A systematic review of interventions to increase physical activity among South Asian adults

Horne, M.; Tierney, S.; Henderson, S.; Wearden, A.; Skelton, D.A.

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Table 2: Cultural adaptations and design theory of the included studies

Paper	Cultural adaptations	Design theory
Andersen et al. (2012) [36]	Used representatives from the Pakistani community to plan and develop the intervention	Participatory/collaborative approach Based on social cognitive theory and targeting self-efficacy, social environment and outcome expectancies Constructs specifically to promote PA self-efficacy, social support for PA and outcome expectancies, were measured by psychosocial scales
Andersen et al. (2013) [37]	As above	Participatory/collaborative approach Based on social cognitive theory and targeting environment, behavioural capability, self-control, self-efficacy, expectations and expectancies
Bhopal et al. (2014) [38]	Reported using culturally adapted and translated resources, including the Counterweight Programme, but did not outline how and/or what cultural adaptations were made. This was identified in another publication [62]. Adaptions related to PA were the translation of materials into Gurmukhi and Urdu Utilised family involvement and support of the family cook as mandatory to enrolment into the trial (families, not individuals were randomised)	**Trans Theoretical Model (TTM)**
Islam et al. (2013) [39]	Culturally and linguistically tailored group education sessions/programme Used trained Community Health Workers (CHWs), who were community leaders in the targeted study area, to deliver the intervention All group education sessions were held in clinical and community settings All group education sessions were separated by gender and conducted in Bengali	Based on the principles of community-based participatory research to improve diabetes management, where increasing PA was one component Community stakeholders involved throughout the development, design and implementation of the intervention

	Intervention delivered by two trained, bilingual Bangladeshi CHWs who were community leaders – one male and one female One-to-one visits were conducted in locations convenient to participants – home, community locations, restaurants and clinics	
Islam et al. (2014) [40]	Culturally and linguistically tailored group education sessions/programme All curriculum materials were developed in English, translated into Punjabi, and reviewed for accuracy by bilingual study staff Intervention led by three trained, bilingual Sikh Asian Indian CHWs and a bilingual, South Asian Indian CHW supervisor at the Community-based Organisation, who were active community leaders in the targeted study area, to deliver the intervention Group activities, physical exercise, culturally-appropriate images and language, and adult learning techniques were incorporated into all educational sessions **Educational sessions were held in a convenient community setting** Educational sessions were held during the weekend and early afternoon to accommodate participant schedules, particularly women who had childcare obligations	Based on the principles of community-based participatory research to develop action-orientated solutions to improve diabetes management, where increasing PA was one component Community stakeholders tailored existing curricula and developed evaluation tools for use in the Sikh community; emphasis placed on cultural relevancy of concepts and examples and linguistic concordance of the intervention Community stakeholders involved in the study design facilitating adaptation of the Diabetes Prevention Programme
Jayasuriya et al (2015) [41]	The PA intervention targeted increasing culturally appropriate exercise during household work (for women)	Self-management intervention based on components of behavioural theory – specifically goal setting (active collaborative approach) and motivational interviewing (goal orientated, client-centred counselling approach)

		Motivational Interviewing
Kandula et al. (2015) [42]	Study partners and SA community advisory board reviewed study materials and questionnaires to ensure cultural equivalence Used a culturally tailored group lifestyle intervention programme Used SA's explanatory models into prevention messages Matching intervention materials and messages to take into account of language, dress Community based facility utilised for the intervention Group classes were based on language preference Group based activity for social support Use of *Melas* (festive gatherings) to incorporate culturally-salient activities to reinforce healthy behaviours, increase group cohesion and support – activity included yoga, aerobic exercise built on SA folk dance	Community-based participatory research (CBPR) framework Survey to assess health needs Intervention based on the constructs from the theory of planned behaviour and social cognitive theory Integrated evidence-based behaviour change strategies with SA's sociocultural context and beliefs Intervention developed using evidence based behavioural strategies and included: • Social support and role modelling - group exercise classes • experiential activities • behaviour change counselling • goal setting techniques • information on how to self-monitor daily steps and how top gradually increase activity • telephone support/counselling used a motivational interviewing framework
Kandula et al. (2016) [43]	Culturally specific strategies included: • Women-only exercise classes • Exercise classes for children • Use of community partnerships • Classes held at a convenient location in the community • Sensitivity to cultural values - i.e. modesty and gender roles • Classes advertised as fitness and exercise and not as dance classes • Music during classes had no inappropriate	Integrated evidence-based behavioural strategies and community-based participatory research principles, using community partners, to develop the exercise intervention Exercise intervention also developed using evidence based behavioural strategies and included: • Social support and role modelling - group exercise classes • Self-monitoring – with Fitbit™ wireless activity tracker • Goal setting for physical activity outside the class • Feedback and reinforcement – provided by study staff using reports generated from Fitbit™ data

	content • Use of bilingual, culturally concordant study staff	Used a discontinuous protocol (Gillett et al 1996) - where participants could rest as needed during class and rejoin the class once ready
Lesser et al (2016) [44]	Female SA personal trainer at a local fitness centre used for the Standard Exercise group Bhangra dance was used as one of the intervention arms led by a female SA personal trainer at a local fitness centre	
Patel et al. (2017) [45]	Culturally tailored an evidence based modified US Diabetes Prevention Program (DPP), the National Diabetes Education Program's (NDEP) Power to Prevent (P2P) No details provided as to how the programme and materials were culturally tailored for Asian Indians to address language and culture Intervention led and facilitated by a bilingual healthcare professional (session leader Gujarati American) Session leader orally translated information to personalise the intervention with examples of Gujarati colloquialisms, customs and traditions Specific barriers to adopting healthy behaviours were addressed by the Gujarati American facilitator through inspirational cultural messaging and visuals	Community-based approach Facilitator led 20 minutes of group PA time during 8 of the 12 sessions as a form of reinforcement Experiential methods e.g. exercise demonstration, were used to engage participants Text messaging and email communication to attend sessions as reminders Pedometers provided to increase motivation and reinforcement
Pfammatter et al. (2016) [46]	Text messages form the mDiabetes program were culturally tailored to be more acceptable and actionable by the population through feedback from Indian consumers Texta were available in one of 12 languages based on participant preference.	Text messages for the mDiabetes program were developed by Emory University and reviewed by a Behaviour Change Task Force – no further detail provided on behaviour change strategies
Ramachandran et al (2013) [47]	No specific cultural adaptations to the intervention were reported	Personalised education and motivation about healthy lifestyle principles, and written information about physical activity

		Individually tailored mobile phone messaging content based on the TTM – messages contained fewer than 160 characters; 60–80 messages were created for each TTM stage and sent cyclically, so participants would not be likely to receive the same message in a 6-month period (on the basis of them receiving two to four messages per week)
Shahid et al (2015) [48]	No specific cultural adaptations to the intervention were reported	
Shetty et al (2011) [49]	No specific cultural adaptations to the intervention were reported	
Subitha et al. (2013) [50]	**Pamphlets and banners were prepared in the local Language to create health awareness** However, used link workers **(people who provide person centred support and act as a bridge to services in the wider community)** and self-help groups (SHGs) to deliver the PA programme, as well as a source of motivation to maintain PA Actively resourced people in rural villages, such as village leaders, youth clubs, SHGs, teachers and health workers of the primary health centre to motivate the study population	Community-based participatory approach underpinned by social marketing principles – specific behaviour change goal, consumer research, audience segmentation, marketing mic/channels of communication, service and incentive to the participants and reducing sedentary behaviour
Vahabi & Damba (2015) [51]	A culture and gender specific physical activity - *Bollywood Dance* exercise program, developed and led by a female SA instructor	Community-based approach at delivery level