attend clinics with the study participant. In PODOSA, recognizing the centrality of family relationships to South Asians' health-related behaviours, we proactively involved family of participants, especially the main cook, and sent dietitians to the homes. Dietitians' involvement in nutrition and lifestyle interventions trials has been highlighted (Delahanty, 2010) and was central in PODOSA.

Contextualizing the work in relation to the research literature

Through international migration, modern urban societies are increasingly characterized by the diversity of their populations in ethnic group, language, religion and other related cultural characteristics (Bhopal, 2007; Liu *et al.*, 2012). This trend is accelerating globally, notwithstanding efforts to slow migration in some countries. While the offspring of migrants are likely to have a lesser need for cultural adaptation, given the intergenerational transmission of health beliefs, attitudes, taboos and behaviour, there is still some need, as we see with African-American populations in the USA (Bender and Clark, 2012). The challenges (Netto *et al.*, 2010) and excitement of health promotion and other public health endeavours in multi-ethnic societies have been long recognized (Bhopal and White, 1993). Unfortunately, with the main exception of US ethnic minority populations (particularly African-Americans) and some topics such as AIDS (Barrera *et al.*, 2012), the research effort has been modest and in some multi-ethnic countries and some populations within such countries, non-existent (Liu *et al.*, 2012). Recruitment of ethnic minority populations into trials remains difficult, at least in Europe (Hussain-Gambles, 2003; Douglas *et al.*, 2011).

The principles of adapting trial methods to optimize them for either multi-ethnic or specific ethnic groups have only recently been established and still hold numerous challenges, not least knowing the cost-effectiveness of adapted and non-adapted interventions (Netto *et al.*, 2010; Barrera *et al.*, 2012; Liu *et al.*, 2012).

A body of practice, nonetheless, is available in a disparate scientific literature (Liu *et al.*, 2012) and much of it seems common sense. When this study was designed (2004/2005) and the implementation started (2006/2007) PODOSA used general knowledge of the literature and prior practical experience (Bhopal and White, 1993). Subsequent to this some PODOSA investigators (Bhopal, Sheikh), amongst others (Bender and Clark, 2012), have helped synthesize published accounts of individual projects to establish a stronger theoretical and evaluation-based foundation for adaptation. Netto *et al.* (Netto *et al.*, 2010), for example, extracted five principles. Subsequently, Liu *et al.* (Liu *et al.*, 2012) developed further principles and tools to aid the adaptation process, including a 46 item typology. While there is virtual consensus that adapting health promotion interventions is effective, empirical evidence for this is sparse. Head-to-head trials of adapted and generic interventions, difficult as they are, are required to establish cost-effectiveness (Barrera *et al.*, 2012; Liu *et al.*, 2012). PODOSA will not show whether our specific, cultural adaptations were helpful or not—this will remain a judgement. However, both our (Netto *et al.*, 2010; Liu *et al.* 2012) and others' reviews (Barrera *et al.*, 2012; Bender and Clark, 2012) suggest such adaptations improve outcomes.

In reviews focused around behaviours relating to non-communicable chronic diseases, we found few practical, detailed accounts of how a trial was adapted for a specific ethnic group, particularly from Europe (Netto *et al.*, 2010; Liu *et al.*, 2012). A recent excellent example from the USA was the account of the Laurence Latino diabetes prevention project (Ockene *et al.*, 2012). There is a need for researchers and health promotion practitioners to share such experiences particularly as information from a few studies is unlikely to suffice internationally. Presently, in this field the cross-flow of knowledge is largely from the USA to other countries, a situation that needs remediation so insights are international.

Insights gained from PODOSA

The process of adaptation is complex but interesting. It touches on every aspect of the trial, from design to the exit of participants. In PODOSA, we emphasized adaptation of the design and the materials as reflected in this paper. Future investigators might include wider perspectives, e.g. adaptation of laws, policies, healthcare systems and clinical measures.

Time and resource constraints, and the pressing trial timetable, prevented us undertaking more comprehensive pilot studies of our adaptations. To enhance face validity of English materials and questionnaires, a multilingual panel rephrased the wording using the local spoken language of Indians and Pakistanis in Scotland. This process was introduced to us by Hunt and Bhopal (Hunt and Bhopal, 2003), and we tried it for the first time in PODOSA. Materials that went through the panel were judged by the dietitians to be better than those only professionally translated.

PODOSA found verbal information more powerful than written material, particularly, but not only, for those people with limited literacy. Some participants who indicated English as their preferred language, in practice, preferred discussion in their mother-tongue language and the simultaneous use of two or even more languages was common. Generally, South Asians were not keen on written work though there were exceptions. Some PODOSA materials were probably too wordy. Verbal instructions followed by bullet point reminders, and imagery illustrating messages, may be more feasible than attempting difficult translations and adaptations of large amounts of material. These observations require further testing and research.

When the trial reports (predicted 2013), we will know whether benefits can be attributed to our culturally adapted intervention but not whether it worked better than a non-adapted intervention because we, in common with most investigators, did not have such a comparison. Head-to-head comparisons of adapted and non-adapted interventions are needed to answer such questions and these are difficult and rare (Barrera *et al.*, 2012; Liu *et al.*, 2012).

CONCLUSIONS

The field of tailored and culturally adapted interventions for individuals and groups has

been growing rapidly (Barrera *et al.*, 2012; Harrington and Noar, 2012). Systematic reviews, evidence syntheses, typologies of actions, reporting guidelines and scoring systems have recently been published, though all too late for PODOSA to benefit directly. Such overviews can, potentially, benefit from case studies and vice versa. This is a rare example from Europe describing in detail how a lifestyle intervention was culturally modified. Our processes, methods and adapted materials may be of value to others who are developing similar trials or services, particularly if they are seeking to replicate or extend/adapt our work in different settings. We have already reported on PODOSA's recruitment challenges, and in this paper we have outlined and discussed the many challenges of intervention adaptation. The broader challenges of the trial are outside the scope of this article, but will be considered as we report the trial data in due course. Our case study illustrates many, but unsurprisingly not all, of the recently published recommendations for reporting and good practice in tailored and or adapted interventions (Netto *et al.*, 2010; Barrera *et al.*, 2012; Bender and Clark, 2012; Liu *et al.*, 2012).

SUPPLEMENTARY DATA

Supplementary data are available at *HEAPRO* Online.

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