# MINDFULNESS-BASED INTERVENTIONS FOR DIABETES TREATMENT AND PREVENTION IN SOUTH ASIAN YOUNG ADULTS

By

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# Abstract

This thesis addressed gaps in the literature regarding the effects of Mindfulness-based interventions (MBIs) for Type 2 diabetes (T2D) and sought to investigate the acceptability and feasibility of an MBI for a group at high risk for T2D, South Asians. A mixed-methods approach was utilised to produce four studies: 1) a systematic review evaluating the psychological and physiological effects of MBIs applied to T2D; 2) a modelling phase to gauge interest in, and cultural considerations for, a modified MBI for young adult South Asians as a diabetes prevention strategy; 3) an examination of the acceptability and feasibility of a modified MBI; and 4) a comparison of the perceived and objective effects of the modified MBI. The review found evidence for psychological benefits and mixed results for physiological effects. The modelling phase indicated that Mindfulness is acceptable to young South Asians pending minor adaptations. The subsequent feasibility study found the modified MBI to be acceptable and feasible, warranting a future full-scale trial. Across these studies, Mindfulness bore psychological benefits, and to a lesser degree physiological and behavioural benefits. The final study's triangulation approach (using quantitative and qualitative methods) suggests the intervention has a potential positive impact on stress, anxiety, energy levels, emotional wellbeing, and systolic blood pressure in this sample.

*I wish to dedicate this thesis to my parents, Nasibe and Fazila Noordali.*

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**Researcher contributions**

Farhan Noordali had the leading and substantial role as the doctoral researcher and author of this thesis in addition to being lead researcher for all studies within. Professor Janice L. Thompson was another key contributor to this thesis, acting as primary supervisor. Dr Jennifer Cumming also provided key contributions in her role as secondary supervisor. Ms Shelly Arkless contributed to this research by assisting with the design and adaptation of the culminating feasibility study programme as well as acting as programme deliverer.

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**Declaration of conflicts of interest**

The Authors declares that there is no conflict of interest.

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# Abbreviations

| | |
|---|---|
| AIDS | Acquired Immune Deficiency Syndrome |
| ANOVA | Analysis of Variance |
| APA | American Psychiatric Association |
| BMI | Body Mass Index |
| BP | Blood Pressure |
| CBT | Cognitive Behaviour Therapy |
| COMET | the Core Outcome Measures in Effectiveness Trials |
| CEB | Community Energy Balance |
| CG | Control Group |
| CRP | C-reactive protein |
| DASS21 | Depression Anxiety Stress Scale |
| FG | Focus Group |
| FN | Farhan Noordali |
| $HbA_{1c}$ | Glycated Haemoglobin A1c |
| HEIDIS | Heidelberger Diabetes and Stress |
| HIV | Human Immunodeficiency Virus |
| JBI | Joanna Briggs Institute |
| JLT | Janice Lee Thompson |
| MeSH | Medical Subject Headings |
| METs | Metabolic Equivalents |
| MBCT | Mindfulness-Based Cognitive Therapy |
| MB-EAT | Mindful eating |
| MBI | Mindfulness-Based Intervention |
| MBSR | Mindfulness-Based Stress Reduction |
| MG | Mindfulness Group |
| MVPA | Moderate-To-Vigorous Physical Activity |
| NHS | National Health Service |
| PA | Physical Activity |
| POMS | Profiles of Mood Scale |
| RCT | Randomised Control Trial |
| SF-36v2 | Short Form 36 Version 2 |

| | |
|---|---|
| SCT | Social Cognitive Theory |
| SDT | Self-determination theory |
| SES | Socio-economic status |
| SPSS | Statistical Analysis Software Package |
| ST | Sedentary Time |
| T2D | Type 2 Diabetes |
| TPB | Theory of Planned Behaviour |
| TTM | Trans-Theoretical Model |
| UK | United Kingdom |
| UKDDQ | UK Diabetes and Diet Questionnaire |
| USA | United States of America |
| WHO | World Health Organisation |

# Chapter 1:
# General Introduction and Literature Review

# Chapter 1: General Introduction and Literature Review

## Background

### An introduction to diabetes

With the industrialisation and urbanisation of the Western world arose contemporary health issues such as obesity and Type 2 diabetes. Although there are three main forms of diabetes (Type 1, Type 2, and gestational), the present research will focus on Type 2 diabetes. Thus, the term 'diabetes' used throughout this thesis refers to Type 2 diabetes. Similarly, though some forms of obesity result from rare genetic conditions, the form of obesity that is the focus of the present research is non-syndromic obesity.

Diabetes is a metabolic condition where glucose remains in the bloodstream, as it cannot enter body cells to be utilised as an energy source (Bilous & Donnelly, 2010). In healthy individuals, the hormone insulin facilitates uptake of glucose by the cells. Diabetes arises when regular ranges of insulin produced are ineffective in ensuring normal cellular glucose uptake (known as insulin resistance). Eventually, pancreatic fatigue will follow and exogenous insulin will be required (*see Figure 1*).

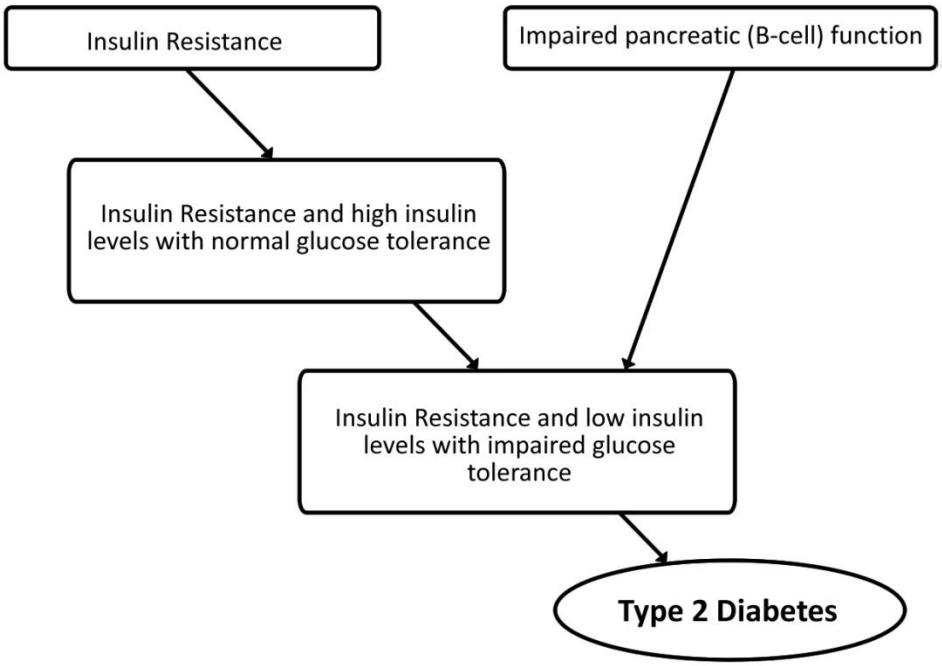


*Figure 1: The progressive trajectory of Type 2 diabetes. Adapted from Saltiel and Olefsky (1996)*

In such hyperglycaemic states, health complications develop: cells become starved of energy and damage can occur to the heart, kidneys, eyes or nerves. Amongst the undiagnosed, symptoms can be hard to notice as the condition gradually develops. In undiagnosed diabetes, symptoms may include: fatigue; urinating frequently; excessive appetite and thirst; blurry vision; and tingling, and pain or numbness in the hands and feet (Clark, Fox, & Grandy, 2007). The most common method of assessing one's glycaemic control involves using a blood sample to determine the percentage of glycated haemoglobin ($HbA_{1c}$). $HbA_{1c}$ is formed when glucose reacts with haemoglobin in red blood cells. Red blood cells survive for approximately 3 months, therefore $HbA_{1c}$ represents average blood glucose levels over that time span and give a more useful longer-term glycaemic history than alternative methods (such as fasting blood glucose). Generally, $HbA_{1c}$ values under 6.5% are recommended (*Table 1*) (DeFronzo, Ferrannini, Keen, & Zimmet, 2004).

*Table 1: Ranges of $HbA_{1c}$, adapted from Diabetes UK (2017)*

| | Healthy | Pre-diabetes | Diabetes |
|---|---|---|---|
| **$HbA_{1c}$ range (%)** | 4.0-5.6 | 5.7–6.4 | > 6.5 |
| **Mmol/mol (%)** | 20-38 | 39-46 | > 48 |

Diabetes is often co-morbid with obesity. It is reported that approximately 85% of the risk for developing diabetes is accounted for by obesity (Diabetes UK, 2016). Obesity is the condition of having very high body weight due to the accumulation of excess body fat (Ogden, 2007). This occurs when energy intake (through diet) exceeds energy expended (through resting metabolic rate, the thermic effect of food, and all daily activities), perpetually resulting in the body being in positive energy balance. The most common method used to assess population levels of obesity is measuring an individual's Body Mass Index (BMI). This involves dividing one's weight in kilograms by their height in metres squared ($kg/m^2$).

It would normally be assumed that being classified as overweight or obese according to BMI would be a reliable indicator of higher risk for diabetes. However, the matter becomes more complex as South Asians (and some other ethnic groups) tend to develop diabetes at a higher rate and at lower ranges of BMI relative to their White counterparts (Chiu, Austin, Manuel, Shah, & Tu, 2011). Instead, as Hsu et al. (2015) observe, body fat percentage and distribution are more apt indicators. Unfortunately, the most reliable measuring equipment, such imaging machines, for these measures are not economical or used on wide scale hence the continued use of the more pragmatic BMI scales. Research suggests that the body fat distribution differs in South Asians compared to white counterparts as they have greater central adiposity at a comparable BMI score (Chandalia et

al., 2007; Chiu et al., 2011; Hsu et al., 2015; Lear et al., 2007), rendering them more susceptible to developing diabetes. It has even been found that new-born South Asian infants have a higher central adiposity (Modi et al., 2009) than white European babies. Thus, (WHO, 2004) convened to agree upon an adjusted BMI scale to account for people of South Asian descent (*see Table 2*).

*Table 2: International and South Asian-adjusted BMI classifications. Adapted from (WHO, 2004)*

| BMI Classification | International BMI ranges ($kg/m^2$) | South Asian-adjusted BMI ranges ($kg/m^2$) |
|---|---|---|
| **Underweight** | <18·5 | <18.4 |
| **Healthy weight** | 18.5-24.9 | 18.5-22.9 |
| **Overweight** | 25.0–29·9 | 23.0-27.4 |
| **Obese** | >30.0 | >27.5 |

Having obesity puts individuals at increased risk for developing numerous illnesses and health complications: diabetes, coronary heart disease, hypertension, stroke, certain cancers (such as cancer of the breast, ovaries, prostate, colon and rectum) (Calle, Rodriguez, Walker-Thurmond, & Thun, 2003), sleep apnoea and mental health issues amongst others (Ogden, 2007). Peeters et al. (2003) found obesity lowers one's life expectancy by six to seven years. In addition to reducing the length, or quantity of one's life, complications associated with obesity will also reduce the quality of a person's health throughout their lifespan.

In the UK, 3.5 million people have diagnosed diabetes, with a further estimated 1.1 million who are yet to have their diabetes diagnosed (Diabetes UK, 2016). Health inequalities exist for diabetes, with certain ethnic minorities, the elderly and those of lower socioeconomic status (SES) more prone to developing the condition. Diabetes is most common in ethnic minorities: in the UK, it is six times more prevalent in South Asians and

three times more prevalent in African-Caribbeans than in the general population (Diabetes UK, 2016). Obesity and related health issues are increasingly prevalent, particularly in the Western world, though their prevalence is also increasing in developing countries such as India and China (Popkin, 2001). Research from the World Health Organisation (WHO, 2018) suggests, globally, just fewer than 3 million people die annually due to being overweight or obese. In England, approximately 30% of British adults have obesity (NHS Digital, 2017). In the United Kingdom (UK) and other Western countries, obesity is more common among people of lower socio-economic status (SES) (McLaren, 2007).

As aforementioned South Asians have a pronounced risk for developing diabetes. Various studies suggest a biological predisposition for developing diabetes in this population. McKeigue, Shah and Marmot (1991) found South Asians living in Western countries exhibit a type of insulin resistance syndrome. The authors found their higher prevalence in diabetes (compared to a European group) correlated with higher blood pressure, increased plasma triglyceride levels and greater fasting and post-glucose serum insulin concentrations. Supporting evidence shows South Asians with diabetes had higher insulin resistance than white counterparts at comparable BMI levels but also at a younger age (Sharp et al, 1987; Raji, Seely, Arky & Simonson, 2001). This may be attributable to South Asians' earlier decline in β-cell function (which is responsible for insulin storage and release, which in turn regulates blood-glucose levels) (Motala & Omar, 1994; Cnop et al., 2007). It is also possible that this greater insulin resistance may be due to higher levels of visceral fat and central obesity in South Asians, which can affect hormonal balance (Kahn, 2003; Kasuga, 2006; Rush, Freitas & Plank, 2009). As highlighted previously, the pathophysiological effects of increased visceral adiposity in South Asians is why many health organisations now utilise adjusted BMI

categories for South Asians. Biomarkers including C-reactive protein (CRP), leptin, adiponectin and markers of oxidative stress are indicative of mechanisms that may have implications in the higher diabetes prevalence of South Asians. CRP is a marker of inflammation and is associated with insulin resistance syndrome. Research shows that CRP levels can be up to twice the level in South Asians compared to white counterparts, irrespective of adiposity (Forouhi, Sattar & McKeigue, 2001; Chandalia et al., 2003). Leptin and adiponectin are proteins associated with diabetes onset. Elevated leptin and decreased adiponectin are commonplace in those with diabetes. Such irregular levels of these proteins have been found to be more profound in South Asians than white counterparts even when controlling for BMI (Mohan, Deepa, Velmurugan & Premalatha, 2005). Oxidative stress has implications in the development of diabetes. While no studies have investigated oxidative stress in South Asians, research demonstrating an association between oxidative stress and elevated visceral fat suggest it as a realistic concern in this population (Pou et al., 2011).

The detrimental impact of these conditions is farther reaching than an individual's health. The report by Wanless, Appleby, Harrison, and Patel (2007) warned that the current trajectory of obesity incidence could financially destabilise the NHS. Diabetes is also becoming a monetary strain on the NHS: 10% of the NHS budget for England and Wales is spent on diabetes, with this figure expected to rise each year (Diabetes UK, 2016). As a consequence, the development of a National Diabetes Prevention Programme (NDPP) in England was announced in 2015 (NDPP, 2015). The NDPP is a joint commitment between Public Health England, NHS England, and Diabetes UK to deliver an evidence-based behavioural programme to reduce the risk of diabetes in adults who are at high risk as indicated by elevated $HbA_{1c}$ levels. However, it is also imperative that more been done to

reduce a person's risk for diabetes long before their glycaemic control is impaired. Thus, new or alternative solutions to prevent and treat obesity, and prevent diabetes early on in one's lifespan, must be considered and assessed to help promote healthful lifestyle behaviours, particularly in those with elevated risk for these disorders.

## The effect of lifestyle on risk for diabetes

The aetiologies of diabetes and obesity are multifaceted and complex. As the European Guideline and Training Standards for Diabetes Prevention (IMAGE) noted, lifestyle is recognised as having a direct and profound effect (Schwarz et al., 2007). Lifestyles that lack a healthy, balanced diet, physical activity or both put an individual at greater risk for developing obesity and diabetes. Maintaining these two health behaviours influences an individuals' wellness. Wellness is not merely the absence of illness but entails a more holistic concept of health that includes emotional, spiritual and physical health (Thompson, Manore, & Vaughan, 2013). Encouragingly, as IMAGE note, lifestyle risk factors are modifiable.

### *The importance of a balanced diet*

A balanced diet involves consuming the right amount of the major food groups (Thompson et al., 2013). There are five major food groups: fruits and vegetables; meat, fish, eggs and pulses; milk and dairy products; starchy foods; and fats and sugars. A plethora of foods fall within each category and contain the nutrients required for normative functioning, growth and energy. The National Diet and Nutrition Survey found most people in the UK consume diets that are nutritionally poor and high in (saturated) fats and added sugars, leading to weight gain and increased risk for subsequent health complications (Adams at al.,

2015). For T2D prevention, IMAGE guidelines specifically recommend increasing dietary fibre (consuming 25–35g/day) and reducing total (and saturated) fat intake (25-35% of daily energy consumption) (Schwarz, 2011). For T2D management, the National Institute for Health and Care Excellence (NICE) recommend consuming carbohydrates from fruit, vegetables, pulses and whole grains; reducing intake of saturated fats and trans fatty acids; and to consume low-fat dairy products and oily fish (NICE, 2015[a]).

Empirical evidence demonstrates the importance of a balanced diet as highlighted by the success of medical nutrition therapies applied to diabetes (Franz et al., 2010). Typically, these therapies, designed by a dietitian and/or nutrition researcher, entail a balanced diet plan with tailored considerations to the individual or group. A plethora of different diet plans focus on changing various aspects of nutrition and eating behaviours, for example: portion control; individualised nutrition; changing consumption level of macronutrients; and healthy food choices. These therapies have yielded success and can lower $HbA_{1c}$ levels by 1-2%. This is enough to induce meaningful improvement in symptoms, which will enhance quality of life. Franz et al. (2008) noted that to maximise success, interventions need to consider personal and cultural requirements, as well as participants' inclination to adopt changes.

Evidence also demonstrates that improved diet behaviours are efficient in tackling obesity. Diet-oriented bariatric interventions can be categorised as: low-calorie, very low-calorie, low-carbohydrate or low-fat. A review comparing these different categories found no significant differences between low-calorie, low-carbohydrate or low-fat in total weight-loss efficiency with a 2–4 kg across different diet types over a 5-year period (Strychar, 2006). Strychar noted that very low-calorie diets (which could lead to adverse effects if practiced

for over 16 weeks), resulted in initial substantial weight loss (1.5-2.5 kg/week) which could not be maintained after reverting to a regular diet. However, Strychar proposed that low-calorie diets might bear the least adverse health effects since these diets had the most preferable, healthy macronutrients balance. Studies have also highlighted excessive fat and sugar intake's contributing role to obesity. Shai et al. (2008) randomly assigned 322 obese participants to either a low-fat, low-calorie; low-calorie Mediterranean; or low-carbohydrate, unrestricted calorie diet. The trial lasted two years with adherence at 84.6% at end point. Mean weight-loss were as follows: 3.3kg for low-fat; 4.6kg for Mediterranean diet; 5.5kg low-carbohydrate group. Of the 36 participants with diabetes, the Mediterranean diet elicited greater changes in fasting plasma glucose and insulin levels. They concluded that Mediterranean and low-carbohydrate diets appear more effective than low-fat diets. Given a choice between these, the Mediterranean diet is better suited for improving glycaemic control and the low-carbohydrate diet preferable for cholesterol control. A review and meta-analysis by Te Morenga, Mallard, and Mann (2013) found in trials of people with ad libitum diets, sugar intake determined body weight. Reduced sugar intake led to weight-loss (0.80kg), increased sugar intake led weight gain (0.75kg) and iso-energetic exchange of sugar with other carbohydrates led to no weight change. This indicates fatness changes seem to be mediated by energy intake changes. They also noted that in prospective studies, those with higher sugar consumption were also more likely to be overweight or obese. However, these studies had short durations (14 days to 2 years). Although these results appear to be promising with regards to types of diets that may help reduce obesity, only short- to mid-term, but not long-term effects of these diets, can be inferred. Furthermore, it is clear the lone effects of diet change are not sufficient to achieve weight-loss that could

dramatically ameliorate health outcomes. Thus, it can be argued dietary behaviour can only be one facet of behaviour change when treating obesity.

*The importance of physical activity*

Like proper nutrition, physical activity is imperative to wellness. Physical activity is any voluntary movement generated by the skeletal muscles, and it is a process that involves expending energy (Caspersen, Powell, & Christenson, 1985). Since physical activity involves energy expenditure, it is pivotal in weight loss and control, and as such can help reduce the risk for, or reduce pre-existing symptoms of, diabetes and obesity. Physical activity can vary in intensity, duration and type. Moderate intensity activities require moderate levels of exertion and are equivalent to 3-6 Metabolic Equivalents (METs) (e.g. dancing, domestic chores or gardening) (WHO, 2014). Vigorous intensity activities require higher levels of exertion and are equivalent to 6+ METs (e.g. running, aerobics, heavy manual labour or competitive sports). There are three categories of physical activity: aerobic, resistance and flexibility activity. Of these, the UK Guidelines for Physical Activity recommends 150 minutes of weekly moderate aerobic activity (e.g. brisk walking, swimming or cycling) and bi-weekly resistance activity (that exercise all major muscle groups). (Department of Health, 2011). The guidelines note similar health benefits can be attained from 75 minutes of vigorous intensity activity spread throughout the week or through other regimes integrating moderate and vigorous intensity activity (e.g., gardening, housework, and occupational activities done at sufficient intensity).

Evidence supports the role of physical activity in benefitting people with diabetes. A meta-analysis by Boulé, Haddad, Kenny, Wells, and Sigal (2001) reviewed twelve aerobic

activity studies and two resistance activity interventions for adults with diabetes. Although the weighted body mass change was not significant between experimental and control groups, the training regimes significantly reduced $HbA_{1c}$ values to a level that would discernibly alleviate diabetes-related complications. They noted that resistance training increased lean body mass, subsequently increasing the number of muscle cells available to enhance the uptake and utilisation of glucose and thus improve glycaemic control. Aerobic activity reduced $HbA_{1c}$ levels by increasing oxidation of blood glucose to provide energy during the exercise.

Physical activity is universally recognised as a critical component of weight loss and maintenance of weight loss (Catenacci & Wyatt 2007; Wing, 1999). Although the total energy expenditure resulting from engaging in vigorous intensity exercise is higher than for low- or moderate intensity activities, people who are obese and/or those with diabetes are typically not able to engage in sustained vigorous intensity activity due to relatively low fitness levels (Ribisl et al., 2007). Hence, as per IMAGE recommendations, the key to sustained weight loss is incorporating appropriate and achievable physical activities into each individual's lifestyle (Schwarz, 2011). Research indicates that moderate intensity physical activity alters macronutrient balance eliciting an increased tendency to utilise fat as an energy source (Sahlin, Sallstedt, Bishop, & Tonkonogi, 2008). A meta-analysis by Wu, Gao, Chen, and Van Dam (2009) revealed that weight-loss was significantly lower in conditions of diet alone as compared to integrative diet and physical activity interventions (where weight-loss was 1.14 kg greater). They concluded that to tackle obesity, lifestyles had to increase energy expenditure and reduce energy intake therefore incorporate changes in physical activity and diet.

*The importance of a balanced diet and physical activity together*

Wu et al.'s (2009) conclusion is supported by data from the National Weight Control Registry, the largest prospective study of long-term successful weight loss maintenance in the world. McGuire, Wing, Klem, Seagle and Hill (1998) investigated whether individuals utilising different weight-loss methods (using a liquid formula, an organised programme, or on their own) would use different strategies to sustain their weight-loss. All three groups maintained successful weight-loss: 30.1 kg (+/- 14.9) over a mean of 5 years. Prior to weight loss, the liquid formula group were generally heavier and older as well as likelier to have medical disorders. This group remained heavier after weight loss than others in the cohort; although they achieved greater total weight loss, they sustained their weight loss over a comparatively shorter time period. This group tended to favour using dietary strategies to maintain weight loss. The organised programme group were also found to be more likely to favour dietary strategies to sustain their weight loss. In contrast, the group who reported losing weight on their own reported greater engagement in strenuous activities as a means to maintain weight loss. Within this group, 15% and 26% utilised running and weight-lifting, respectively, compared to 6% and 15% in the other groups. The 'on their own' group had less lifetime weight fluctuations than the other groups and tended to be male. In summary, despite utilising one of three methods to achieve initial weight loss, participants all used broadly similar weight maintenance strategies that entailed reduced calorie diets combined with physical activity. The difference between groups' strategies lay in the specific type of dietary behaviour, type of physical activity and emphasis between these. Wing and Phelan (2005) echoed these findings in a subsequent examination of participants in the Registry. To sustain weight-loss, participants consistently reported exercising one hour a day, as well as

sustaining an eating pattern which involved a low-calorie, low-fat (less than 30% of total energy) diet and consuming breakfast on a regular basis.

Prospective population-based lifestyle studies have also been carried out with the specific aim of diabetes prevention. Dunkley et al. (2014) conducted a systematic review and meta-analysis on the effectiveness of real-world lifestyle interventions for T2D prevention. This review included 25 studies that were either RCTs or observational studies. They found that the programmes resulted in a mean weight loss of 2.12 kg (at 12 months). Generally, greater adherence to treatment protocol elicited greater weight loss and waist circumference reduction. Gillies et al. (2007) conducted a similar systematic review approximately 7 years prior to the Dunkley et al review, that focused on pharmacological and lifestyle interventions to prevent T2D. This review included 21 RCTs. Lifestyle interventions were found to be at least as effective as pharmacological approaches. However, findings indicated that the beneficial effects were not sustained after treatment ended. Thus, it is important to identify interventions that cultivate life-long or longer-term skills that can be effective beyond the life of any intervention. The authors also highlighted that lifestyle interventions incurred fewer adverse reactions than pharmacological alternatives.

The Diabetes Prevention Program Research Group (2002), in a landmark study, randomised 3,150 participants with impaired glucose tolerance to an intensive lifestyle change group, a drug therapy group or a placebo group. Around 45% were ethnic minorities. The aims were for participants to achieve at least 150 minutes of moderate weekly physical activity and a weight loss of 7%. The main observed outcome was development of diabetes

as defined by the American Diabetes Association. Methods involved utilising both individual and group-based support, lifestyle coaches, a core programme, self-monitoring as well as considerations for ethnic diversity (Diabetes Prevention Program Research Group, 2009). During the 2-8 year follow up period, diabetes incidence in the lifestyle group decreased by 58% compared to placebo. The drug therapy reduced incidence by 31%. After ten-year follow-up, diabetes incidence decreased by 34% and 18% in the lifestyle and drug groups, respectively. The researchers concluded that lifestyle interventions can reduce the risk of diabetes development for at least 10 years. Though these results are compelling, real-world replication comes with the caveat that the intervention used in this RCT is time, resource and personnel intensive. Especially as this intervention involved a one-to-one approach, it is unlikely to be practical or financially feasible in a real-world setting. Hence, there is a need to identify practical low-cost alternatives such as a group-based intervention. Another criticism of this intervention is its limited theoretical base. Without a clearly outlined theory to drive the approach forward, it becomes challenging to evaluate and identify areas for refinement.

In summary, it is evident that healthful behavioural choices such as physical activity and a healthful diet can reduce the risk for, and ameliorate symptoms of, diabetes. However, the task of changing people's lifestyles to foster these healthful behaviours is no simple matter. There is a plethora of factors that mediate or determine whether individuals will engage in these behaviours. In the UK, NICE guidelines for T2D prevention or management at population and community-level recommends that (physical activity, dietary and weight management) interventions also consider cultural-religious beliefs and practices, gender, age, literacy and lower socioeconomic groups (NICE, 2012). Furthermore, it should be understood that intervention effectiveness and cost-effectiveness can vary considerably

depending on the specific target demographic. NICE acknowledged an imperative aspect of T2D prevention or management was limiting emotional distress and maintaining mental wellbeing since stress can exacerbate T2D symptoms or impede self-care (NICE, 2015[b]). NICE also cited a recent systematic review for psychological interventions for T2D-related distress that noted studies were of low-quality and that none of the interventions improved diabetes-related distress more than usual care (Chew et al., 2017).

As part of their behaviour change toolkit, IMAGE recommended an empirically supported process model for practical lifestyle change (Greaves et al. 2010; Schwarz, 2011). This consists of 3 phases (initiating motivation, taking action and maintaining motivation) which are designed to empower the individual and subsequently enable successful healthy behaviour adoption. Therefore, higher quality studies and new interventions are required to assist T2D management. Hence IMAGE's suggestion to incrementally increase behaviour change (particularly physical activity) to avoid adding to pre-existing stressors and mental overload. As IMAGE highlighted, modifying physical activity levels is not always within an individual's control because there are macro-social determinants of their behaviour (such as availability, accessibility and affordability of facilities or equipment) that may be beyond their control (Schwarz, 2011). Therefore, political support is necessary to translate healthy lifestyle intention to behaviour. As NICE noted, behavioural change theories are an important tool to better understand, predict and potentially to help change health behaviours (as will be discussed later in this thesis) (NICE, 2014). NICE, in its recommendations for selecting appropriate T2D prevention and management interventions, acknowledged theoretically driven and empirically supported approaches are imperative.

**Stress-related pathways to diabetes**

Chronic stress can lead to health consequences through activation of neuroendocrine pathways such as the hypothalamus-pituitary-adrenal (HPA) axis and sympathetic nervous system (SNS) (Golden, 2007; Rosmond & Björntorp, 2000). Following HPA and SNS activation the stress hormones cortisol, and adrenaline and noradrenaline are released, and have been identified as mediators between stress and impaired glucose and lipid metabolism. Recently Liang et al. (2018) showed that plasma levels of cortisol were raised in individuals with impaired fasting glucose levels compared to healthy controls. Moreover, plasma levels of cortisol, adrenaline and noradrenaline were even higher in T2D patients when compared to those with impaired fasting glucose levels and healthy controls.

Chronic stress may also lead to increased diabetes risk through a neuro-immunological pathway. As stated, increased stress leads to activation of the neuroendocrine system. It has been recognised that cross-talk occurs between the immune and neurological systems (Procaccini et al. 2014). In support of this, Brunner et al. (2002) found that high plasma levels of cortisol were correlated to high plasma levels of interleukin-6, a pro-inflammatory cytokine released by the immune system. Increased activation of pro-inflammatory pathways leads to insulin resistance, and also occurs in metabolically healthy and unhealthy obese individuals, obesity and metabolic syndrome, all of which are precursors of T2D (Strissel, Denis & Nikolajczyk, 2014; Wellen and Hotamisligil, 2005).

Another stress-related pathway is the behavioural pathway. Stress can lead to unhealthy lifestyle choices as a coping mechanism or can impede the uptake of healthy behaviours. The ‘comfort food hypothesis’ contends that chronic stress leads to changes in

the composition of foods consumed, namely increased energy intake from carbohydrate and saturated fat (Gardner, Wansink, Kim & Park, 2014). Specifically, negative moods trigger a shift to favour more proximal, mood management choices in the form of indulgent dietary choices and quantities instead of distal, health-conscious decisions. Long-term unhealthy food selection, as previously discussed, increases T2D risk. Similarly, Stults-Kolehmainen and Sinha (2014), in a review on the reciprocal effects of stress and physical activity, noted that stress appears to cause disinclination for physical activity. As also previously discussed, physically inactive or sedentary lifestyles increase T2D risk. Notably, they identified that a minority of studies found physical activity was positively 'behaviourally activated' by stress. This was suggested to be due to some individuals utilising physical activity as a coping tool.

## An introduction to Mindfulness

Mindfulness is a mind-body practice that involves the self-regulation of attention and awareness to lower reactivity to stressors and manage thoughts and feelings (Kabat-Zinn, 1990). This is enabled by encouraging participants to focus upon sensations, thoughts and emotions in the present moment and accepting them without judgement to reduce worry and rumination (Querstret & Cropley, 2013). Using such practices allows mental clarity so that participants can react to life stimuli appropriately.

### *Development of Mindfulness into a Westernised therapy*

Many consider the Mindfulness concepts such as the notion of awareness and meditation to have originated in Buddhism (Wilson, 2014), however these features of Mindfulness have also been an inherent part of Hindu culture long before the advent of

Buddhism (Smith, 1994). Nonetheless elements of both cultures' versions of Mindful practice have influenced contemporary Mindfulness. Such practices include Vipassanā (where the awareness of breathing and to thoughts, emotions and actions can attain a truer sense of reality), Satipatthana (monitoring sensory experiences as a pathway to achieving peace of mind) and Anapanasati (to feel the bodily sensations during Mindful breathing) (McMahan, 2008).

From these Buddhist practices and principles, Jon Kabat-Zinn developed Mindfulness as it is currently recognised in the modern Western world (Kabat-Zinn, 1990; Wilson, 2014). Kabat-Zinn first came across meditation when attending a guest seminar from a Zen missionary while still a student at Massachusetts Institute of Technology (MIT). Later, he went on to learn from more prominent Buddhist teachers. His interests eventually culminated in him opening a stress reduction clinic at MIT in 1979. There, he combined Buddhist principles and elements of Hatha yoga into a secular 8-week programme now known as Mindfulness-based stress reduction (MBSR). Following several publications written for academic and lay audiences, Kabat-Zinn's programme has become a popular therapy in psychology and alternative medicine, with several MBSR clinics opening from the 1990s (Wilson, 2014).

*Components of Mindfulness-based Interventions*

Typically, Mindfulness-based interventions (MBIs) entail participation in an 8-week programme. Each week an instructor-led, facilitated session is offered that lasts between 90 minutes to two hours. These sessions may be delivered one-to-one or in a group setting. Each week's session teaches a different Mindfulness practice or principle. Most MBIs begin

with introducing the body-scan exercise in week 1. During subsequent weeks, the following practices are taught: seated meditation; the body scan; Mindful walking/movement; breathing control and exercises; Mindfulness in daily life; acceptance and compassion; Mindfulness and communication; and dealing with difficult emotions or sensations.

Seated meditation is designed to help calm the mind and by extension, the body. The body scan aims to gradually train an individual to focus their attention by shifting attention and awareness to different parts of their own body (Williams & Penn, 2011). With time and practice, individuals can then begin to train their attention to concurrent tasks and to be more 'present-focused' and less distracted. Similarly, Mindful walking or movement involves attention training, specifically focusing attention to internal cues such as feel of each step taken on the foot to external cues in the environments. Acceptance and compassion has more psychological emphases in training individuals to be more accepting of difficult scenarios and shifts in cognition, whereby they reduce undue blame for themselves and others. Mindfulness and communication skills involve focus on improving interpersonal skills, particularly in being able to communicate calmly and clearly as well as to focus on the other person's conversation. Dealing with difficult emotions or sensations entails using Mindfulness to understand that emotions and sensations are not necessarily objective nor reflect the truth (e.g., negative pre-examination emotions, while unpleasant do not necessarily equate to inability to succeed). In addition to these sessions, home practice is encouraged (*see Table 3*).

*Table 3: Overview of a typical Mindfulness programme*

| Week | Session overview |
|---|---|
| 1 | **Introduction**<br>• What is mindfulness?<br>• The Raisin Exercise: drawing us away from automatic pilot<br>• Breathing space exercise<br>• Compassion exercise: What do I appreciate?<br>• Resources (audio, online)<br>• Home practice: 1) Eating mindfully 2) Breathing space |
| 2 | **Mindfulness in daily life**<br>• Awareness of a routine activity e.g. remove shoe: drawing away from automatic pilot<br>• Mindfulness and spirituality (see book: 'Into the Silent Land')<br>• Home Practice: 1) Daily practice of a Body scan and a short breathing space. 2) Compassion exercise: Keep a daily record of an activity you enjoy |
| 3 | **The Breath**<br>• Mindfulness of the breath<br>• Home practice: 1) daily mindfulness of the breath, everyday activity 2) Compassion exercise: Keep a daily record of an unpleasant activity |
| 4 | **Body Scan**<br>• Compassionate Body Scan<br>• Home practice: to use the body as a mindfulness anchor in irksome situations |
| 5 | **Mindful Movement**<br>• Mindful walking and/or movement<br>• Home practice: 1) Mindful walking/movement 2) Compassion exercise: breathing space practice when feeling troubled |
| 6 | **Thoughts are not facts**<br>• Seeing thoughts as creations of the mind<br>• Working wisely with unhappiness and depression<br>• How can we relate to our thoughts differently?<br>• Home practice: Mindfulness of hearing and thinking<br>• Home practice: 1) Noticing thoughts, labelling them and deciding how to relate to them. 2) Short daily breathing space |
| 7 | **Compassion**<br>• Introduction to compassion<br>• Compassionate breathing space<br>• Home practice: "Just like me" – using compassion for others as a mindfulness activity |
| 8 | **Endings**<br>• Thinking about endings<br>• Inviting difficulty practice<br>• Maintaining progress (working in pairs)<br>• Reflection on course e.g. what will I take away? What could we do differently?<br>• Final breathing space – living in the moment |

There are three main subtypes of MBI: Mindfulness-based stress reduction (MBSR), Mindfulness-based cognitive therapy (MBCT) and Mindful eating (MB-EAT). MBSR represents Kabat-Zinn's Westernised, scientific version of Mindfulness. As the name suggests, it was initially envisaged as a stress-reductive practice. However, recent applications have varied

greatly, as will be subsequently discussed. MBCT is a synthesis between Kabat-Zinn's MBSR and cognitive behaviour therapy (CBT), which aims to use features of two complementary therapies for beneficial outcomes (Segal, 2002). MBCT was initially designed to treat those suffering depression relapses. MB-EAT was designed to cultivate mindful awareness as it pertains to eating and knowledge of food in those with binge-eating disorder and/or obesity (Kristeller & Wolever, 2001). MBIs have been applied within a wide range of settings and populations beyond the initial target groups of those with stress, depression and anxiety. These different applications have been empirically tested with varying degrees of success. The use and effectiveness of Mindfulness in promoting healthy lifestyle behaviours related to reducing the risk for diabetes are the focus of the present PhD research.

**Mindfulness in diabetes-related research**

Mindfulness was initially envisaged as stress-reductive technique and has been shown to have moderate to high stress-reductive effects (Goyal et al., 2014; Segal et al., 2002). Gradually MBIs became applied to other areas of mental health (such as anxiety and depression) for which systematic reviews have shown Mindfulness to be an effective tool (Chiesa & Serretti, 2010; Hoffman, Sawyer, Witt & Oh, 2010). Khoury et al. (2013) conducted a comprehensive meta-analysis of MBIs' effects on anxiety, depression and stress symptoms. They found Mindfulness to be moderately effective compared to wait-list control groups (Hedge's $g$ = .53) and other psychological treatments (Hedge's $g$ = .33). Mindfulness was found to be as effective as CBT, behavioural therapies and pharmacological treatment. Sundquist et al. (2014) conducted an RCT and found Mindfulness to be equally efficacious as CBT for depression, anxiety or stress and adjustment disorders. These authors also noted the

practical benefits of Mindfulness in allowing for group-based delivery and being an effective low-cost alternative to usual psychological treatment.

MBI applications have since extended to physical health settings (Niazi & Niazi, 2011). There have been applications in the areas of chronic pain, various cancers, irritable bowel syndrome and human immunodeficiency virus (HIV)/acquired immune deficiency syndrome (AIDS) (Simpson & Maple, 2011; Page, 2012; Niazi & Niazi, 2011). This body of research has shown that MBIs can improve medical symptoms by improving quality of life and reducing stress, anxiety and depression. Mindfulness may have a similar effect on diabetes (through aforementioned stress-related pathways). Other psychological treatments have been applied to diabetes. Ismail, Winkley and Rabe-Hesketh (2004) conducted a systematic review of psychological interventions for diabetes. Included studies did not measure stress but distress (an umbrella term for negative psychological states), finding a moderate effect (*d* = .55). Most Mindfulness studies yield a similar moderate effect (Chiesa & Serretti, 2009; Khoury et al., 2013). Considering Khoury et al.'s (2013) meta-analysis, Mindfulness may also be superior to other psychological interventions applied to diabetes (especially when only two of 11 studies in Ismail et al. (2004) used an intention-to-treat approach, thus pooled effects are prone to positive effect bias). Mindfulness appears more promising than another 'alternative medicine' approaches such as yoga. Aljasir, Bryson and Al-Shehri (2010) conducted a systematic review of yoga interventions for stress management in diabetes compared to other interventions, and results were not significant and were inconclusive. Despite diabetes being an increasingly common physical health condition, MBI research for diabetes is sparse and not yet aggregated. This gap in the current literature presented the opportunity in this PhD to conduct a systematic review investigating the effectiveness of

MBIs on physiological and psychological complications in adults with diabetes (see Chapter 2). There is evidence from research conducted within chronic diseases related to diabetes that suggests MBIs may be effective at treating comorbid illnesses and conditions that bear the same symptoms as diabetes.

MBIs have also been applied to obesity, a condition comorbid with diabetes that is also considered to be a risk factor for developing diabetes (Diabetes UK, 2016). Godsey (2013) conducted a systematic review assessing MBIs' effectiveness in treating obesity and disordered eating. She concluded that MBIs could represent an important constituent to holistic obesity treatment. Godsey noted that studies found Mindful approaches were associated with healthier dietary choices, reduced dietary intake and slower, more mindful eating practice. These healthy lifestyle practices are all congruent with diabetes management, as adopting and sustaining healthy dietary behaviours are crucial for effective management of this disease (Finnish Diabetes Prevention Study Group, 2006; Wing et al., 2001). The findings from Godsey's review suggest that MBIs may be a useful tool in a diabetes setting.

Additionally, Godsey also noted that MBIs resulted in improved coping behaviour and emotional regulation. Considering the fact that people with diabetes are more prone to psychological issues such as anxiety and depression (Anderson et al., 2001; Grigsby et al., 2002), such psychological outcomes might be beneficial in equipping patients with useful self-care skills. Peyrot et al. (2003) investigated psychosocial impediments to diabetes management in 13 countries in Asia, Australia, Europe and North America. They found that diabetes service-providers (n = 3,827) stated that most patients have psychological issues

that impeded diabetes self-care and regimen adherence. Additionally, they reported 10% of patients (n = 5,104) report receiving psychological treatment. Katterman et al. (2014) conducted a systematic review looking at MBIs for binge eating, emotional eating, and weight loss. They found mixed effects on weight loss, but reported reduced binge eating (with moderate to large effect sizes) and emotional eating (with moderate to large effect sizes, particularly in those with elevated emotional eating). Both of these reviews noted that most studies had a greater representation of women than men in the samples, so inferences about MBI effectiveness on obesity in men should be made with caution.

Another diabetes-related illness to have had some, albeit limited, MBI application is coronary heart disease (CHD). O'Doherty et al. (2015) aimed to investigate MBI effectiveness on treating depression in CHD using a non-randomised controlled trial. The treatment and control groups had 32 and 30 participants respectively. At 6-month follow-up, 71% of the treatment group (compared to half of the control group) clinically recovered from depression. Additionally, there were moderate to large effect size improvements in quality of life, psychological adjustment, mood and anxiety. Participants also reported high levels of satisfaction with the MBI, showing it to be acceptable in a chronic illness population. Parswani, Sharma & Iyengar (2013) conducted a randomised controlled trial examining the effects of a MBI on CHD in a sample of 30 adult males from an outpatient clinic. They observed reductions in anxiety, stress and depression as well lower blood pressure and BMI. These findings also suggest MBI may be useful in men. This body of research shows that MBI may be effective in enhancing the psychological well-being of a group with chronic illness that also suffers from similar psychological symptoms as experienced in people with diabetes.

Diabetes is also comorbid with hypertension (Diabetes UK, 2016). Palta et al. (2012) assessed MBI effectiveness on hypertension in older adult African-Americans. Participants were randomised to either the MBI or a social support control group. Those in the MBI experienced significant reductions in both systolic and diastolic blood pressure, whereas the control group experienced an increase in diastolic blood pressure. Although the narrow target population limits generalisability to other populations, these data suggest that MBIs can be effective in ameliorating hypertension. Finding from Hughes et al. (2013) provide further support for these findings. They investigated MBI effectiveness in individuals with pre-hypertension compared to a progressive muscle relaxation control group with pre-hypertension. They found that the MBI significantly reduced blood pressure compared to the control group. Although the decreases in blood pressure were low (4.8-mm Hg in systolic blood pressure compared to 0.7-mm Hg reduction in the control; and 1.9 Hg-mm in diastolic blood pressure compared to 1.2-mm Hg increase in the control), it was concluded by the authors that if changes of this magnitude were sustained, they could reduce the risk of CHD events.

There is a growing body of literature related to the use of MBI for treating diabetes. Sowattanangoon et al. (2008) found significant correlations between Mindfulness values and better self-care behaviour and reduced $HbA_{1c}$ in people with Type 2 diabetes. Whitebird, Kreitzer, and O'Connor's (2009) review considered MBIs' potential usefulness in diabetes based on their success in other chronic health conditions where they have improved quality of life and functioning, reduced medical symptoms and decreased psychological ill-being (such as anxiety, depression and stress). Berghmans et al. (2012) support the notion that MBIs can benefit people with diabetes, as the MBI they implemented in patients with type 1

diabetes decreased stress, anxiety and depression symptoms. More recently, Keyworth et al. (2014) reported that their MBI reduced worry and thought suppression in patients with either type 1 and Type 2 diabetes. Since Whitebird and colleagues first suggested MBIs as a possible diabetes treatment, research examining the use of MBIs for diabetes has increasingly been undertaken.

Similarly, there is also increasing published research on MBIs targeted towards obesity. A gap in the literature was identified as no reviews had yet aggregated either body of literature. Since obesity is, as previously discussed, highly co-morbid with diabetes, it was decided that this thesis would begin by conducting a systematic review to gauge the effectiveness of MBIs for diabetes and obesity. However, during the preliminary development of the systematic review, Katterman et al. (2014) published their systematic review on MBIs for obesity, prompting the present author to narrow the focus of the review to MBIs for diabetes only. The review helped establish various MBI mental and physical benefits to a diabetes population (as will be discussed further in Chapter 2).

Creswell and Lindsay (2014) proposed a “stress buffering” account to explain how Mindfulness may lead to healthier outcomes. They suggested Mindfulness reduces stress, stress-induced impediments to healthy lifestyle choices, and attenuates stress-reactivity responses, eventually facilitating healthier outcomes. Considering the stress-related pathways discussed earlier, it is plausible that Mindfulness skills enable an individual to address their thoughts and emotions, subsequently preventing or reducing excessive activation of the neuroendocrine and neuro-immunological pathways. This limits the release of hormones and other biological substances that lead to impaired glucose and lipid

metabolism. Through the behavioural pathway, Mindfulness' awareness skills also give individuals equanimity to make more carefully considered lifestyle decisions. Thus, they opt for healthy behaviours (that are beneficial for the long-term) and eschew short-term habitual unhealthy behaviours such as having indulgent food or remain inactive when stressed. Consequently, through a cascade of psychological and biological processes, Mindfulness skills can reduce the risk for or exacerbation of T2D.

The original intention for this thesis was to build upon the systematic review and develop an intervention for diabetes, for an ethnic group at higher risk for diabetes as in Dreger et al. (2013). Since, as aforementioned, South Asians suffer high diabetes incidence, and the city of Birmingham has a large South Asian population, this presented an opportunity for a novel application of an MBI. However, practical and temporal issues arose that precluded targeting a clinical sample. Furthermore, considering the wide array of diabetes management programmes that have already been successfully implemented in ethnic minority groups, such an intervention would not make a unique contribution to the literature. This warranted the eventual change of emphasis. Despite the literature emerging related to MBIs for diabetes treatment, there appears to be no published studies (to our knowledge) to date examining the use of MBI in the prevention of Type 2 diabetes, particularly within a high-risk group such as South Asians. Even in the broader literature, there were no published studies delivering MBIs to South Asians for any physical or mental health condition. Clearly, the gap in literature needed to be addressed as a proof of concept for Mindfulness delivered to South Asians. If MBIs are acceptable and feasible for this group, then this would provide further opportunities to investigate whether MBIs can ameliorate various physical and mental health conditions in this population. The systematic review was

instrumental in informing the thesis going forward by providing a suitable range of outcome measures to explore in a feasibility trial.

## Theories used to change lifestyle behaviours

### *The purpose of theories and models*

Behaviour change theories and models aim to explain, predict and adapt individuals' or populations' health behaviours (Hayden, 2017). Health behaviours are mediated or determined by a range of factors that can either facilitate or impede engaging in a particular behaviour, including socio-cultural, economic, environmental, personal, emotional, and policy-related factors. Hayden (2017) categorised these factors into three levels of influence: intrapersonal, interpersonal and community levels. Intrapersonal factors are those pertaining to an individual: biological and demographic variables as well as attitudes, beliefs, motivation, knowledge and skills. Interpersonal factors acknowledge the external influence of other people (family, friends, peers and healthcare professionals) who may share thoughts, feelings or offer assistance. Community level factors focus on macro-social variables (e.g. institutional, organisational, community norms, environment and policy variables) that are distal to the individual yet can exert a strong impact on their behavioural choice.

Changing lifestyle behaviours of individuals and populations is challenging, as it can be difficult to ascertain which of numerous factors cause engagement in unhealthy behaviours, and thus it is unclear exactly which factors to act upon to implement desired changes (Hayden, 2017). Behaviour change theories provide frameworks that can enhance comprehension of what leads to health behaviour choice by suggesting how and which

factors interact, influence and drive health behaviour. Therefore, theories inform social scientists of the most pertinent factors to focus and intervene upon. Another benefit of using theories is that their validity and appropriateness to different groups and populations can be scientifically tested (Conner & Sparks, 2005). Since theories, as a conceptual entity or simply their constructs, can be empirically supported or refuted, theories can be revised accordingly to better explain health behaviours. The more valid and appropriate a theory is, the better-equipped it is to systematically guide intervention design to implement successful health behaviour change.

*Differentiating between theoretical approaches*

There are a plethora of behaviour change theories and models published in the literature. These theories or models adopt one of two broad approaches: an individual-focused approach or an upstream (or ecological) approach (Hayden, 2017). Individual-focused theories and models aim to explain, predict and change behaviour at an individual level. They typically account for factors at the intrapersonal and interpersonal level. These theories can be applied to individuals or groups of individuals that share particular characteristics. They are normally used to guide behaviour change in individuals or small groups.

Conversely, upstream theories and models aim to explain, predict and change behaviour at a population level. They account for factors at all levels of influence: intrapersonal, interpersonal and community levels. Upstream theories are typically applied to large groups or whole populations, and they take into account several levels of factors (ranging from proximal to distal) in the aetiology of chronic illnesses (Bronfenbrenner, 2005).

Ecological models acknowledge the intrapersonal factors that are also the focus within individual-focused models, but they also recognise interpersonal (cultural and social), organisational, community level and public policy factors in more depth (Swinburn et al., 1999). Factors at the interpersonal level entail the influence of intimate partners, family, friends and peers within an individual's closer circle. Organisational factors describe their workplace environment. Community level factors include community leaders' influence, neighbourhood dynamics, service systems and transportation. Public policy factors are the most distal factors to any individual whereby governmental decisions and economic implications can have an effect on their behavioural choices. Ecological models recognise that health behaviour can be influenced by multiple factors across these social levels (Sallis et al., 2008). Sallis et al. also note that factors across the different levels can interact. For instance, a genetic predisposition for weight gain (an intrapersonal factor) may be exacerbated by limited community resources (a community factor) such as safe access to public exercise facilities (Fleury & Lee, 2006; Henderson & Ainsworth, 2003). Therefore, these various factors can interact to have a dynamic influence on an individual's health over the lifespan (Bronfenbrenner, 2005).

*Individual-focused theories and models of behaviour change*

Some of the most widely used and empirically supported individual-focused theories and models include Social cognitive theory; Self-determination Theory; Trans-theoretical model; and Theory of planned behaviour.

Social cognitive theory's constructs are self-efficacy, outcome expectations, socio-structural factors and goals (*see Figure 2*) (Bandura, 1986). Bandura proposed that self-efficacy can determine whether behaviours will be initiated, as well as determine the amount of effort to be applied in the face of barriers. Outcome expectations' triad of factors (physical, social and self-evaluative) has empirical support for its real-world applicability (Dijkstra & DeVries, 2000). SCT has limitations as it assumes that changes to the environment or in others will automatically result in change in an individual. This puts SCT somewhat at odds with Mindfulness, which is focused on the self and one's awareness. Additionally, it does not explain or indicate how various factors can interact and lead to behaviour change. Another criticism is that it places too much emphasis on social learning and thus overlooks innate biological dispositions that may influence health behaviour. Similarly, SCT disregards intrapersonal psychological factors such as emotion and motivation. Social learning is not a core tenet of Mindfulness, which instead addresses emotions and thoughts; these differences render SCT incompatible with Mindfulness.

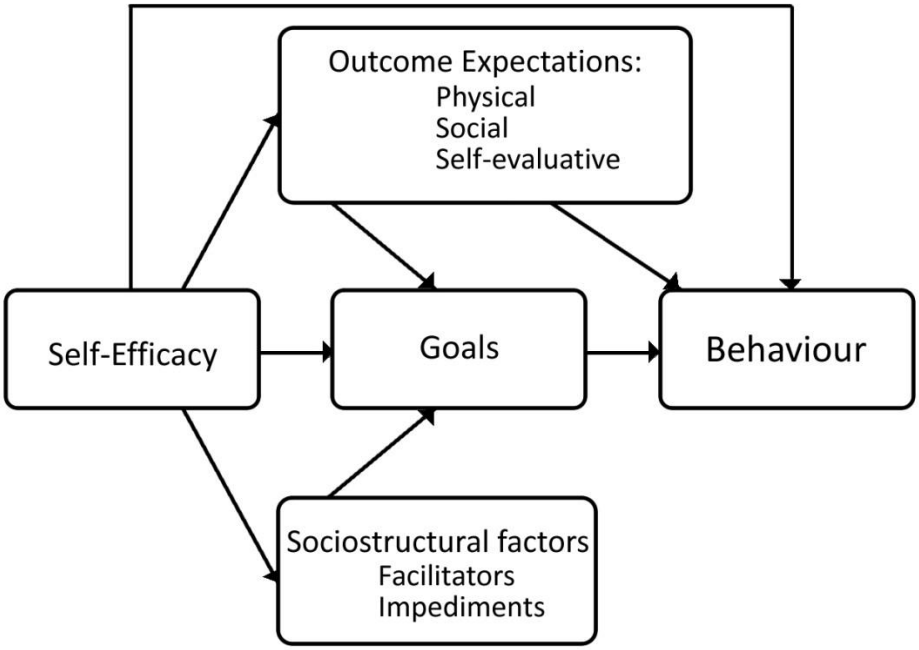


*Figure 2: Social Cognitive Theory. Adapted from Conner & Sparks (2005)*

Self-determination theory (SDT) assumes people and their actions are oriented towards self-development (Deci & Ryan, 1985). Intrinsic motivation (engaging in behaviour that are directly reinforcing and perceived as an opportunity to learn and self-actualise) is key to this theory. The three major constructs which govern people's feeling of being self-determined are autonomy, relatedness (to others) and competence (*see Figure 3*). When people experience these constructs, they become self-determined and intrinsically motivated to pursue activities and objectives that interest them. While SDT has its utilities in organisational and sport psychology, it does not have such empirical support in health psychology. Furthermore, it is reductionist by only explaining behaviour through intrinsic motivation, a construct that is not integral to Mindfulness. Furthermore, its heavy focus on self-improvement is incongruent with Mindfulness' self-acceptance perspective. Another critique is that it does not explain why people engage in harmful or unhealthy behaviours.

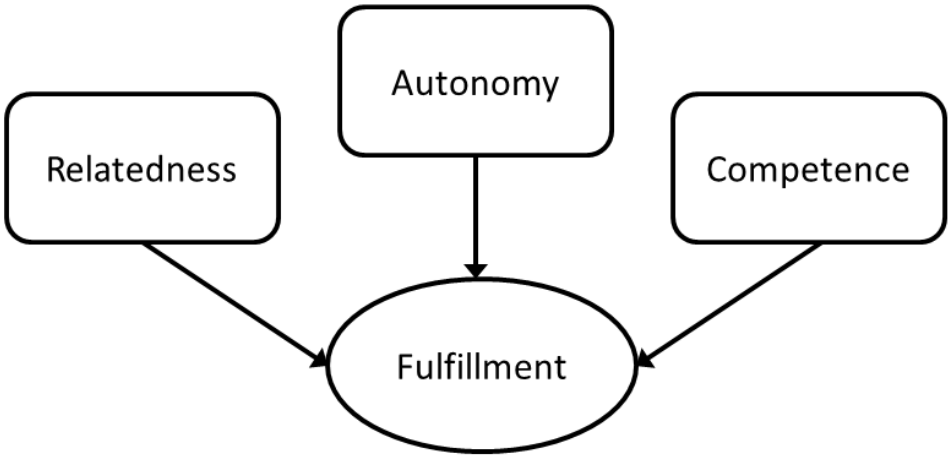


*Figure 3: Self-Determination Theory. Adapted from Deci and Ryan (1985)*

The Trans-theoretical model (DiClemente & Prochaska, 1982) is another intrapersonal focused model. Its five stages of change are: Pre-contemplation, Contemplation, Preparation, Action and Maintenance (*see Figure 4*). Progress through these stages can be forwards or backwards. Self-efficacy and Decisional Balance are key constructs that influence transition between stages. The Trans-theoretical Model was not utilised in this PhD research, as it has limited applicability for a Mindfulness intervention. Mindfulness programmes are typically implemented over eight weeks, as was within this PhD research, which precluded the ability to observe whether the intervention led to the maintenance stage (which is defined as sustaining a behaviour for 6 months). Additionally, the future-focused preparation stage of TTM conflicts with the present-focused teachings of Mindfulness interventions. There is also little evidence demonstrating the model's applicability to changing physical activity levels and dietary behaviours (van Sluijs, van Poppel, and van Mechelen, 2004).

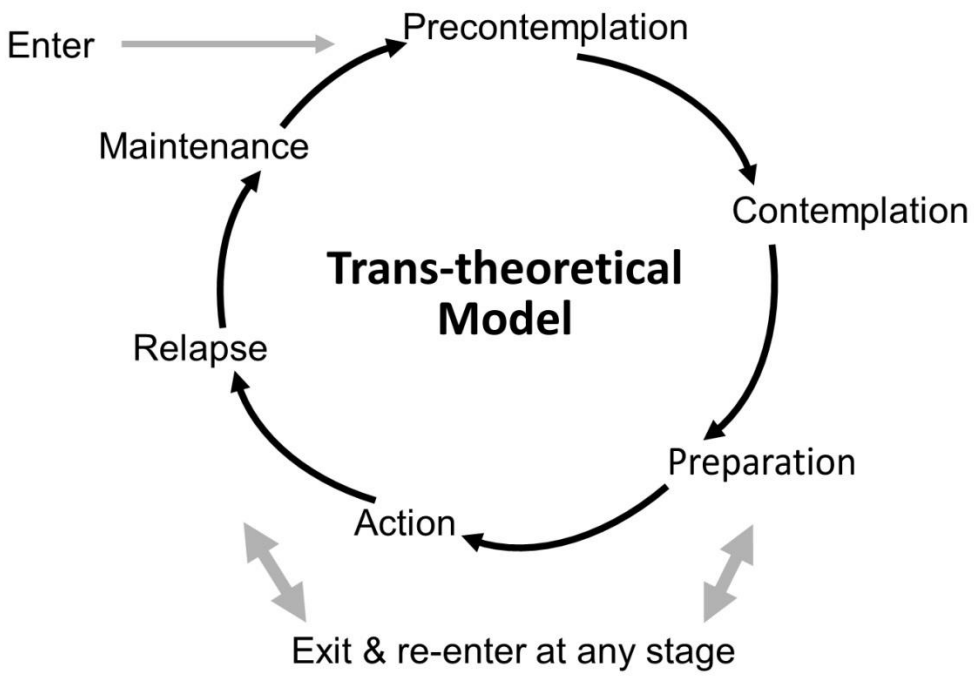


*Figure 4: Trans-Theoretical Model. Adapted from Conner & Sparks (2005)*

The Theory of Planned Behaviour is a predominantly intrapersonal-level focused theory (Ajzen, 1991). This theory contends that the main determinant and construct that influences behaviour is intention (*see Figure 5*). This involves an individual's conscious motivation to fulfil a particular behaviour. Intention subsequently is influenced by three other constructs: attitudes, subjective norms and perceived behavioural control (a more recent addition). Attitudes entail positive or negative evaluations of performing certain behaviours. Subjective norms are perceptions of what other people think about performing particular behaviours. A person's perceived behavioural control is their perception of the control they have over performing certain behaviours. This construct has also been found to influence and predict behaviour directly as well as moderate intention's effect on behaviour (Sheeran & Abraham, 2003). A meta-analysis of meta-analyses of health behaviour studies outlined the relationships between the theory's constructs (Conner & Sparks, 2005). The

intention-behaviour (r+= 0.48) and attitudes-intention (r+= 0.51) relationships had large effect sizes. This shows that attitude does influence intention, which subsequently influence behaviours thus the TPB can predict behaviour on the basis of its constructs. Chatzisarantis and Hagger (2007) noted (as will be elaborated further on) that Mindfulness can strengthen the intention-behaviour relationship for physical activity, suggesting this theory to be suitable for predicting or explaining Mindfulness research. The majority of the remaining constructs' relationships had medium (r+~ 0.3) to large (r+~ 0.5) effect sizes. Only the subjective norm-behaviour (r+= 0.16) relationship had a small effect size. This meta-analysis lends support to the predictive and explanatory value of the theory.

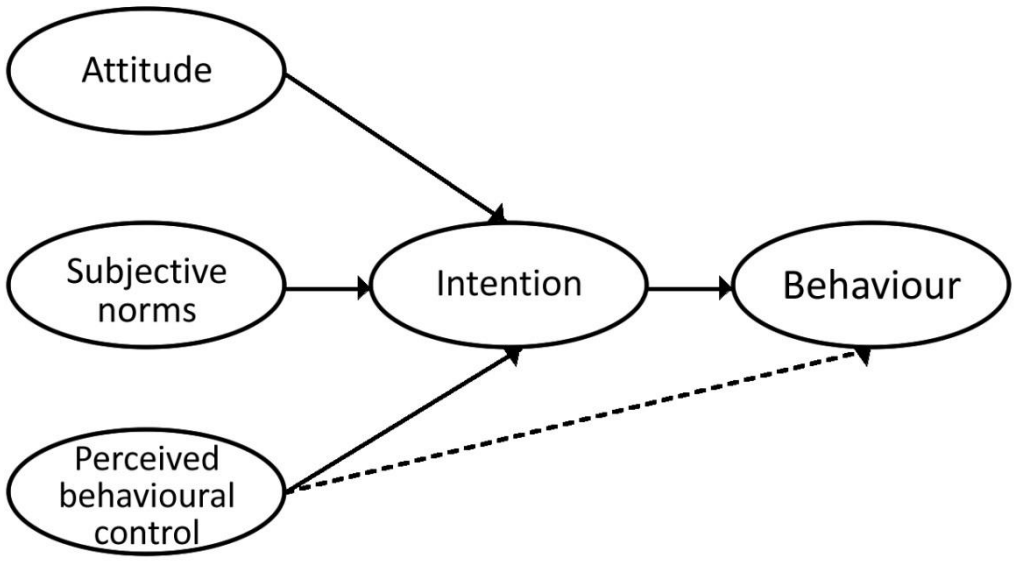


*Figure 5: Theory of Planned Behaviour. Adapted from Ajzen (1991)*

TPB does however have some flaws; it has been suggested that the subjective norms construct attempts to acknowledge interpersonal influences, but this construct is vaguely defined and often does not bear much predictive value for behaviours (Conner & Sparks, 2005). The perceived behavioural control construct has been identified as a useful addition as it has associations with behaviour however, there is no evidence that this construct allows

a person to exert actual control over their behaviour (Armitage & Conner, 2001). Another criticism is of TPB is that it assumes an individual has the opportunities and resources to perform a given behaviour regardless of their behavioural intention. Thus, it ignores the wider social and environmental contexts within which behaviours can be facilitated or hindered.

While these theories do have strengths, they also have limitations. The general disadvantage of individual-focused models of behaviour change is that they are not comprehensive because they only attribute behaviour to proximal individual factors such as their genetics, gender, cognitions, lifestyle and personal skills (Sallis, Owen and Fisher, 2008). Some individual theories do include constructs that attempt to explain interpersonal factors (such as TPB's subjective norms and SCT's socio-structural factors), but they are often incomprehensive and present a simplistic representation of intrapersonal or interpersonal implications.

*Ecological models*

Mindfulness acknowledges that not all determinants of health behaviour are within an individual's control (hence the inclusion of its acceptance and self-compassion teachings). Therefore, it was important to also utilise an overarching model or framework that encompassed this reality. As aforementioned, ecological models encompass for various health behaviour factors across the different levels of society. Many of which (particularly more distal, macro level factors) are insufficiently, if at all accounted for, by individual-focused theories. Ecological models account for community, policy and environmental factors that can add context and enhance understanding of certain behavioural choices

within given populations. Relevant, health-focused ecological models to this PhD do exist. Ecological models have been applied to explain ethnic minority health behaviour (Fleury & Lee, 2006) and cultural contexts of women's health (Thurston & Vissandjée, 2006). More recently, Kumanyika et al. (2012) proposed an ecological model to contextualise ethnic minorities' increased obesity prevalence. They accounted for social factors unique to migrants in terms of their relationships with food and physical activity. For instance, prolonged food scarcity and hunger could foster norms of overeating or seeking high energy foods that may not necessarily be adjusted by changes in cognition or knowledge. Additionally, in highlighting areas where deleterious health practice can arise, they can make useful suggestions for intervention work. For example, they noted that community change is most accessible and can be facilitated through change agents such as community leaders or service providers (from outside the community). Though such ecological frameworks have seldom been empirically tested due to their broad nature (with some notable exceptions such as the Family ecological model; Davison, Jurkowski & Lawson, 2012), they can propose an aptly comprehensive explanation to the complex issue of ethnic minorities' health inequalities for chronic illness.

While not a theory of behaviour change per se, dual processing theories of behaviour can explain one aspect of poor diet: habitual eating, hence is a noteworthy. Dual processing theories of behaviour posit that thought (and subsequently, behaviour) emanate from one of two mental processes. The first of these is an implicit, unconscious process that is often automated. The second is an explicit, conscious process that is overtly controlled by the individual. Wansink (2006) noted that dual processing is evident in eating behaviour. For instance, the act of habitual eating can be explained by the first (implicit) process. This can

account for phenomena such as mindless eating where individuals are unaware of their point of satiety or their intake. Similarly, following stress or other negative mood states, an automated response is often to consume unhealthy foods. Comfort eating can become associated with stress-alleviation and become an automated process. Environmental cues, such as large packets or food containers, the presence of others, lighting or variety can implicitly affect the serving and consumption sizes. In the pursuit of improving dietary choices, it is paramount to address deleterious habitual processes. Mindfulness may present a potential solution via its attention and awareness practices to utilise the second, explicit and controllable process to make healthier food choices. However, Wansink (2016) suggested that removing cues (i.e. limiting the presence unhealthy food or large food vessels in the home) for unconscious, automated eating might be a more effective strategy than attempting to have constant awareness over very automated processes.

**Theories and frameworks to be used in this thesis**

Within this PhD, an individual-focused theory will be used to guide the intervention's development and evaluation. Simultaneously, an ecological model will be used as a broader framework for the purpose of adding greater context and ensuring fewer factors are overlooked.

The TPB will be utilised to guide the intervention. As previously discussed, TPB focuses on intrapersonal factors and it has good predictive value for dietary and physical activity behaviour (Armitage et al., 2001; Hausenblas et al., 1997; McEachen et al., 2005). Furthermore, the TPB can be seen as a conceptually complementary theory to Mindfulness as explained by Chatzisarantis and Hagger (2007). Chatzisarantis and Hagger (2007)

conducted two studies which examined Mindfulness' moderating effects of the intention-behaviour relationship with the TPB. In study 1, they found that intentions could predict physical activity behaviour in Mindful individuals but not in less-mindful individuals. In study 2 they studied counter-intentional habits (in this study, binge drinking), and again found that those who were more Mindful were more likely to enact their physical activity intentions than their less-Mindful counterparts. Thus, Mindful approaches allowed individuals to disengage from habits that would usually detract from the fulfilment of their intentions into behaviours. The authors argued that Mindfulness possesses qualities that are beneficial to the strengthening of the intention-behaviour relationship. They posit Mindfulness caters for greater self-control and propensity to act adaptively to stimuli or events, as it encourages them to be present-focused and aware to all present experiences and novel solutions (as opposed to maladaptive habitual behaviour) (Langer, 1992). As such, it can be suggested that Mindfulness renders individuals more able to glean a more accurate perception of their behavioural control, which in turn can predict their intention and subsequently behaviour. When one has greater self-control, attitudes for particular plans or intentions are more likely to be positive and can subsequently strengthen the intention-behaviour relationship further. As illustrated in study 2 of Chatzisarantis and Hagger (2007), Mindfulness also allows one to focus in fulfilling intentions in the face of counter-intentional thoughts that otherwise impede or preclude the implementation of intentions. The authors added that tendencies such as rumination, fixation on the past (or future), and social anxieties or distress that typify less Mindful individuals reduce attention to an intention, thus abating the intention-behaviour relationship (Kuhl & Fuhrmann, 1998). The Attitudes construct can be intervened upon using the seven attitudinal factors of Mindfulness (Kabat-Zinn, 2004). These are: non-

judging; patience; acceptance; beginner's mind (open-mindedness); non-striving; acceptance; and letting go. Below, *Figure 6* illustrates how Mindfulness principles can be used to influence TPB constructs.

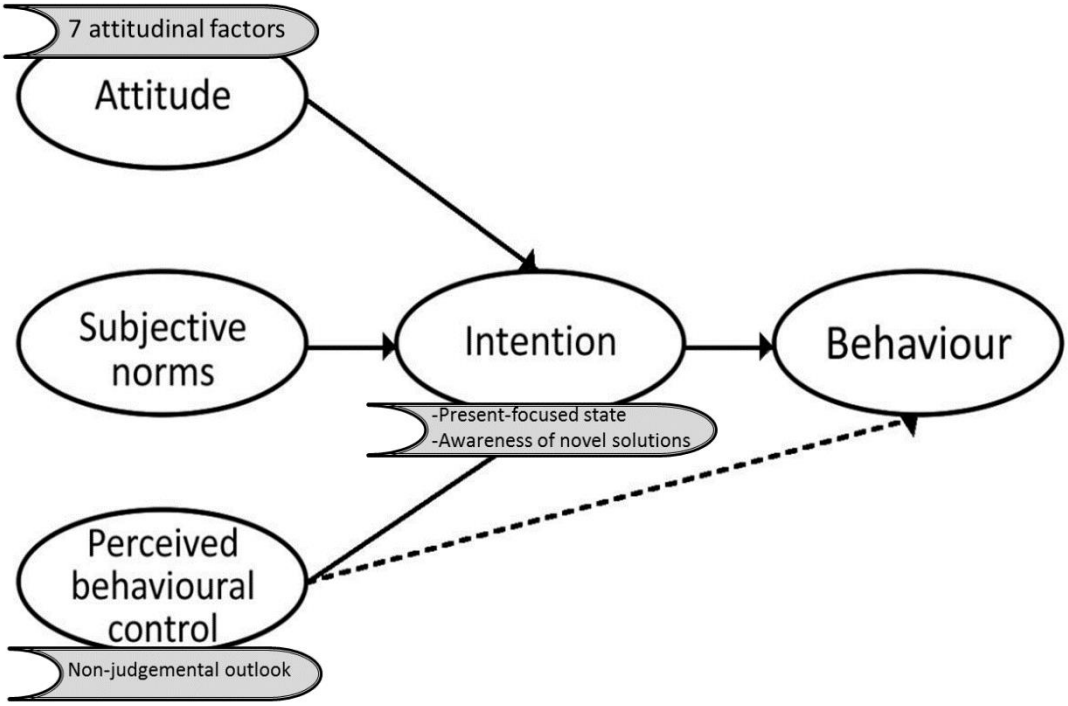


*Figure 6: Mapping Mindfulness features to the TPB*

An ecological model will be used as an overarching theoretical framework for this PhD thesis, as these models acknowledge that both proximal (such as intra- and interpersonal level) and distal (i.e. community, organisational and public policy) factors usually have an interactive influence on behaviour. Therefore, an ecological model used in conjunction with TPB can help address the limitation of TPB described previously whereby it assumes individuals have the resources and opportunities to fulfil an intention and provide explanations for why certain behaviours may not be possible. As the research involves intervention design for an ethnic minority group, the ecological model's more distal levels can present important factors and constructs to consider and incorporate.

Kumanyika et al.'s (2012) Community energy balance model will be used as it draws many parallels with this research (*see Figure 7*). The Community energy balance model is akin to other ecological models, however it uses different names for the various levels. The 'People' level is the proximal, intrapersonal level. The 'Families' level is an interpersonal level which also encompasses the norms of more collectivist cultures by accounting for family systems (something not explicitly addressed in other models). Similarly, the 'Ethnic minority community' level is another, albeit more distal, interpersonal level. This level encompasses sociocultural factors, the built environment and ways of life in the particular ethnic group. The 'General population and culture in host country' is the most macro-social and distal level and provides a wider context in terms of considering aspects of the host country that may influence lifestyle behaviour. Other unique aspects of this model include the focus of ethnic minorities' dietary and physical activity behaviour in regard to a chronic illness as well as examining factors unique to migrant populations, such as the historical experiences of the ethnic group, migration status, structural and sociocultural influences on their lives. Within this ecological framework, the individual-focused TPB can still be utilised to guide intervention development and evaluation.

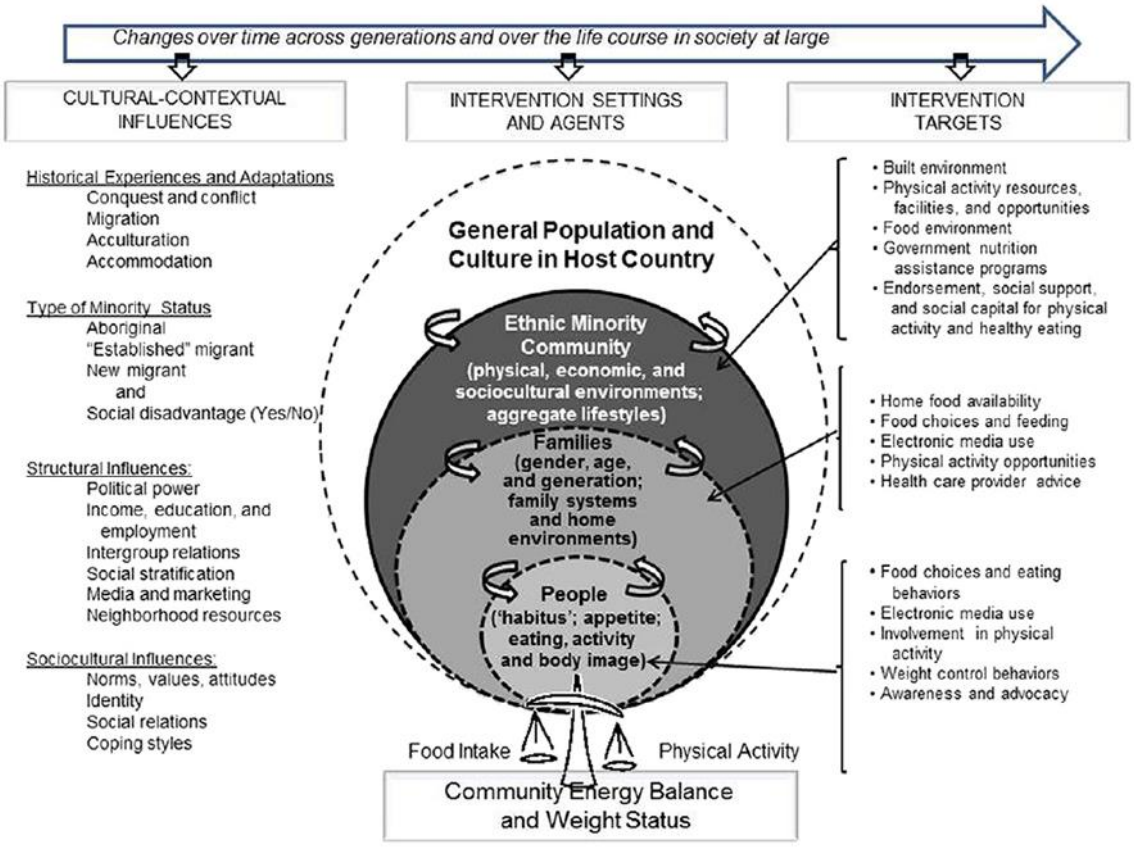


***Figure 7: A "community energy balance" framework for identifying cultural and contextual influences to high-risk of obesity in ethnic minority populations.***

Since this thesis aimed to culminate in a feasibility intervention, it was important to utilise a tool that was designed to evaluate the Mindfulness training. This is important for improving the programme for future replications, to maximise the implementation of acquired learning and to also demonstrate the value of the training. The New World Kirkpatrick Model was chosen for these purposes, for being comprehensive in its evaluations and for its ease of use. This model recognises that a programme should transcend learning and should lead to changed behaviour and subsequently results thus assesses a programme across 4 levels *(Table 4)*.

*Table 4: The New World Kirkpatrick Model*

| | |
|---|---|
| **Level 1: Reaction** | **The degree to which participants find the training favourable, engaging and relevant**<br>• **Customer Satisfaction**<br>• **Engagement (New world addition):** **The degree to which participants are actively involved in and contributing to the learning experience**<br>• **Relevance (New world addition):** **The degree to which training participants will have the opportunity to use or apply what they learned in training on the job** |
| **Level 2: Learning** | The degree to which participants acquire the intended **knowledge**, **skills**, **attitude**, **confidence** and **commitment** based on their participation in the programme |
| **Level 3: Behaviour** | The degree to which participants apply what they learned during training when they are back on the job<br>• **Required Drivers (New world addition):** Processes and systems that reinforce, encourage and reward performance of critical behaviours on the job |
| **Level 4: Results** | The degree to which targeted outcomes occur because of the training and the support and accountability package<br>• **Leading indicators (New world addition):** Short-term observations and measurements suggesting that critical behaviours are on track to create a positive impact on desired results |

Level 1 Reaction is concerned with participant response the Mindfulness training. However, the model recognises that response is not merely limited to their satisfaction and initial perception. Participants' engagement (the degree to which they are actively involved as opposed to being passive in the learning experience) and the relevance of the Mindfulness content (whether participants have an application for it) also determine the programme's effectiveness. Level 2 Learning entails whether participants acquire the training and knowledge. Specifically, whether they truly attain Mindfulness knowledge and Mindfulness skills, foster a pro-Mindfulness attitude (i.e. that it can be beneficial), their confidence that they can implement the Mindfulness skills and their commitment to attempting to implement Mindfulness learning into daily life. Level 3 Behaviour involves the degree to which participants implement the Mindfulness skills. The model takes into account required

drivers, processes or experiences in their daily life that would reinforce continued Mindfulness practice. Required drivers also include the Mindfulness practitioner reinforcing participant progress (at least during the programme). Level 4 results assess the degree with which implemented Mindfulness skills yield desired outcomes. While this level is primarily concerned with participants' results, it also encompasses results for the programme as a whole. The leading indicators construct helps bridge the gap between short term observations that may suggest longer-term benefits.

## Aim statement

The aims of this PhD research were to: 1) systematically review the research examining the effectiveness of MBIs in the treatment of diabetes; and 2) develop, implement, and evaluate the feasibility and acceptability of a culturally tailored Mindfulness intervention designed to reduce the risk of developing diabetes in young (18-30 years) South Asian adults living in the United Kingdom (UK). South Asians living in the UK have an increased risk for diabetes as compared to White Europeans (Barnett et al., 2006). The onset of diabetes is also earlier in South Asians (Gholap et al., 2009). Additionally, the fact that duration of diabetes bears a considerable risk factor for further complications (Chowdhury & Lasker, 2002) means that preventative interventions are needed at an earlier age for South Asians. For this reason, young adults are the focus of this research. In additional to assessing the feasibility and acceptability of the tailored Mindfulness intervention, various behaviours were measured including:

- Mindfulness
- Stress, anxiety & depression (in a combined scale)

- (Health-related) Quality of life
- Self-reported diet
- Body mass index (BMI)
- Blood pressure
- Physical activity (measured by accelerometry)
- Sedentary time (measured by accelerometry)

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# Chapter 2: Effectiveness of Mindfulness-based Interventions on Physiological and Psychological Complications in Adults with Diabetes: A Systematic Review

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# Chapter 2: Effectiveness of Mindfulness-based Interventions on Physiological and Psychological Complications in Adults with Diabetes: A Systematic Review

## Overview

This systematic review aimed to examine the effectiveness of Mindfulness- based interventions (MBIs) in reducing diabetes-related physiological and psychological symptoms in adults with types 1 and 2 diabetes. Five databases were systematically searched. Eleven studies satisfied the inclusion criteria. MBI effectiveness for physiological outcomes (glycaemic control and blood pressure) was mixed. MBIs appear to have psychological benefits reducing depression, anxiety and distress symptoms across several studies. Studies' short term follow-up periods may not allow sufficient time to observe physiological changes or illustrate MBIs' potential long-term efficacy. More long-term studies that include a consistent, standardised set of outcome measures are required.

**Keywords:**

Mindfulness, Mindfulness based stress reduction, Mindfulness based cognitive therapy, diabetes, systematic review

## Introduction

Diabetes is a chronic metabolic disease that can lead to glycaemic, neuropathic, nephropathic, retinopathic and macrovascular complications (Fowler, 2008, Porte and Schwartz, 1996). Although the physical symptoms of diabetes are well documented, patients with the disease must contend with more than just these symptoms. Diabetes is psychologically and behaviourally demanding, as it requires meticulous self-management through multiple simultaneous lifestyle adaptations. To manage their disease, people with diabetes must monitor their physical activity levels, diet, weight, medication requirements and blood glucose levels.

As such, diabetes presents a considerable source of life stress. Thus it is not surprising that diabetes has a high comorbidity with some psychological disorders. People with diabetes are twice as likely to have depression at clinical levels (Anderson et al., 2001). Additionally, 40% of patients with diabetes exhibit elevated anxiety symptoms (Grigsby et al., 2002). Diabetes also presents a social burden that can impede social interactions, as people with diabetes often perceive negative appraisal of their condition by others (Schabert et al., 2013). Schabert et al. outlined various aspects of negative appraisal that emanate from higher body weight and use of insulin for those who are insulin-dependent. The culture of blame surrounding overweight and obesity causes patients to perceive their illness as being self-inflicted through laziness and low self-control, and other such character judgements rife in Western culture (Thomas et al., 2008). Patients also fear unwanted attention or being mistaken for illicit drug users when publically using vials and syringes (in those who do not use insulin pumps and pens). Schabert et al. noted such stigmatisation can preclude optimal diabetes-related self-management. The negative emotional states induced

by stigma causes concealment attempts such as avoiding injecting insulin in public spaces, therefore delaying or foregoing insulin intake (Shiu et al., 2003). Another example of concealment includes reluctance to decline foods with higher caloric values due to embarrassment (Wellard et al., 2008).

Therefore, equipping patients with the necessary coping and self-care techniques may be an important step in managing diabetes-related distress and other associated psychological symptoms. Subsequently, managing psychological barriers may facilitate improved health behaviour geared towards ameliorating diabetes symptoms. Various mind-body approaches exist that could be beneficial to people with diabetes. Mindfulness is an approach that has surged in popularity in many applications, settings and populations (Baer, 2003, Niazi and Niazi, 2011).

Mindfulness as a therapeutic intervention was developed by Dr Jon Kabat-Zinn in 1979 (Kabat-Zinn, 1990). Mindfulness therapies are derived and adapted from Buddhist practices but are delivered secularly. They incorporate breathing techniques and meditation exercises, and aim to channel attention non-judgementally into the present moment. Thus internal (e.g. emotions, thoughts or sensations) and external (e.g. visual and audible) stimuli are attended to without gauging whether they are important or unimportant, good or bad, pleasant or unpleasant, or correct or incorrect.

Initially, Mindfulness was aimed at managing and reducing stress, particularly for psychological issues such as anxiety, stress-related disorders and depression; hence its alternative nomenclature: Mindfulness-based stress reduction (MBSR). A more recent variant of Mindfulness-based therapy, known as Mindfulness-based cognitive therapy

(MBCT), has been developed and initially applied to people suffering from relapses of depression (Segal et al., 2002). As the name suggests, it is a synthesis of MBSR and cognitive behaviour therapy. These Mindfulness-based interventions (MBIs) typically entail participating in weekly 1- to 2-hour long sessions for a period of 8 weeks. The sessions involve guided practice of the aforementioned techniques and exercises.

MBIs have garnered success and acceptance in mental health applications (Chiesa and Serretti, 2011, Khoury et al., 2013). In the decades since its inception, Mindfulness application has increasingly been extended with relative success to physical health conditions including irritable bowel syndrome, chronic pain, diagnoses of cancer and human immunodeficiency virus (HIV)/acquired immune deficiency syndrome (AIDS) (Simpson and Mapel, 2011, Page, 2012, Niazi and Niazi, 2011). Collectively, this research demonstrates that MBIs can lead to ameliorated medical symptoms by reducing ill-being (e.g., stress, anxiety and depression) and enhancing quality of life and wellness.

Whitebird, Kreitzer, and O'Connor's (2009) review considered the potential applicability and efficacy of MBIs for diabetes (in light of the then lack of MBI research on diabetes) by accounting for MBI success when applied to other chronic conditions. Whitebird et al. contended that developing non-judgemental awareness may reduce the burden of diabetes in a similar manner observed in other illnesses. MBIs have since been applied to diabetes, although the research is sparse and unfocused, with varying primary outcomes measured across studies. Encouragingly, evidence shows that MBIs can have psychological benefits when applied to diabetes. Berghmans et al. (2012) found MBIs are effective in reducing stress, anxiety and depression symptoms in patients with type 1 diabetes, and

Keyworth et al. (2014) demonstrated Mindfulness yielded improvements in worry and thought suppression in patients with types 1 and 2 diabetes. Sowattanangoon et al. (2008) found a significant association between strength of Buddhist values (of which Mindfulness is integral) and better diabetes self-care and lower $HbA_{1c}$. While these were not causal relationships, the extant findings suggest that Mindfulness techniques may be associated with positive health behaviours and improvements in physical health symptoms among people with diabetes. In recent years, MBI studies applied to diabetes have also studied physical health outcome measures while using experimental designs.

Since Whitebird et al.'s (2009) review, more MBI for diabetes research has been conducted. Some of this research has also investigated MBI's physiological effects. Current literature has not yet aggregated the effectiveness of MBIs on the psychological or physiological complications in diabetes. The purpose of the present systematic review is to follow on from Whitebird et al. (2009) and assess the usefulness of MBIs applied to both types 1 and 2 diabetes. It also highlights gaps in current knowledge pertaining to MBIs for diabetes.

## Methodology

### PICO statement

To inform and guide study selection and appraisal of articles, the following PICO statement was developed: In adults with (Type 1 or Type 2) diabetes, does an adjunctive Mindfulness-based intervention reduce their diabetes-related physiological (such as $HbA_{1c}$ level, albuminuria, macrovascular and microvascular) and/or psychological (such as quality of life; diabetes-related stress; depression; stress, anxiety and worry) symptoms?

**Inclusion/ Exclusion criteria**

The PICO statement helped to establish the inclusion and exclusion criteria:

Inclusion criteria:

- Original primary research studies
- Prospective, quasi-experimental (non-randomised, non-controlled) and randomised controlled trial designs
- Adults (aged 18 years or older) diagnosed with type 1 or Type 2 diabetes
- Mindfulness-based interventions inclusive of MBSR, MBCT or Mindful eating programmes, or dual therapy interventions which include Mindfulness as a major component
- Reported outcomes of glycaemic control, microvascular complications, macrovascular complications, or psychological symptoms

Exclusion criteria:

- Review articles and any other secondary articles, case studies, or qualitative studies
- Symposium or conference articles (as these do not have fully described methodological procedures)
- Patients with non-diabetes metabolic conditions
- Patients with gestational diabetes
- Absence of pre- and post-intervention comparison
- Inclusion of uncontrolled physical activity or dietary changes as part of the intervention
- Yoga-focused interventions (these are first and foremost physical activity interventions with Mindfulness integrated rather than the converse. Thus, it is

difficult to disentangle and ascertain the sole Mindfulness effects from the physical activity effects as alluded to by Abbott et al. (2014))

- Articles outlining a methodology for an on-going study but had not yet collected or reported results
- Full texts published in languages other than English or French (based on literacy levels of the author team)

**Search strategy**

A systematic literature review search strategy was devised in consultation with a medical librarian at the university. Five databases were searched as these were deemed the most relevant for Health Psychological research: Medline, Web of Science, PubMed, PsycInfo and Google Scholar. Keywords and Medical subject headings (MeSH) were used as part of the search strategy. For Medline and PsycInfo (1946 to week 4 of May 2015), the search strategy began by searching Mindfulness, expanding this MeSH heading to also search for related subheadings. The search for the MeSH heading Diabetes was also expanded for associated subheadings. These two search results were then combined using the 'And' operator. The search strategy was limited to these three basic steps as Mindfulness for diabetes literature is still relatively novel and thus sparse. For the other databases, key terms used were Mindfulness, Mindful* or meditation in combination with diabetes, gly?emi*, neuropathy, retinopathy, nephropathy, macrovascular or vascular. The reference lists of retrieved (primary and secondary) articles were also hand-searched to find any studies not yielded by database searches. Grey literature was not considered. Articles were identified for further review by screening search results' titles and abstracts. In the event that a study's design was unclear when reviewing the abstract, the full article was obtained for a full text

review. For an illustration of this study identification process, *see Figure 8*. Titles, abstracts and full texts using the inclusion and exclusion criteria were screened by FN and an independent researcher. Any disagreements were reconciled through discussion. If a discrepancy could not be resolved, a third reviewer (JLT) was consulted.

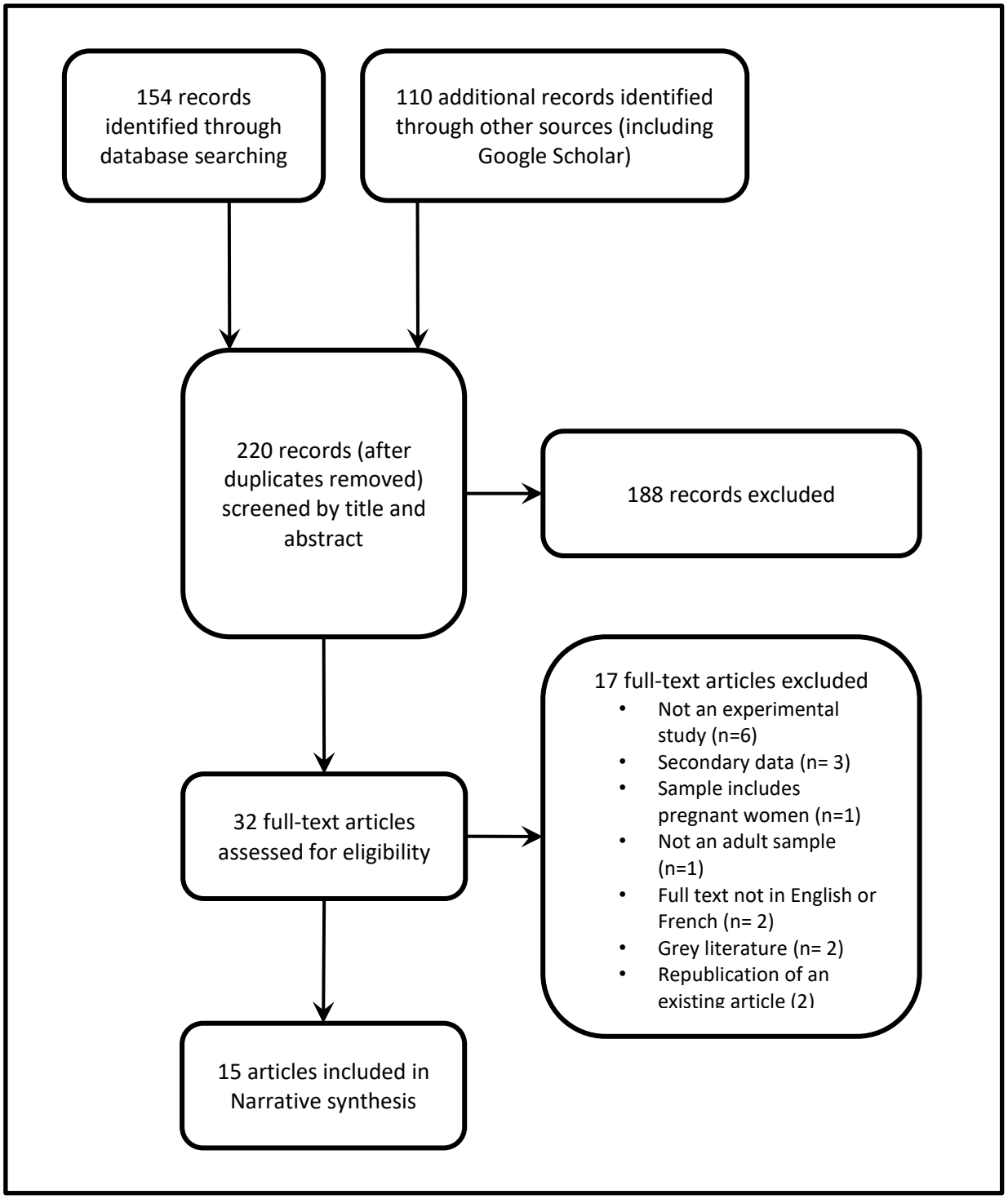


*Figure 8: Flow chart demonstrating identification process of selected MBIs for diabetes articles.*

### Critical Appraisal of Included Literature

The studies were then critically appraised to assess the risk of bias using the Joanna Briggs Institute (JBI) checklist for experimental studies (see Appendix A). Upon completing the checklist for each study, judgements about the degree with which quality affects confidence in each study were made. This was also assessed independently by two reviewers (FN and an independent researcher).

### Data collection

Study characteristics such as the research design, population, setting, intervention details, outcome measures, results observed and risk of bias were collected using a standardised data extraction form (see Appendix A). The two aforementioned reviewers extracted data independently and discussed any discrepancies to arrive at consensus.

### Analysis approach

A narrative synthesis was used for the analysis approach because of the lack of consistency and high variation in measured outcomes across the included studies. This is also the reason as to why a meta-analysis could not be conducted, as no consistent outcome was measured across all the studies.

## Results

Electronic searches yielded 264 results. After title and abstract screening, 32 remained for full text review. A total of 11 studies from 15 articles were included in the final review (*see*

*Table 5 for a summary of included studies*). Reasons for exclusion at full-text review stage are listed in *Figure 8*.

*Table 5: Summary of included articles*

| Article, country | Study design & comparator | Participants | Diabetes type | Intervention | Length of intervention | Outcomes |
|---|---|---|---|---|---|---|
| **Berghmans (2012), France** | RCT with a wait-list control group | 17 adults (3 men, 14 women) Age range = 20–50 yrs | Type 1 (>10 yrs) | MBSR (group-based). Weekly 2½ hr sessions | 8 weeks (plus 16-week follow-up) | Primary: Stress, anxiety and depression |
| **Dreger et al. (2013), Canada** | Quasi-experimental | 11 Aboriginal adults (1 man, 10 women) Mean age ±SD = 60.1 ±8.7 yrs | Type 2 | MBSR (group-based, adapted culturally and for diabetes). Weekly 2 hr sessions. Plus, mindfulness home practice: 20-30mins, 5 days a week | 8 weeks (plus 2-month follow-up) | Primary: HbA1c, blood pressure Secondary: Weight, health-related quality of life, psychological distress, subjective well-being, diabetes self-care, Mindfulness |
| **Gregg et al. (2007), USA** | RCT with diabetes education only control | 81 adults (43 men, 38 women) Mean age = 50.9 yrs (Standard deviation unreported) | Type 2 | Acceptance and commitment therapy (ACT). Group-based and adapted for diabetes | 4 hr ACT (including acceptance and Mindfulness skills) workshop in addition to control group's diabetes education workshop 7hrs) (3 months follow-up) | Primary: HbA1c Secondary: Self-management, Changes in ACT processes |
| **Hartmann et al. (2012), Germany** | RCT with treatment as usual control | 110 adults (86 men, 24 women) Age range = 30–70 yrs | Type 2 (>3 yrs) with albuminuria | The HEIDIS-Study: MBSR (group-based and adapted for diabetes) once a week, plus a booster session at 6 months | 8 weeks (plus 1-year follow-up) | Primary: Albuminuria Secondary: Systolic and diastolic blood pressures, HbA1c depression, stress, health status |
| **Keyworth et al. (2014), UK** | Sequential Mixed methods Pre-test, post-test | 40 adults (19 men, 21 women) with age range of 54- | Type 2; coronary heart disease; patients with both Type 2 and heart | Pilot study. MBSR variant (group-based and adapted for diabetes). Weekly 2hr sessions (first session lasted 2½ hrs) | 6 weeks | Primary: Worry, thought suppression Secondary: Intervention feasibility and acceptability |

| | | | | | | |
|---|---|---|---|---|---|---|
| | experimental design | 85 yrs | disease | | | |
| **Kopf et al. (2014), Germany (same study [HEIDIS] as Hartmann (2012))** | RCT with treatment as usual control | 110 adults (86 men, 24 women) Age range = 30–70 yrs | Type 2 (>3 yrs) with albuminuria | The HEIDIS-Study: MBSR (group-based and adapted for diabetes) once a week, plus a booster session at 6 months | 8 weeks (plus 1, 2 and 3 years follow-up) | Primary: Albuminuria Secondary: Metabolic parameters (HbA1c), intima media thickness, depression, stress, health status and cardiovascular events |
| **Miller et al. (2012) and Miller et al. (2014), USA** | RCT with Diabetes Self-Management Intervention | 52 adults (19 men, 33 women) Age range = 35 to 65 yrs | Type 2 (>1 yr) | Mindful Eating Intervention: 8 weekly and 2 biweekly 2½ hr group-based sessions | 8 weeks (plus 1 and 3-month follow-up) | Primary: Dietary intake, body weight, HbA1c, fasting plasma glucose, fasting insulin, depressive symptoms, nutrition and eating-related self-efficacy, Secondary: physical activity, outcome expectations, cognitive control, disinhibition of control regarding eating |
| **Rosenzweig et al. (2007), USA** | Prospective observational study | 14 adults (5 men and 9 women) Age range = 30-75 yrs | Type 2 (>1 yr) | MBSR. 150 min group-based session once a week plus 7 hr weekend session | 8 weeks (plus 1-month follow-up) | Primary: HbA1c, blood pressure, body weight, symptom checklist-90 revised (anxiety, depression, somatisation, general psychological distress scores) |
| **Schroevers et al. (2013), The Netherlands** | RCT with waitlist–control group | 24 adults (14 men, 10 women) Age range = 44 to 65 yrs | Type 1 or 2 | Individual MBCT (I-MBCT). 8 weekly individual sessions of 1 hr | 8 weeks (plus 3-month follow-up) | Primary: Depressive symptoms and diabetes-related distress Secondary: Mindfulness, Awareness and attention regulation |
| **Teixeira (2010), USA** | Pre-test, post-test experimental design | 20 adults (5 men, 15 women) Age range = 50-92 yrs | Type 2 (>1 yr) | Pilot study. Mindfulness meditation (not MBSR) | 4 weeks | Primary: Neuropathic Pain, Quality of Life and Sleep quality |
| **Tovote et al. (2014) and Tovote et al.** | RCT with CBT group | 94 adults (48 men, 46 women) | Types 1 & 2 (with symptoms of depression) | MBCT. Weekly (individual) 1hr sessions plus daily home practice for 30 min/day | 8 weeks (plus 9-month follow-up) | Primary: Severity of depressive symptoms, Depression, Secondary: Anxiety, wellbeing, |

| | | | | | | |
|---|---|---|---|---|---|---|
| **(2015), The Netherlands** | | Age range = 36-65 yrs | | | | diabetes-related distress, and HbA1c |
| **Van Son et al. (2013) and Van Son et al. (2014), The Netherlands** | RCT with waitlist control | 139 adults (70 men, 69 women) Mean age ±SD = 56.5 ±13 yrs, | Types 1 & 2 (with low emotional well-being) | The DiaMind study: MBCT (group-based and adapted for diabetes) 2 hrs a week and home practice for 30 min/day | 8 weeks | Primary: stress, anxiety & depression, mood, diabetes distress Secondary: Quality of Life, HbA1c |

**Study characteristics**

Included articles dated from 2007 onwards (see Table 4). Studies were conducted in the USA (n = 4), the Netherlands (n = 3), Germany (n = 1), France (n = 1), UK (n = 1), and Canada (n = 1). Most studies focused on participants with Type 2 diabetes; only Berghmans et al. (2012) focused on participants with type 1 diabetes. Three studies included participants with both types. One study included patients with diabetes and/or coronary heart disease. The majority of participants across trials were white, however the sample in Dreger et al. (2013) consisted of Canadian Aboriginals. Women represented the larger proportion of participants in all but three studies. There was a wide age range of participants, from 18 to 92 years old across studies.

**Intervention characteristics and measured outcomes**

There was much heterogeneity in results regarding intervention types, duration and measured outcomes. Six were MBSR trials, two used MBCT trials. One was a Mindful eating trial (Miller et al., 2012, Miller et al., 2014), another trial was a dual therapy trial (Gregg et al., 2007), and a final trial (Teixeira, 2010) was described as a form of Mindfulness meditation based upon, but not specifically, MBSR. Most trials were 8 weeks long (n = 9). Outcomes included various physiological ($HbA_{1c}$, blood pressure, weight, albuminuria and neuropathic pain), psychological (stress, anxiety, depression, distress, quality of life, diabetes self-care, health status, worry, thought suppression, sleep quality, mood, subjective well-being Mindfulness) and dietary measures (nutrition and eating-related self-efficacy, disinhibition of control regarding eating). Eight were delivered to groups, 2 delivered to individuals and one provided a Mindfulness CD for home practice.

**Effect of MBIs on physical health outcome measures**

Physical health outcomes included weight (n = 4), $HbA_{1c}$ (n = 7), diabetic neuropathy (n = 1), albuminuria (n = 1) and blood pressure (n = 3). Few studies reported weight outcomes. One trial reported weight loss (Miller et al, 2012); however three trials reported no change in weight (Dreger et al., 2013; Kopf et al., 2014, Rosenzweig et al, 2007). Four interventions successfully lowered $HbA_{1c}$ levels. These studies were either tailored for diabetes patients, towards eating behaviour or culturally-adapted. However, the three largest studies found no change in $HbA_{1c}$. Teixeira (2010) reported no effect of MBI on diabetic neuropathy. One of the larger trials (HEIDIS) reported no post-intervention effect on albuminuria (reported in Hartmann et al., 2012). At 1-year follow-up, albuminuria improved: there was a reduction in urinary albumin-creatinine-ratio (ACR). However, this was not sustained after 2 and 3-year follow-up (reported in Kopf et al., 2014). Blood pressure reduction was observed in the two smallest studies. Diastolic (but not systolic) blood pressure reduction was observed in the HEIDIS study, however these effects were lost at 2- and 3-yr follow-up.

**Effect of MBIs on psychological outcome measures**

Studied psychological outcomes were: anxiety (n = 5); stress (n = 3); depression (n = 6); diabetes-related distress (n = 3); distress (n = 3); quality of life (n = 2); well-being (n = 1); health status (n = 1) illness condition acceptance (n = 2); self-management (n = 1); coping (n =1); sleep and relaxation (n =1); worry (n = 1); thought suppression (n = 1) and Mindfulness (n = 2). It is important to note the subtle distinctions between stress, anxiety and distress. Stress is a response to a known stressor that elicits activation of the sympathetic nervous

system (Ahmed et al., 2011). Anxiety has similar symptoms to stress but no identifiable cause. Anxiety is characterised by a state of panic and feeling of helplessness (American Psychiatric Association, 2013). Distress is generally regarded as a broad umbrella term encompassing various negative states and has its own measuring scales (Ridner, 2004). In all five studies that took measures of anxiety, anxiety symptoms were reduced. Stress reduction was observed in two trials and in the HEIDIS study (Hartmann et al., 2012) via per-protocol analysis (a comparison of experimental groups which only includes participants who completed the intervention). However, in HEIDIS, after an intention-to-treat analysis (a comparison of experimental groups which includes all participants as originally allocated following randomisation), no stress reductive effect was observed. Furthermore, the HEIDIS stress reduction effects were not sustained at follow-up of 2 and 3 years. Depression symptoms were reduced in six studies including the 3 largest studies, of which van Son et al. (2013) observed clinically significant effects. Tovote et al. (2015) found sustained effects on depression symptoms at 9-month follow-up. Conversely, when van Son et al. (2013) followed up after 6 months, depressive symptom reductions measured by an alternate scale (Profile of Mood States (POMS; Curran, Andrykowski & Studts, 1995)) were not significant compared to baseline.

Four interventions led to reductions in distress measures. Conversely, van Son et al. (2013) and Dreger et al. (2013) found no change in distress measures. Five interventions found improvements in measures related to wellness (quality of life, well-being and health status). Two trials led to greater illness condition acceptance. However, one of these MBIs also included components of acceptance and commitment therapy. One study, Gregg et al. (2007), assessed behavioural adaptation and reported enhanced self-management.

Keyworth et al. (2014) observed improvements in sleep (qualitatively reported), relaxation (qualitatively reported), worry and thought suppression. Finally, two studies assessed Mindfulness scores. Schroevers et al. (2013) observed an increase in 1 of the 2 Mindfulness subscale values: act with awareness (but not accept without judgement). Dreger et al. (2013) found no significant change in Mindfulness scores post-intervention.

**Dietary outcome measures**

Miller et al. (2012) reported reductions in energy intake and glycaemic load. Dreger et al. (2013) found small to medium effects for general diet improvement and high-fat food avoidance, although these changes were not statistically significant.

**Factors potentially related to intervention effectiveness**

Intervention characteristics can affect effectiveness and thus need to be examined when assessing intervention effectiveness. Intervention duration varied across studies. Three studies did not follow the 8-week MBI template: Gregg et al. (2007) opted for a one-day, 4-hour workshop; Teixeira (2010) delivered a 4-week MBI program; and Keyworth et al. (2014) delivered a 6-week program. Interestingly, the briefer intervention durations were as likely to result in positive outcomes. Gregg et al. (2007) observed $HbA_{1c}$ level reductions with the one-day workshop, suggesting that 8 weeks were not required to see beneficial outcomes. However, this group delivered a dual therapy with Acceptance and Commitment therapy components, which could have contributed to these beneficial effects in a shorter time span. Teixeira (2010) and Keyworth et al. (2014) measured outcomes that other studies did not, making it impossible to compare across studies.

Additional factors that may have affected intervention effectiveness include experience and training level of the practitioner, and the use of a group- or individual-delivery format approach. Five studies gave information regarding their practitioner's years of experience and/or clinical background. The experience and training level of the practitioner did not have an influence on outcomes. Nine studies used a group-based delivery format, with the remaining 3 individual-based. Mode of delivery did not appear to influence outcomes. A final factor that may affect MBI effectiveness was whether the MBIs were adapted for their population. Five studies were adapted to be more diabetes-focused. Of these 5, Dreger et al. (2013) was also adapted to incorporate cultural (Canadian Aboriginal) healing traditions. Additionally, Miller et al. (2012) adapted their intervention to focus on eating and hunger cues as their aim was to reduce weight control issues common amongst people with diabetes.

**Acceptability and feasibility**

Where reported within studies, MBIs were deemed acceptable and feasible. Teixeira (2010) noted a low attrition rate and reported that the intervention was well received and feasible. Dreger et al. (2013), Gregg et al. (2007) and Schroevers et al. (2013) reported that participants stated they were satisfied with the intervention. Dreger et al. (2013) in particular noted that their culturally-adapted MBI was feasible for the target minority group under study.

**Study quality (risk of bias)**

The risk of bias for each study is summarised in *Table 6*. Overall, the general quality of studies was mixed, ranging from 2 to 10 and scoring an average of 6.3 (out of a maximum score of 11) on the JBI critical appraisal checklist. The 7 RCTs however were generally of high quality, scoring an average of 9. The non-RCTs scored an average of 3.6. Not all studies used two comparable groups, with 5 using different quasi-experimental designs. This causes concern for their internal validity and casts doubt over how readily we can establish the causality of these MBIs' beneficial effects. It must be noted however, that controlled trials yielded similar beneficial effects, particularly for psychological outcomes. Six of the 7 studies that used randomised designs specified their randomisation method; most that did report randomisation method used computer generated number sequences. Only one study confirmed blinding participants, with the other 11 neglecting to report any information about this methodological aspect. This increases the risk of bias as participants are aware of their group allocation. The majority of studies had complete outcome measure data (for all participants) and also used intention-to-treat analyses (with listed explanations for any dropout during the intervention). Six studies conducted follow-up. Of these, two had not retained an adequate sample size of 80% at follow-up (in accordance with the JBI critical appraisal tool). Another study also suffered potential attrition bias with a dropout rate of approximately 25% from their experimental group. The studies generally measured outcomes reliably.

*Table 6: Summary of quality of included literature*

| Source | Was the assignment to treatment groups random? | Were participants blinded to treatment allocation? | Was allocation to treatment groups concealed from the allocator? | Were the outcomes of people who withdrew described and included in the analysis? | Were those assessing outcomes blind to the treatment allocation? | Were the control and treatment groups comparable at entry? | Were groups treated identically other than for the named interventions? | Were outcomes measured in the same way for all groups? | Were outcomes measured in a reliable way? | Was there adequate follow-up (>80%) | Was appropriate statistical analysis used? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Berghmans et al. (2012), France** | Yes | Unclear | Unclear | Yes | Yes | Yes | Yes | Yes | Yes | No (no follow-up) | Yes |
| **Dreger et al. (2013), Canada** | No (no other treatment groups) | No (no other treatment groups) | No (no other treatment groups) | Yes | No (no other treatment groups) | No (no other treatment groups) | No (no other treatment groups) | No (no other treatment groups) | Yes | Yes | Yes |
| **Gregg et al. (2007), UK** | Yes | Unclear | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **Hartmann et al. (2012), Germany** | Yes | Unclear | Unclear | Yes | Unclear | Yes | Yes | Yes | Yes | Yes | Yes |
| **Keyworth et al. (2014), UK** | No (no other treatment groups) | No (no other treatment groups) | No (no other treatment groups) | Unclear | No (no other treatment groups) | No (no other treatment groups) | No (no other treatment groups) | No (no other treatment groups) | Yes | No (no follow-up) | Yes |
| **Kopf et al. (2014) Germany (same study [HEIDIS] as Hartmann,** | Yes | No | Unclear | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **2012)** | | | | | | | | | | | |
| **Miller et al. (2012) and Miller et al. (2014), USA** | Yes | Unclear | Yes | No | Yes | Yes | Yes | Yes | Yes | No | Yes |
| **Rosenzweig et al. (2007), USA** | No (no other treatment groups) | No (no other treatment groups) | No (no other treatment groups) | Unclear | No (no other treatment groups) | No (no other treatment groups) | No (no other treatment groups) | No (no other treatment groups) | Yes | No | Yes |
| **Schroevers et al. (2013), The Netherlands** | Yes | Unclear | Unclear | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **Teixeira et al. (2010), USA** | Yes | Unclear | Yes | No | Yes | Yes | Yes | Yes | Yes | No (no follow-up) | Yes |
| **Tovote et al. (2014) and Tovote et al. (2015), USA** | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No (no follow-up) | Yes |
| **Van Son et al. (2013) and van Son et al. (2014), The Netherlands** | Yes | Unclear | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No (no follow-up) | Yes |

## Discussion

The aim of this review was to follow on from Whitebird et al.'s (2009) review in aggregating and assessing the usefulness of MBIs applied to both types 1 and 2 diabetes. It also aimed to highlight gaps in current knowledge concerning MBIs for diabetes. Eleven studies (from 15 articles) met the inclusion criteria. Congruent with prior literature (Khoury et al., 2013, Chiesa and Serretti, 2011), there was relatively consistent evidence for MBIs' effectiveness on psychological outcomes. Results found mixed evidence for MBIs' effectiveness on physiological outcomes.

MBIs had mixed evidence for effectiveness in alleviating physical health symptoms- again similar to MBIs for other chronic illnesses (Carlson, 2012, Niazi and Niazi, 2011). Although 4 studies found that MBIs reduced $HbA_{1c}$ levels, another three studies (which were larger, higher quality with lower risk of bias) found no change. Blood pressure reduction was observed in 3 studies, however these effects were lost at 2- and 3-year follow-up in largest of these. The HEIDIS study found no initial post-intervention effect on albuminuria, nevertheless at 1-year follow-up reductions in urinary albumin-creatinine-ratio were observed. However these effects were not sustained when measured at 2- and 3-year follow-up. Although Teixeira (2010) found no MBI effect on diabetic neuropathy, these results are difficult to directly compare to the other published studies due to Teixeira et al.'s method of Mindfulness delivery being via CD and not via face-to-face delivery by a Mindfulness practitioner. Regarding the impact of MBIs on weight loss, only Miller et al. (2012) (of 4 studies to measure weight change) reported (moderate) weight-loss. Notably, Miller et al. (2012) implemented a Mindful eating-focused MBI thus it appears MBIs could have at least moderate effects on weight-loss when focusing on Mindful eating. Evidently,

the small sample size and diverse delivery methods within the published studies make it difficult to conclude the extent to which MBIs are effective in improving physiological outcomes in people with diabetes. These results are reminiscent of Katterman et al.'s (2014) MBIs for obesity systematic review where MBIs had mixed effects on weight-loss but reduced binge eating and emotional eating.

The findings were consistently more positive with regards to psychological outcomes. MBIs elicited improvements in stress, anxiety and depression symptoms similar to MBIs for other chronic illnesses (Bohlmeijer et al., 2011, Lawrence et al., 2013, Niazi and Niazi, 2011). Four of 6 studies observed improvements in distress. Among other main psychological findings, 4 studies found improvements in quality of life, well-being or health status. Keyworth et al. (2014) observed improvements in worry and thought suppression. According to the formulation model applied by Whitebird et al. (2009) and Dreger et al. (2013), such psychological and psychosocial benefits may enable subsequent positive health behaviour change as this mind-body model suggests that reducing stress and other psychological issues may facilitate subsequent physical health improvements.

There are various factors that may influence MBI effectiveness and provide some insights into the currently limited evidence for physical health benefits. As MBIs for diabetes research is in its infancy, much of the research is exploratory. With little consistency in methods and measured outcomes, it remains too early to attempt to establish any theoretical underpinning. Inevitably, without a theoretically driven approach this could potentially diminish the effectiveness of MBIs for diabetes. This is a recognised weakness of the current evidence base, and future studies should be theoretically informed, and

designed and evaluated to allow for an examination of the theoretical rationale for why MBIs may have value for diabetes management.

Another factor influencing the effectiveness of MBIs is their duration. Although it is possible to detect physiological changes such as $HbA_{1c}$, weight loss and blood pressure in a period of 8 weeks (the typical MBI duration), this period of time may be insufficient to gain adequate mastery over Mindfulness practice and subsequently elicit physiological benefits. Therefore, longer-term follow-up periods may be necessary to gauge the effectiveness of Mindfulness practices on physical health outcomes (as also noted by Abbott et al., 2014 in relation to MBIs for vascular disease). This is pertinent when it is considered that Hartmann et al. (2012) observed positive effects for albuminuria, intramedia thickness and depression after 1 year but not immediately at post-intervention. They attributed this observation to the temporal accumulation of MBI effects.

In contrast, among the studies that conducted follow-up assessments, several beneficial effects (blood pressure; albuminuria; and depression in van Son et al., 2013) were not maintained. Arguably this raises questions about MBIs' long-term usefulness for diabetes populations. However it is difficult to draw any firm conclusions about this issue, as authors did not report whether participants continued to practice (and possibly master) Mindfulness after the intervention. Consequently, the loss of MBIs' effects may result from participants ceasing Mindfulness practice, reflecting the possible lack of long-term acceptability and sustainability of Mindfulness as opposed to its efficacy. MBIs, as with any behavioural intervention, require regular practice to be effective. It is worthwhile to note that the issues of long-term acceptability, adherence and sustainability is not exclusive to MBIs, as these

issues are also present in other behavioural interventions such as physical activity and dietary programmes, as well as medical treatments (McAuley et al., 2003, Wadden et al., 2004, Osterberg and Blaschke, 2005). Thus, the implications for future research are that it is not only important to record Mindfulness measures pre-intervention, immediately post-intervention, and at longer-term follow-up; it is also integral to the treatment's evaluation to assess and report if participants continue to incorporate regular Mindfulness methods into their lives following completion of the intervention. It would also be beneficial to assess whether on-going support is needed to facilitate maintenance of MBI practice, and if so, what form of support would be most effective in promoting the sustainability of one's practice. There is the possibility that people with diabetes are reluctant to invest more time and effort on Mindfulness practice in addition to the already considerable diabetes self-care they undertake. It is suggested that future research explore this supposition to determine if it is correct.

The type of MBI may also be a possible determinant of effectiveness. Miller et al.'s (2012) Mindful eating intervention, which aimed to develop a personal understanding of nutritional and diabetes needs and Mindful awareness pertaining to eating, was effective in resulting in several physical and psychological benefits. Thus, it is possible a MBI focusing on specific health behaviours (such as eating) may be more successful. Eight studies used MBSR interventions, whereas two used MBCT. It was not possible to compare the two major subtypes of MBI: MBSR and MBCT. This was because the MBCT studies focused on outcome measures not observed in the other studies. As aforementioned, Gregg et al. (2007) used a dual therapy intervention. Similar to one MBSR intervention and Miller's Mindful eating intervention, they observed $HbA_{1c}$ reductions. It can also be noted that of the 3 studies to

find no change in $HbA_{1c}$, 2 used MBSR and 1 used MBCT. From this limited number of studies, it appears that the specific type of MBI may not play a role in the MBIs' effectiveness on $HbA_{1c}$. Teixeira (2010) used an unidentified MBI and observed outcomes not examined in other studies (apart from quality of life), which precludes outcome comparisons to other studies. Teixeira's study was successful in improving quality of life similar to van Son et al.'s (2013) MBSR study. Broadly speaking there was too much heterogeneity across outcomes and too few non-MBSR studies to make comparisons of effectiveness for type of MBI.

Practitioner experience is another potentially relevant factor. Only 5 (of 11) MBI studies declared the level of Mindfulness training and/or experience of personnel delivering the MBIs. As such, it was difficult to compare studies delivered by trained and experienced practitioners against untrained and/or inexperienced practitioners. As mentioned earlier, Teixeira's (2010) CD-based intervention did not elicit physiological benefits. From the information provided in the studies included in this review, there was no clearly discernible pattern between practitioner and MBI physical outcome effectiveness. Studies that reported positive physical outcomes were among those that did not detail practitioner experience (Gregg et al., 2007, Hartmann et al., 2012, Rosenzweig et al., 2007). Interestingly, the 5 studies confirming that practitioners had relevant Mindfulness experience all reported significant psychological benefits.

Mode of delivery, such as whether the MBIs were group-based or individual-based, could affect MBI effectiveness. Generally, from the included articles, there does not appear to be a pattern to suggest either group-based or individual-based MBIs are more effective than the other. This is inconsistent with past findings from another MBI application- MBIs for

weight-loss literature. In this application, group-based delivery was more successful as it elicited greater weight-loss and reduced cognitive-behavioural avoidance (Mantzios and Giannou, 2014). However Mantzios and Giannou (2014) found that individual practice did hold some advantages for the psychological outcomes of Mindfulness and a decrease in (eating-related) impulsivity.

Some MBIs were adapted for a diabetes population. Dreger et al.'s (2013) MBI was adapted for a Canadian Aboriginal culture as well as a diabetes population. They found physical and psychological benefits. Though a small study, findings support the need for more research examining the impact of tailored MBIs for ethnically diverse groups, of which many are at higher risk for Type 2 diabetes (Hippisley-Cox et al., 2009). Four studies also tailored their MBIs specifically for a diabetes population. Hartmann et al. (2012) found albuminuria improvements after 1 year, however this was the only study to observe albuminuria. As such, it cannot be stated if a non-adapted MBI would be result in positive changes for this outcome. For psychological outcomes (such as depression, anxiety, stress, distress and quality of life), there were diabetes-specific and non-specific MBIs that resulted in improvements. Therefore this suggests that MBIs do not need to be specific for diabetes to influence psychological outcomes. Overall, there was no discernible pattern between tailoring and outcomes.

There were some limitations in terms of the quality of the studies included in this review. Seven of the 11 included studies were RCTs. These studies were generally well conducted and of high quality, scoring an average of 9 (out of 11) on the JBI critical appraisal tool. Therefore they had a lower risk of bias. Six of these studies did not satisfy the criterion

that participants were blinded to treatment allocation. However, as noted by Abbott et al. (2014), it is impossible to blind participants from their treatment allocation in MBI research. The 5 non-RCT studies were mainly observational studies, with the exception of Dreger et al. (2013), employing a quasi-experimental design. These 5 studies scored an average of 3.6 on the JBI critical appraisal tool, indicating a higher risk of bias. However, of these Dreger et al. and Teixeira (2010) satisfied quality checklist criteria that were applicable to them. Furthermore as Anglemyer et al. (2014) suggest, a non-RCT study is not inherently a poor quality study, it only highlights a risk of bias and that other methodological considerations have more governance in a study's quality. Therefore these studies should not be discredited, as they can be informative of some of MBIs' potential effectiveness, especially when it is considered that results herein are congruent with MBI effects for other physical health research (Bohlmeijer, Prenger, Taal & Cuijpers, 2009; Niazi & Niazi, 2011).

Another limitation of the existing literature focusing on MBIs for diabetes is that the studies focus on disparate aspects of diabetes, with a lack of consistency and high variation in measured outcomes across studies. To better understand MBIs' effects on diabetes, there is a need for more consistency in outcome measures, which is recognised as a growing problem in clinical trials literature Kirkham et al. (2010). The Core Outcome Measures in Effectiveness Trials (COMET) initiative aims to unite relevant stakeholders in agreeing upon a set of outcome measures for given treatments to facilitate the suitable collation, comparison and aggregation of studies (Williamson et al., 2012). This was initially applied to rheumatoid arthritis (Smolen et al., 2010), before being applied to other medical conditions. Outcome sets entail the minimum, pertinent outcomes that should be assessed and reported in all future interventions of a given condition.

Therefore a standardised core outcome set could be used by all forthcoming research in the field of mindfulness and diabetes. Physiological outcomes such as $HbA_{1c}$ and weight are recommended. Psychological outcomes such as stress, anxiety and depression, quality of life and a measure of Mindfulness are recommended for inclusion. In this review, only two articles were identified that reported Mindfulness values as an outcome measure. As such, we are not able to determine how effective participants were at utilising learned techniques and exercises post-intervention across the included studies.

The present review is not without limitations. Firstly, the included non-RCTs were of relatively low quality, scoring an average of 3.6 (out of 11) on the JBI critical appraisal checklist. Therefore these studies have a higher risk of bias and are more prone to spurious findings. However, an executive decision was made to include such articles due to the novelty and scarcity of MBIs applied to diabetes to help illuminate knowledge pertaining to this particular application. Similarly, included studies were heterogeneous in terms of outcome measures, settings, delivery mode, demographics and MBI type. Such aspects made the scope of this review broad and only allows for a relatively superficial understanding of MBIs' effect on diabetes. Additionally, the inclusion criteria were limited to studies published in English and French (due to the linguistic abilities of the authors). As such, non-English language studies were omitted and could have influenced the results.

The outcomes of this review highlight research implications moving forward. For future studies, it is recommended that a standardised core outcome set is identified and applied. It would also be good practice for future research to assess and report whether participants incorporate Mindfulness practice into their lives after the intervention,

particularly when reporting follow-up outcomes. The potential mechanisms as to how Mindfulness may confer positive effects in managing some chronic diseases (including diabetes) remain unclear. Literature has postulated vague potential formulation models for MBIs, where psychological and psychosocial factors may impede positive health behaviour (Lawrence, Booth, Stewart & Crawford , 2013; Whitebird et al. 2009). Nonetheless, the literature herein is not able to explain why MBIs may be effective in managing diabetes. Thus, more mechanistic research is required before the effective components of Mindfulness can be established.

In conclusion, whilst research focusing on the benefits of MBIs in people with diabetes (and other chronic illnesses) is new and relatively limited, the studies included in this systematic review indicate some promise, particularly for psychological outcomes. Much of the current literature remains unfocused with disparate outcome measures. Further research addressing the limitations described here is required to elucidate the potential benefits of MBIs for diabetes.

## Addendum

At conception, this review aimed to investigate Mindfulness effects on T2D and obesity. However, following the publication of Katterman et al.'s (2014) systematic review about Mindfulness for obesity, this present review's focus changed to Mindfulness effects on T2D only.

Subsequent to the publication of this systematic review, additional articles have been published which support its conclusions regarding MBI effectiveness for several psychological outcomes, and some mixed support for physiological benefits. Studies found MBIs improved the following psychological outcomes: stress (n = 3), depression (n = 1), self-efficacy (n = 1), Mindfulness (n = 2), and anger (n = 1) (DiNardo et al., 2017; Latheef, 2017; Momeni, Omidi, Raygan, & Akbari, 2016; Raja-Khan et al., 2017). MBIs also yielded the following physiological improvements in: glycaemic control ($HbA_{1c}$) (n = 1), fasting glucose (n = 2), systolic blood pressure (n = 1), changes in triglyceride/HDL ratio (n = 1), weight loss (n = 1, not sustained at 18 months), cortisol levels (n = 1), and plasminogen activator inhibitor-1 (n = 1; elevation of this protein is a risk factor for atherosclerosis and thrombosis) (Daubenmier et al., 2016; DiNardo et al., 2017; Jung, Lee, & Park, 2016; Latheef, 2017; Momeni et al., 2016; Raja-Khan et al., 2017). However, Southgate et al. (2017) found no effect on emotional eating. This may be due to their intervention being delivered by a dietitian and social worker as opposed to a Mindfulness practitioner.

This review was envisioned as the starting point for a thesis initially concerned with the treatment of T2D. However, due to practical constraints and lack of time to gain ethical approval for a clinical sample and then implement the programme, an executive decision was made to focus on diabetes prevention in a healthy population that are recognised in the

literature to have elevated risk for T2D due to genetics. Despite the change in focus, this review's findings are still relevant and can inform subsequent intervention adaptation and feasibility testing work by identifying relevant outcome measures (irrespective of whether future interventions target the T2D treatment or prevention).

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# Chapter 3:
# Formative Assessment of a Mindfulness Intervention Amongst South Asian Young Adults

# Chapter 3: Modelling Phase of a Mindfulness Intervention Amongst South Asian Young Adults

## Overview

This modelling phase served to inform the development of the subsequent feasibility intervention (in Chapter 4). The main aim of this study was to investigate if a proposed Mindfulness intervention is culturally acceptable and feasible for South Asian young adults (aged 18-35 years). Other aims included examining whether cultural considerations are needed when establishing the programme content, format and delivery personnel, as well as to decide which research methods are most acceptable to this population.

Six single-gender focus groups, 3 all-male and 3 all-female (N= 22) were used to attain views of the proposed feasibility intervention and research study methods. These were audio-recorded and transcribed verbatim. For analysis, a transcendental phenomenological perspective was used to capture participants' understanding and perception of the programme and research methods. Directed inductive content analysis was used to analyse the transcripts.

Results found that most participants possessed accurate health knowledge and had family histories of chronic illness. It was also found that the proposed Mindfulness intervention was well-received as it was deemed acceptable and feasible pending the following adaptations: 1) single-gender classes; 2) incorporating Mindful eating content; 3) having the intervention delivered by a qualified and experienced Mindfulness practitioner; 4) no co-delivery from community/faith leaders; and 5) reducing the number of sessions. The research study methods were deemed acceptable. Specifically, there was a strong recommendation to use accelerometry for physical activity measurement for its objectivity and ease of use.

# Introduction

## Rationale

This chapter marks a change in emphasis from the preceding chapter (which focused on the treatment of diabetes (T2D)) to focus upon T2D prevention. As noted in the introductory chapter, the original intention for this thesis was to develop an MBI for T2D treatment in an ethnic minority group. Like Dreger et al. (2013), the chosen ethnic minority group would be one with high-risk for, and prevalence of, T2D. However, practical, temporal, and financial constraints impeded this endeavour. Nonetheless, a slight change in direction, focusing on T2D prevention rather than treatment, was determined to be important for various reasons. Firstly, the same outcome measures could still be inferred from the previous chapter's systematic review regardless of whether the MBI was for T2D treatment or prevention. Secondly, the feasibility MBI could operate as a proof of concept for Mindfulness for South Asians as at the time of writing there was no such application. Related to this, as it is postulated in this thesis that stress (via neuroendocrine, neuroimmunological and behavioural pathways) can lead to the development of T2D, it is also possible that stress can lead to conditions co-morbid with diabetes (e.g. obesity and hypertension), to other chronic conditions South Asians are susceptible to (e.g. coronary heart disease) or for mental health (where as noted in previous chapters, MBIs are effective). Therefore, acceptability and feasibility would provide a proof of concept for MBIs for a variety of applications beyond the scope of this thesis.

Specifically, this chapter describes the modelling phase of the development of a proposed Mindfulness feasibility intervention for South Asians. This ethnic group were targeted because of their high T2D risk in addition to the conferred practical advantage of

South Asians being highly populous in Birmingham city (where the research was conducted). This study was pivotal to the development of the feasibility intervention, as at the time of writing, there were no published research studies investigating the acceptability and feasibility of Mindfulness training amongst South Asian young adults to improve health behaviours and subsequently, reduce diabetes risk. It also allowed the opportunity to obtain views on the feasibility intervention's research procedures. Part of the research methods included the choice of outcome measures which were informed by the preceding chapter's systematic review.

As discussed in more detail in Chapter 1, Type 2 T2D is 6 times more prevalent within the South Asian diaspora than it is in the indigenous white European population (Diabetes UK, 2016). The problem is further exacerbated by the propensity for South Asians to develop T2D at a younger age and lower BMI range (Chiu, Austin, Manuel, Shah, & Tu, 2011; Raji, Seely, Arky, & Simonson, 2001). This increased risk can be partly attributed to physiological differences between ethnic groups. Hsu, Araneta, Kanaya, Chiang, and Fujimoto (2015) demarcated South Asians from white counterparts by their greater central adiposity at a comparable BMI value. Sattar and Gill (2015) noted that regardless of the physiological risk factors South Asians have, they need to be encouraged to engage in healthy lifestyle behaviours with the help of culturally appropriate interventions.

One potential solution to improving health behaviours in South Asian young adults is to introduce Mindfulness techniques to them. Ludwig and Kabat-Zinn (2008) hypothesised several ways in which Mindfulness can reduce risk for, or ameliorate, illness and disability. These include increased adherence to medical treatments, reduced mental health symptoms (including stress, anxiety and depression), improved pain tolerance, improved biological

pathways that influence health (e.g. neuroendocrine system, autonomous nervous system and immune system), and increased motivation to engage in healthier lifestyle behaviours (including diet, physical activity, reduced alcohol consumption and other behaviours). However, as Ludwig and Kabat-Zinn remarked, such potential Mindfulness benefits have not been thoroughly investigated. The proposed benefit of greater motivation to engage in healthy lifestyle behaviours is of particular interest to present research, particularly with regards to its application to a population with marked health inequalities. Thus, it was proposed that a Mindfulness intervention could be an effective tool to reduce risk for T2D in South Asian young adults.

Before developing and pilot testing a Mindfulness intervention for the targeted group, a modelling phase was considered to be a necessary step to inform the researcher about key cultural considerations. Halcomb et al. (2007) noted focus groups were particularly useful in expanding knowledge of the needs of culturally and linguistically diverse groups. As opposed to waiting until risks have intensified or T2D is diagnosed and then treating symptoms, the target group was healthy young adult South Asians aged 18-35 years. This age range was chosen with the goal to help instil health protective Mindfulness techniques as a form of early prevention of T2D. This preventative approach is particularly important considering the aforementioned susceptibility of South Asians for T2D onset at a younger age. Hence, it was important for this research to investigate and illuminate knowledge on the phenomenon of living as a South Asian young adult at risk for T2D in order to design a tailored programme for them. The primary aim of this study was to examine if a Mindfulness intervention for young adult (18-35) South Asians is culturally acceptable and feasible. Secondary aims included investigating whether cultural considerations are needed

when developing the programme content and format and selecting delivery personnel, as well as to ascertain which research methods are most acceptable to this population for evaluating any changes in the key outcomes of interest including mindfulness, healthy lifestyle behaviours (such as physical activity and diet) and quality of life.

**Theoretical framework**

Phenomenology was chosen as the method of inquiry for this modelling phase study. It was deemed apt because of its prevalent use in psychology, social and health sciences (Borgatta & Borgatta, 1992; Giorgi, 2009; Polkinghorne, 1989), and its appropriateness to the topic. Phenomenology is concerned with the study of the subjective experience of phenomena (Cresswell, 2012). In particular, it aims to examine the essence or fundamental nature of human experiences. There are two broad types of phenomenology: hermeneutical (van Manen, 1990) and transcendental (or psychological) phenomenology (Moustakas, 1994). While both have interests in the lived experiences of participants, hermeneutical phenomenology views the researcher as a mediator who makes an interpretation of participants' experiences and as such also requires an account of the researchers' experience of the phenomena. Conversely, transcendental phenomenology focuses on epoche, described as bracketing the researchers' experiences as much as possible so that the phenomena can be interpreted with a fresh perspective (Moustakas, 1994). The latter approach will be adopted so as to focus on the participants' experiences of living as South Asian young adults at risk for T2D. This approach is appropriate as it will enable a deepened understanding of the population's experience of being at an increased genetic risk to T2D and what factors may facilitate or impede the uptake of healthy lifestyle changes.

There are several steps to conducting a phenomenological study. Moustakas (1994) noted researchers must first conduct a step called 'horizonalisation,' which involves highlighting significant quotes or portions of text. Afterwards, the researcher must develop 'clusters of meaning' from the significant quotes into broader themes. From these quotes, the researcher can then describe what (textural description) and how (structural description) participants experience phenomena. Organisation of the data can be presented in numerous ways (Cresswell, 2012). This chapter will present findings from this modelling phase study in the style of a research report described by Polkinghorne (1989).

As described in Chapter 1, this doctoral research has utilised an Ecological model, Kumanyika et al.'s (2012) Community energy balance, as an overarching framework within which an array of health behaviour influences can be considered and accounted for. Like most theories, Ecological models consider the effect of intrapersonal factors such as emotion, motivation, readiness for change, self-determination and intention amongst many other examples. Ecological models also account for interpersonal factors such as peer pressure, the effect of others on one's behaviour and social norms. However, unlike individualistic theories, Ecological models acknowledge that macro-social factors such as organisational, community level and public policy factors affect behaviour. Organisational factors entail behaviour influencing factors within the workplace. Community level factors entail the immediate community's influence, transportation and available services. Public policy factors comprise of political and economic factors that inevitably affect a person's life behaviour. Ecological models, unlike individual-focused theories are more comprehensive as they account for multiple social levels of influence. It also noteworthy that factors across different societal levels can interact to influence health behavioural choices. An overview of

how the results from this modelling phase study fit within the context of the Community energy balance model is included in the Discussion section of this chapter.

In summary, the primary aim of this modelling phase study was to examine whether a Mindfulness intervention for South Asian young adults (aged 18-35 years) is culturally acceptable and feasible. Secondary aims included examining if cultural considerations are required when developing the programme content, format and delivery personnel, as well as to determine which research methods are most acceptable to this population.

## Methodology

### Design

Focus groups (FG) were used to gather the data for this study. FGs entail engaging a small number of individuals in informal group discussions over topics of interest (Wilkinson, 2008). This study consisted of 6 FGs, 3 all-female and 3 all-male. In FGs, the researcher acts as a moderator, presenting topics and questions, encouraging participants to contribute fully and facilitating flowing discussions between participants rather than with the researcher. An advantage FGs hold over individual interviews is that through group interaction, participants can debate and even disagree over issues regarding the topics.

### Materials

A semi-structured focus group schedule of 7 topics, posed as exploratory open-ended questions, was used to guide data collection via informal group discussions (see Appendix B). Initial questions were aimed at establishing the acceptability and feasibility of a Mindfulness intervention for young adult South Asians. Therefore, questions centred around cultural

appropriateness. Other questions focused on the preferred format and delivery of an intervention. The final questions regarded decisions that would inform research study methods. Participants were also given a 'Mindfulness overview' document (see Appendix C) which briefly described its origins, aims, applications and other pertinent details. Overleaf of this document included a typical sample of an 8-week programme. Leading questions were avoided. Prompts were used to probe for additional information as needed.

**Participants**

The all-female focus groups had 6 (FG 1), 3 (FG 2) and 3 (FG 3) participants. The all-male focus groups had 3 (FG 4), 3 (FG 5) and 4 (FG 6) participants (*see Table 7*). Participants' mean ± SD for age = 24.6 (± 4.66), with participants being either working professionals or students. All participants were British passport holders and fluent English-language speakers. The participants were recruited through opportunistic sampling from the dissemination of research flyers, approaching members of the public and snowballing through current participants. No recruited participants dropped out of this study. Participants were also asked to respect co-participants' privacy and not to discuss co-participants' contributions after the FGs. Using pseudonyms ensured anonymity and confidentiality.

*Table 7: Participant demographics*

| Participant pseudonym | Focus Group | Gender | Age | Ethnicity | Religion | |
|---|---|---|---|---|---|---|
| **Iram** | 1 | F | 23 | Pakistani | Muslim | |
| **Mala** | 1 | F | 35 | Indian | Hindu | |
| **Mary** | 1 | F | 35 | Indian | Christian | |
| **Rukhsana** | 1 | F | 33 | Pakistani | Muslim | |
| **Sandy** | 1 | F | 26 | Indian | Sikh | |
| **Sonia** | 1 | F | 25 | Indian | Sikh | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Adeeba** | 2 | F | 23 | Pakistani | Muslim | |
| **Ayesha** | 2 | F | 23 | Bangladeshi | Muslim | |
| **Maryam** | 2 | F | 23 | Pakistani | Muslim | |
| **Neelam** | 3 | F | 25 | Indian | Sikh | |
| **Saba** | 3 | F | 26 | Pakistani | Muslim | |
| **Sunita** | 3 | F | 25 | Indian | Sikh | |
| **Ahmed** | 4 | M | 25 | Pakistani | Muslim | |
| **Amit** | 4 | M | 26 | Indian | Hindu | |
| **Umar** | 4 | M | 24 | Pakistani | Muslim | |
| **Indy** | 5 | M | 26 | Indian | Sikh | |
| **Manvir** | 5 | M | 19 | Indian | Sikh | |
| **Sunny** | 5 | M | 18 | Indian | Sikh | |
| **Abbas** | 6 | M | 21 | Pakistani | Muslim | |
| **Arfan** | 6 | M | 20 | Pakistani | Muslim | |
| **Bilal** | 6 | M | 20 | Pakistani | Muslim | |
| **Naeem** | 6 | M | 20 | Bangladeshi | Muslim | |

**Data collection**

FGs were conducted by Farhan Noordali (FN) (a male doctoral student with credentials of an MSc in Health Psychology, with training in focus group research) in a variety of locations: a University of Birmingham focus group room (FGs 1 and 6), University of Birmingham meeting room (FG 2), coffee shops (FGs 3 and 4) and a quiet public space (FG 5). The shortest FG (FG 6) lasted 47 minutes and the longest FG (FG 1) lasted 1 hour and 51 minutes. No relationship had been established between researcher and participants in this study; however, through the participant information sheet they were aware of the researcher's aims and motivations for the research. Repeat interviews were not conducted as they were not deemed necessary for this research. Discussions were audio-recorded using a digital recorder. Healthy refreshments and hot drinks were served during the discussions. The first FG had a non-participant present, a research assistant to the FG facilitator (to make

notes about the discussions) who was introduced to participants with her role explained. This individual was a doctoral student with focus group experience.

Following FGs, data were transcribed verbatim by FN using Jefferson-lite transcription (as described by Potter and Hepburn, 2005) (see Appendices X-Z). This method was chosen because it was less time-consuming than Jeffersonian conventions yet maintained sufficient information for the style of analysis adopted. Some non-verbal information was included to make sense of talk that would otherwise appear ambiguous.

**Data analysis**

Content analysis is an analysis method for written, pictorial or verbal communication messages (Cole, 1988). It aims to make replicable and valid deductions from data by identifying patterns of words, and their frequency and discourses so that they can be condensed into broader, discernible themes or categories (Gbrich, 2007). By this process, a given phenomenon can be described in its conceptual form through the provision of meanings, knowledge or novel insights (Elo & Kyngas, 2008). Unlike other qualitative methods, content analysis has the scope to make use of quantifiable data such as the number of occurrences of a given word (Vaismoradi, Turunen, & Bondas, 2013).

There are various approaches to content analysis (Hsieh & Shannon, 2005). For the purpose of this research, directed content analysis will be utilised. Directed content analysis is guided by a structured approach (Hickey & Kipping, 1996). In this study, certain insights regarding the applicability and feasibility of an intervention are of interest; as such, the questions and analysis reflected these aims. Content analysis can be inductive or deductive (Elo & Kyngas, 2008). The former is used when there is little to no prior research

investigating a phenomenon, thus concepts are derived from the data. Conversely, the latter is utilised when there is considerable prior knowledge pertaining to the subject matter, with certain codes and themes anticipated or theories that can be tested. Green and Thorogood (2004) noted that when exploring phenomena where little is known and work is exploratory (as is the case in this research), then content analysis may be a more suitable choice than other analytical styles. As Mindfulness for a South Asian population is a novel application, an inductive approach was used. While Mindfulness has been applied to other ethnic minority groups and that various themes from such research may appear here, cultural differences do exist between groups and may govern subsequent choices over suitability and acceptability of a programme therefore each culture must be studied separately (Hohmann & Shear, 2002).

There are three phases in content analysis that facilitate data coding: preparation, organising and reporting (Elo & Kyngas, 2008). The initial preparation phase involves the transcription of audio recordings and then familiarisation with these transcripts by reading and re-reading. In the organising phase, the researcher will begin open coding which entails attributing codes to certain segments of text. Initially, there may be codes that either have the same meaning or bear overlap (e.g. “physical activity” and “activity”) which may be collapsed under a preferred code. Codes can then be grouped under higher order headings (e.g. “tennis” and “walking” under “physical activity”) and beneath categories or themes (e.g. “physical activity” under “lifestyle”). The reporting phase involves reporting the data in a conceptual form so that broader inferences can also be discerned by readers. As aforementioned, this analysis was conducted with a transcendental phenomenological

approach: the researcher suspends their experiences of the discussed phenomena to gain a richer understanding of the participants' perspectives.

Some qualitative studies relay transcripts or findings back to participants for comment or correction. This step was not taken in this instance for pragmatic purposes.

## Results

Open coding by FN bore 81 unique codes. Due to practicality issues, a second data coder was not possible. Subsequently triangulation of coding was not possible. These data were eventually compartmentalised into the following 4 themes: Personal influences; Acceptability and Feasibility; Programme and Research study methods (*see Figure 9*). As directed content analysis was used, focus group questions were geared towards study aims of acceptability and feasibility and research methods. Inevitably, data and subsequently codes reflected these broader themes therefore it was deemed suitable to name the themes as such. Several codes pertaining to personal family history and knowledge about health emerged that were grouped under an unanticipated "Personal influences" theme. A quantified summary of key findings is present below (*Table 8*).

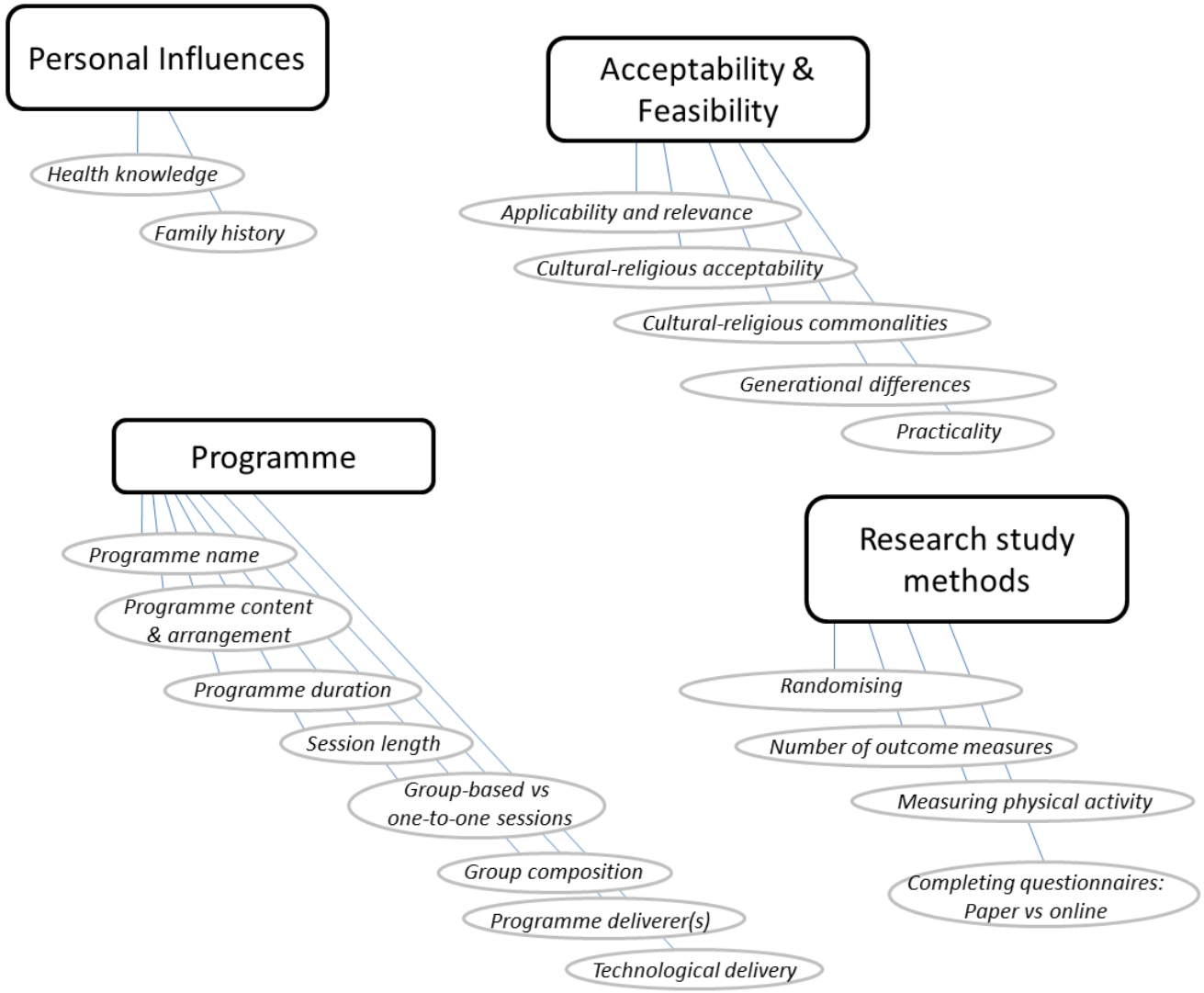


*Figure 9: Themes and sub-themes derived from six focus groups with South Asian young adults.*

*Table 8: Quantified summary of key findings*

| Theme | Percentage (%) | Finding |
|---|---|---|
| **Personal influences** | 100% | Had family history of chronic illness |
| **Acceptability & feasibility** | 30% | Of males felt other South Asians wouldn't embrace Mindfulness |
| | 100% | Felt Mindfulness would be applicable/relevant |
| | 100% | Felt Mindfulness was non-conflicting with religion/culture |
| | 9% | Felt the naming of "Body scan" may cause unease (though felt the practice itself was acceptable |
| **Programme** | 100% | Advocated inclusion of Mindful eating |
| | 72% | Felt the duration of an 8-week programme to be excessive |
| | 28% | Deemed 8 weeks appropriate to cover content |
| | 58% | Deemed 90 minutes sessions acceptable |
| | 42% | Preferred 45-60 mins sessions |
| | 66% | Favoured a group-based delivery |
| | 13% | Favoured 1-to-1 delivery |
| | 20% | Favoured a combination of group and 1-to-1 delivery |
| | 100% | Stressed a competent deliverer (irrespective of professional background) experienced in Mindfulness |
| | 100% | Objected using co-delivery from faith leader or community leader |
| **Research study methods** | 36% | Those who felt prospective participants would be fine with being randomised |
| | 59% | Those who felt it may not be accepted |
| | 5% | Those who were undecided |
| | 80% | Favoured using an accelerometer over a questionnaire for physical activity measurement |
| | 91% | Had no issue with the number of outcome measures |

## Personal influences

*Health knowledge*

Participants demonstrated accurate health knowledge and some practice of healthy lifestyle behaviours throughout discussions with anecdotal references to healthy lifestyle knowledge: "*…but we use olive oil…*" *(line 20, FG 2); "you need to have meals spread out throughout the day (.) reasonable amount and eat slowly as well" (lines 1231-1232, FG 1)*; *"I exercise quite a lot" (line 689, FG 6)*; "*…I do love walking so I do walk everywhere* (.) *it's only now that I've got a car that I'm getting lazy …*" *(line 30, FG 2)*. There were some instances whereby participants noted prevailing health myths and attitudes. Adeeba noted *"I think it's also that (.) um what a healthy body looks like (.) cos when you look at kids (.) they're like "he*

*needs eating more" (.) and then you look at the kid like "that kid's fat…don't feed it anymore" (lines 626-628, FG 2)*. Below is another similar discussion:

> *Extract 1, FG 2*
> ***Ayesha:*** *And my mum has this thing where if you eat loads you'll grow (.) I'm like "mum you'll grow the other way (gestures width by parting hands horizontally) not the tall way"*
> ***All:*** *(laugh)*
> ***Maryam:*** *It's that belief as well isn't it*
> ***Ayesha:*** *Yeah it's that belief*
> ***Moderator:*** *Okay (.) so you think it's a lack of knowledge or understanding*
> ***Ayesha:*** *Not really knowledge it's just the way <u>they</u> were told*
> ***Adeeba:*** *But I think it's <u>that</u> generation (.) I think our generation is more mindful about what we eat (.) it's just the generation above us*

Adeeba and Ayesha described examples of health-related misinformation within South Asian families. The health advice given by elders appears well-intentioned, but ultimately misguided and unhealthy. Adeeba clarifies that though this is widespread within their culture, younger generations are demarcated from their older counterparts in that they are more health conscious. Participants appeared to bear frustration by debunking inaccurate health perceptions inherent in their culture and families.

*Family history*

Not all focus groups discussed family histories of chronic illness. From those that did, there was family history for T2D and coronary heart disease amongst participants: Sunny responded "*Err heart disease (.) and diabetes yes (.) My grandparents have them" (line 591, FG 5).* Bilal responded: *"my family's got a history of err diabetes" (line 682, FG 6).* Adeeba noted *"<u>Yes</u> every health issue that you have runs in my family" (line 27, FG 2)*.

When questioned whether family history of chronic illness influenced their lifestyles, most insisted it had no bearing on their lifestyle. Naeem stated *"I just go about my life (.) I don't really pay much attention to it" (line 698, FG 6),* whilst Ayesha stated: *"No I just eat as I please (laughs)…".* Indy elaborated this aspect of South Asian health attitudes:

> *Extract 2, FG 5.*
> ***Indy:*** *I think with Asians (.) until something radical happens to them err (.) rather than being proactive about it they won't find a need to change (.)*
> ***Sunny:*** *Yeah*
> ***Indy:*** *As I was saying earlier it only took until something happened to me for me to make that change (1 sec,) cos your mind is always active and it just wants to go (.) and your body while it's young can handle that (.) but then as it starts to get older you know (.) you find that your body will start to let you down (.) like joints aches pains (.) are starting to creep in(.) but I've just turned 26 so I'm thinking "Wow (.) I need to look after myself a bit more"*

Indy insinuated a laissez-faire attitude among Asians whereby health is not a primary concern until it seriously deteriorates. This was also evident by Ayesha's nonchalant unhealthy eating confession. Indy's latter comments suggest youth and its associated wellness contribute to a sense of impregnability that contributes to a carefree attitude to health. It appears from these data that participants view South Asian health attitudes as reactive rather than proactive.

**Acceptability and feasibility**

*Applicability and relevance*

The moderator enquired whether the programme was applicable and relevant to the target audience's needs. Participants recognised the potential utility of the programme:

*Extract 3, FG 4*

***Amit:*** *Erm I think for myself (.) I am someone who's all over the place (.) like I'm doing too many things at once (.) my mind is at too many different places at once (.) even when I'm at work (1 sec) I have things about work to stress about (.) I have things that I do in my own time that I stress about (.) and then I'm also trying to be physically fit because that's important (.) in terms of um having a good lifestyle (.) and I think this sort of method will help me (.) segregate all those issues that are all in my mind at once (.) so definitely (.) it's definitely a good um (.) programme*

*Extract 4, FG 5*

***Indy:*** *I think definitely it applies to us South Asians more (.) because it applies to our (.) the nature of <u>our diet</u> also there's a bit of a stereotypical thought in that even though you work 9-5 in one line of work you then [have] a secondary err (.) line of work through a business or a hobby or something (.) so it's actually quite applicable to me cos I'm physically, I'm letting go a little bit even though it's not as visible to others but I can feel it (.) and I've also got 2 jobs that I'm working on (.) so yeah it's quite applicable to me*

*Extract 5, FG 2*

***Maryam:*** *I think it's quite good cos (.) you kinda (.) well with me I'm like "I'm craving this so I have to have it" (.) you kinda think about it and you constantly thinking about it and then you just go and have it but if I was like "okay I don't need to have that" I can do something else (.) so I think your thoughts and stuff are really important so regulating them would be good*

Maryam's discourse provides evidence of emotional eating and appears to support dual processing theory (introduced in Chapter 1) in stress triggering unhealthy habitual eating. She implies Mindful awareness allows use of explicit mental processes overriding implicit processes responsible for unhealthy eating. Sandy also remarked: *"I think when you've got big families and all the politics and things going around (.) there's a lot of that stuff*

*happening in err Asian families (.) I think the target group is correct…" (lines 321-323, FG 1)*. From these excerpts and quotes, the Mindfulness techniques appear relevant and applicable to the busy South Asian lifestyle, as it can be helpful to those who have a busy working life with multiple streams of income to focus more on the present tasks. In a similar manner, Mindfulness is deemed apt to help deal with complex family politics and stress. Additionally, participants viewed Mindfulness techniques as applicable to managing lifestyle habits such as coping with unhealthy food cravings.

Some men questioned the function of the Mindfulness programme:

> *Extract 6, FG 6*
> ***Arfan:*** *But then how would this transfer to your thing of helping in their self-development in terms of their diet?*
> ***Moderator:*** *Um well (.) the reason-*
> ***Arfan:*** *Cos like the way you're saying it (.) it's just to create more time (2 secs) cos when you create more time you wanna do more leisure activities (.) so*

> *Extract 7, FG 6*
> ***Bilal:*** *I think with this programme is (.) as you're focusing on healthy diet, healthy lifestyle (1 sec) mmm naturally we all know that we need to walk and do more exercise (.) but we dunno- some people dunno how to (.) or how to eat healthy (.) wouldn't it be more better if you focus on that a bit more?*

Men in this FG seemed to favour or expect an active health education intervention. In contrast, women generally seemed to understand and appreciate how this intervention aims to assist people:

> *Extract 8, FG 2*
> **Adeeba:** [it's talking about how <u>you're</u> dealing with stress (.) and instead of think "Oh I'm stressed let me go eat loads of food" (.) it's "I'm stressed what can I do about it?"

*Cultural-religious acceptability*

Participants discussed whether the programme was acceptable within the parameters of their culture and/or faith. All participants remarked that there were no discernible conflicts between Mindfulness and South Asian culture and religions:

*Extract 9, FG 1*

***Mala:*** *I'm Hindu and I don't think there'd be any clash with my cultural background*

***Mary:*** *I'm Christian and I don't think so either*

***All:*** *(2 secs) [(laugh)*

***Moderator:*** *[It didn't have to go around the room (.) but-*

***Iram:*** *I'm Muslim and yeah it doesn't really clash…*

*Extract 10, FG 1*

***Sandy:*** *Sikh*

***Moderator:*** *And do you see any clashes or-*

***Sandy:*** *No*

Members of various major Asian religions (Hinduism, Christianity, Islam and Sikhism) noted no inherent discord between their cultural-religious beliefs and Mindfulness. However, participants expressed concern the programme may not be well received by some South Asians:

*Extract 11, FG 3*

***Sunita:*** *I think your explanation at the beginning was good, because I suppose you said Buddhism but then as you began explaining (.) you kinda (.) you were more clear on what that meant*

***Saba:*** *Yeah (.) I think the clarity [is what you need to address initially*

***Sunita:*** *[yeah*

***Saba:*** *Err just making sure that they're aware it's only (.) taken from the principles of Buddhism (.) it's a fragment of what their beliefs are (.) it's not (.) it's nothing that's gonna like <u>convert</u> you to Buddhism or anything (.) it's just there for you as a guide to get to better health (.) um and if you like promote it in a sense where it's not being as*

*religious (.) but telling them that it is taken from the Buddhist lifestyle or something (.) rather than it being a part of the religion or something of the sort (.) just cos people I think (.) we're quite ignorant in that sense (.) and we don't like taking things on board maybe from other religions and stuff (.) erm and we don't know about it to be honest*

***Neelam:*** *Yeah it's for your own wellbeing*

***Sunita:*** *I guess it also depends on how religious the person actually is (.) like I wouldn't have a problem with doing that cos I'm not too religious but maybe someone who is religious (.) might hear that word and think "No I'm not doing this"*

Some South Asians are presented by participants as being committed to their faiths and reluctant to consider other schools of thought, in particular the idea of being led away from their faith or converted to another faith appears a concern. Umar elaborated this point: *"….there are certain religions that forbid innovations and consider it as a no-go area" (lines 126-127, FG 4)*. He is suggesting that certain religions common amongst Asians view themselves as complete, and thus forbid outside or novel influences. Sunita's last statement suggests variability in religious adherence would also be a determinant in whether they would be averse to a novel or "*alien*" concept.

A potential concern which was flagged on 3 separate occasions was the naming of the compassionate body scan technique (sometimes simply named body scan):

*Extract 12, FG 4*

***Moderator:*** *Yeah (2 secs) Amit you look like you have something to ask?*

***Amit:*** *Compassionate body scan (.) how err?*

***Umar:*** *Compassionate is it*

***All:*** *(laugh)*

***Amit:*** *How err (.) thorough is it? (.) Cos Asians are very err*

***Umar:*** *Reserved*

The frequent misunderstanding of 'body scan' suggests it can invoke ideas of an intimate activity. Umar's *"reserved"* description suggests South Asians can be conservative and thus less tolerant of anything that might be perceived as risqué. When the moderator explained the body scan technique, no participants had any further concerns as displayed by Amit's response: *"No (.) I don't think that would an issue (.) it'd be an issue if it was a very intimate (2 secs) encounter (.) but if it's what you've described then err it's fine" (lines 308-309, FG 4)*.

While the utility of the programme was recognised by participants, three of the men doubted whether all South Asians would be willing to try it, with Bilal claiming *"… about 40%" (line 155, FG 6)* would be willing. Umar justified similar assertions:

> *Extract 13, FG 4*
> **Umar:** *Well (1 sec) from personal experience the South Asian community is not one that is patient (.) so therefore their understanding of this would be just (2 secs) you'd start explaining it and that's it (.) you lose them straight away from there (.) personally there's a-*
> **Amit:** *Yeah they might lose interest b-*
> **Umar:** *And they won't be as understanding and get the bigger picture (.) they'll just think of it as another diet programme (.) they might think it's just a farce*
> ***Amit:*** *Yeah I see what you're saying but um (.) I think they will definitely understand what it is*
> ***Umar:*** *So therefore I think intellect will be a big player (.) since- personally I think of graduate level or higher*
> ***Amit:*** *Yeah*
> ***Ahmed:*** *Yeah*
> ***Umar:*** *Would be more willing and understanding even if they don't participate (.) they'll understand the programme (.) but anyone below that or someone not educated (1 sec) but then again a <u>wise</u> person may also be understanding so it depends*

The South Asian population was described by participants as impatient and expectant of *"instantaneous results" (line 97, FG 4),* and that this cultural trait would impinge upon their willingness to give it the required time for it to be effective. Umar initially felt that people who would be able to understand the aims and usefulness of Mindfulness would usually be those with further (degree) education. Ultimately, he remarked that individual differences would play an ultimate role in acceptability, as though some people may not be highly educated, wisdom or natural intellect may allow them to be more accepting of the programme. This is relatable to the *Personal influences* theme as it suggests that though interpersonal factors such as culture govern practice, one's intelligence, wisdom or education can attenuate a cultural aversion to alien practices.

*Cultural-religious commonalities*

Upon seeing that participants felt the target audience may accept such a programme, the moderator asked if the programme bore any similarities to their culture or faith. Participants noted there were some similarities:

> *Extract 14, FG 1*
> ***Sonia:*** *Yeah I'm Sikh as well (.) I don't see any clashes I think it can complement it (.) depending on which kinda religion you're from (.) cos I know with Hinduism particularly with Gautama Buddha cos he was Hindu so he adopted the Mindfulness err (.) the meditation and that kinda thing (.) so I think it can link quite well*
> ***Moderator:*** *So you think it would link quite well with Hinduism?*
> ***Sonia:*** *Mmhmm (nods head) as well as Sikhism (.) cos if you kinda think about (.) I'm kinda going back to Guru Nanak and how he spent his time meditating as well (.) so there is (.) kinda links (1 sec) I don't see it opposing anything (.) basically*
> ***Rukhsana:*** *Yeah and carrying on from that we have our 5 daily prayers and when you pray you do take that time out (.) so this sort of influence would work*
> ***Moderator:*** *So you find there is a complementary-*

***Rukhsana:*** *Yeah (.) because when I feel when I'm praying (.) and with outside (gestures away from herself) (.) that's when you need this (.) gives you a bit of breathing space*

*Extract 15, FG 5*

***Indy:*** *I see a few parallels with Sikhism (.) err with regards to just keeping your mind at ease and be objective about things (.) we're also taught to actually keep a physically well balanced lifestyle (.) the idea of it being (.) if you're not physically fit then you can't (.) then how are you expected to meditate properly if you've got so many things going on*

***Manvir:*** *Yeah that as well (.) yeah*

***Indy:*** *If you are not physically fit (.) how can you be mentally fit (.) um so from that point of view I think this helps*

When asked whether Mindful techniques were relevant to Islamic prayer, Arfan responded: *"Fair enough (.) it's a transferable skill" (line 389, FG 6)*. Participants acknowledged *"general similarity" (line 135, FG 3)* between Mindfulness and some cultural-religious beliefs, but these were usually broad and non-specific. Though the parallels were fleeting and somewhat generic, they were still regarded as useful skills that could be implemented into their lives in conjunction with their own beliefs.

*Generational differences*

Participants repeatedly noted that elder generations, defined as aged "*Fifty plus*" *(lines 241-243, FG 4),* may be averse to trying the intervention as it was something unfamiliar:

*Extract 16, FG 3*

***Sunita:*** *Erm I think there'd be a less (.) less of an issue um (.) with young adults (.) maybe the (1 sec) the um the people more towards the older bracket (.) depending on*

*what their home life is like might be a bit more difficult (.) but I don't think it would be as much compared to older (.) the older generation*

***Neelam:*** *Yeah*

*Extract 17, FG 3*

***Maryam:*** *I think if it was an older generation they probably would be a bit iffy about it (.) but I think our generations would be fine*

***Ayesha:*** *They wouldn't even know anything about Buddhists*

***Maryam:*** *Yeah but still (.) they don't know anything they'll be like "it's some kinda religious thing" (.) whereas for younger generations they might understand it*

The older generations were portrayed as having greater familial responsibilities and being less knowledgeable and more sceptical of other cultures' practices. Conversely, the young adult generation was perceived as being more able to understand novel concepts and open to trying them. It is important to consider that perceptions of older generations are given here by younger adults thus the veracity of their descriptions must be taken with care.

*Practicality*

A common concern expressed was that of the busy South Asian lifestyle, particularly for the women:

*Extract 18, FG 1*

***Iram:*** *…like in terms of lifestyle South Asians- I'm not generalising but sometimes you do have like household and kinda err other commitments like childcare so it can kinda influence how much you can commit to (.) on a week basis*

*Extract 19, FG 3*

***Sunita:*** *And I also think err (.) especially South Asian women (.) they devote a lot of their time to their family and to ask them to um (.) kind of be a bit selfish (.) may cause a few issues (.) especially the older generation*

These descriptions positioned women as the lynchpin of South Asian family life whereby their roles entail certain assumed or designated responsibilities involving children and household duties. Such roles had the potential to preclude participation, particularly for older women. However, men also cited concerns of finding time to participate:

> *Extract 20, FG 4*
> ***Umar:*** *The main thing is they don't have <u>the time</u>*
> ***Ahmed:*** *<u>Time</u> can be an issue (.) I work full-time so it'd be hard to find time*

Sandy brought up an important point regarding the importance of timing to feasibility of attending:

> *Extract 21, FG 1*
> ***Sandy:*** *Maybe not do the sessions during Ramadan or anything like that (.) or Christmas or (.) you know just be wary of the main religious festivals*

South Asians, as generally religion observing peoples, would not be able to partake in sessions that coincided with their religious festivals and celebrations. Ayesha pointed out another instance where religious obligations may preclude attendance*: "Friday's Jummah (.) but we're girls so it's okay" (line 832, FG 2)*. The weekly Islamic congregational prayer normally held at *"Zohr time" (line 839, FG 2)*, *"Between 12 to 2"* (*line 840, FG 2*) would be prioritised by Muslim men.

**Programme**

*Programme name*

The moderator asked about the suitability of the name 'Mindfulness' and whether it should be changed. All participants agreed that there was no need to change the name:

*Extract 22, FG 5*

***Manvir:*** *Nah I reckon the name's alright because erm especially with this name (.) if they end up searching they'll end up finding a 100 things as well about it (.) so if they're not sure they can go home and find out more themselves*

***Sunny:*** *Yeah it's a simple name (.) they'll know what the programme is about (.) it's nothing complex or anything (.) so it's easy to understand*

In addition to the above, Umar had also noted *"it's a <u>neutral</u> word (.) something you wouldn't associate with any sect or group" (lines 146-147, FG 4)*. Participants' understanding of the name was that it was satisfactorily descriptive of the programme, comprehensible, neutral and could also be independently researched by curious potential attendees. Abbas remarked *""Mindfulness" is alright (.) just the Buddha part" (line 226, FG 6).* Again, the Mindfulness term was not off-putting but the prospect of practicing another religion (Buddhism), as discussed earlier under the *Acceptability and Feasibility* theme, invoked concern for some and had the potential to deter participation.

*Programme content and arrangement*

Participants made suggestions for the course arrangement (in terms of the order of teachings):

*Extract 23, FG 6*

***Naeem:*** *(2 secs) Um you'd put the more interesting exercises at the start?*

***Moderator:*** *Erm (.) yeah that could be done (.) well which ones would you put first?*

***Naeem:*** *The compassionate body scan (.) that would be among first*

Participants felt certain techniques were of more interest than others, and so suggested putting the more interesting content among the earlier sessions. As Sonia notes: *"if it's the first thing that you're doing (.) you wanna give a good impression" (lines 257-258, FG 1)*.

Among other suggestions to keep the audience engaged and interested, participants also suggested to not use a raisin or orange (as normally used) for the raisin exercise and opt for something unusual. Mary noted: "*it'd also increase someone's interest when you use something unusual (.) rather than thinking you're doing a task" (lines 282-283, FG 1)*. Suggestions were sparse but included *"dragon fruit or purple cauliflower" (line 280-281, FG 1)*. Activities were seen as being a more enjoyable experience if the object used was more unfamiliar. However, Iram retorted:

> *Extract 24, FG 1*
> ***Iram:*** *Erm can I add something (.) I think raisin would fine (.) because in terms of it being small it might be like "Oh it's a small thing you're worrying about" (.) and most of the life activities you don't wanna focus on something you don't like (.) so even if you don't like a raisin you have to focus on the raisin (laughs)*

To some participants, the raisin presented a microcosm of real world experience and as such, was deemed more suitable than exotic alternatives that did not give as good a metaphorical portrayal of life problems.

The sample Mindfulness programme shown to participants, as with most Mindfulness programmes, did not include Mindful eating, so in some focus groups the Moderator verbally described it and asked if this would be worth incorporating:

> *Extract 25, FG 6*
> ***Arfan:*** *Yeah that's probably more important than anything*
> ***Bilal:*** *That is more important yeah*
> ***Moderator:*** *Yeah? (3 secs) Naeem what do you think?*
> ***Naeem:*** *<u>Yeah</u> (.) more important*
> ***Moderator:*** *More important (.) okay so you definitely advise putting that in?*
> ***Naeem:*** *Yeah*

***Moderator:*** *Would you advise putting it in early in the programme?*
***Arfan:*** *Yeah probably the same with the other one the err (.) the thoughts are not facts*

*Extract 26, FG 2*
***Adeeba:*** *I think it should be (.) because I think we gotta think about portion size (.) especially in our culture (.) like in my family I eat the least and I look at how they eat and I'm like looking at my mum (.) thinking "no (.) you're eating too much" (.) even though she only has three meals a day (.) they're quite big portions and I don't think as South Asians we understand (.) portion sizes at all (.) but um I was gonna say something else but I've forgotten (1 sec) but yeah I do think that would be useful*

Mindful eating was well received by participants whenever suggested. This was regarded as an applicable and relevant addition to the sample programme shown to them. South Asian attitudes towards food are described as to have plentiful quantities. However, this is something participants identified as an endemic South Asian issue and being an unhealthy cultural trait. Participants had various other suggestions as to how to tie Mindful eating to their perceived deleterious South Asian dietary habits:

*Extract 27, FG 1*
***Rukhsana:*** *I think the dishes that we do cook (.) try and give some options of a healthier version (.) like say use these substitutes (.) say like [instead of] cream use yoghurt (.) you know to get them thinking (.) cos then they can make their own choices*
***Sandy:*** *I think with Asians as well they overcook their food (.) so they have like a vegetable dish (.) but they'd boil it so much that all the nutrients have been killed off*

Other suggestions included Arfan advising using supplementary health education materials similar to the *"NHS Change 4 Life stuff (.) you can maybe do it like that (.) like that (.) like the little cards and stuff" (lines 195-196, FG 6)* and Sonia's "*perhaps educate them in terms of what oil to use*…" *(line 1254, FG 1)*. Sandy also added "…*letting them know the implications*

*of too much salt, too much sugar…*" *(lines 1306-1307, FG 1)*. Participants seemed to favour the addition of traditional health educational dietary information as a supplement to Mindful eating as *"…you got thoughts like (.) once you get rid of the thoughts now you can actually go through it" (lines 181-182, FG 6)* and utilise traditional changes. However, participants urged caution:

> *Extract 28, FG 6*
> ***Arfan:*** *But you can't bombard someone with stuff cos it's just (.) cos they're just gonna be like (.) I'll give you an example of my friend he's like "Yeah you shouldn't do this man" "You know what, I don't care" (.) that's the (.) it's "I don't care"*

Participants noted that too much information regarding which changes to implement would be an unsavoury experience and would result in the individual losing interest and being dissuaded from changing for the better. Another issue was raised by Iram who noted that suggestions must be given sensitively, as not everyone cooks for themselves and there would be a need to consider "*who is cooking in the house (.) they might not be as open (.) they might just wanna cook it their way*" *(lines 1290-1291, FG 1)*. This seems a commonly agreed facet of South Asian culture, as several participants noted "*my mum makes my food*" *(line 107, FG 6)*. Thus, it is apparent certain sensitivities must be considered in that the person trying to make dietary adaptations may not be the person cooking within a household, and thus transmitting that message must be dealt with sensitively, particularly if the person is of an older generation and less open to change.

*Programme duration*

Many (72%) participants stated that they felt the duration of an 8-week programme to be excessive. For example, Naeem stated *"I'd say 8 weeks is also quite long (.) you wanna condense it down" (line 11, FG 6)*. Sandy had also noted: *"I think if it's a 1-month commitment you're more likely to stick to it rather than if it's dragged out to 2 months (1 sec) and I think if you do it in 4 weeks I think that's a sizeable chunk to be able to commit to" (lines 332-334, FG 1)*. Commitment seemed difficult for the standard Mindfulness programme duration; this was in relation to commitments mentioned under the previously discussed *Busy lifestyles* sub-theme:

> *Extract 29, FG 3*
> ***Saba:*** *I think (.) especially if you're working at that age group (.) like Sunita said earlier (.) if they're working Monday to Friday (.) or whatever (.) that one day to commit every single week for 8 weeks is a lot of time so for me (.) I'd personally think maybe a 4 week span so you know it's a shorter one (.) its quick (.) it'll be over and done with soon (.) you can commit yourself to that short period of time but (.) whereas if it's 8 weeks (.) it could possibly- yeah it's 2 months (.) and you might not want to continue on with it*
> ***Neelam:*** *Erm I suppose I can agree with that actually (.) because I myself won't stick to anything that long*
> ***Sunita:*** *Yeah I agree with Saba (.) I think it should (.) it's a bit too long (.) and also if I was going to some therapy (.) I'd want it as fast as possible so I could implement it as fast as possible*

Participants' work responsibilities and life commitments were seen to dictate their availability, and as such could preclude commitment to the full duration of an 8-week programme. A shorter time span was generally perceived to be more acceptable and achievable, and less disruptive to their usual routine. However, 5 participants felt that 8 weeks was a suitable time period compared to 4 weeks:

*Extract 30, FG 2*

***Moderator:*** *One of my other focus groups had proposed a 4-week programme instead of an 8 week one (.) what do you think?*

***Ayesha:*** *Yeah but it would depend on what the programme is trying to achieve (.) and how long it takes (.) and how much you're trying to teach (.) cos (1 sec) okay let's say the first session is how do- oh ways of being Mindful (.) that's gonna be an hour in itself (.) what if people have questions? (.) I don't think 4 weeks is enough cos if you're trying to teach people how to be Mindful-*

***Adeeba:*** *And you're trying to change their life as well*

From discussions, it appears that there is a balance between delivering a longer, comprehensive programme that may suffer a high drop-out (and possibly poorly practiced) and a shorter, more circumscribed programme that is nonetheless better attended and practiced. While a more comprehensive programme offers more Mindfulness techniques, a shorter more "bite-size" programme could be more enticing.

*Session length*

Participants were informed that the range in lengths of weekly Mindfulness sessions varied between 1 hour to 3 hours. Upon hearing the upper limit, Adeeba responded as follows:

*Extract 31, FG 2*

***Adeeba:*** *Oh (laughs) I'd run away*

***Moderator:*** *So what do you think would best?*

***Ayesha:*** *I think an hour and a half is fine*

***Maryam:*** *Yeah an hour and a half (.) if you do it longer you could do a short break half way*

Sessions of 90 minutes were generally deemed acceptable by 58% of participants. Sunita noted "*I think it's quite difficult to concentrate for 2 hours especially if you were, say, going*

*to this after work*". Some participants wanted sessions as short as *"45 minutes" (line 126, FG 1; line 289, FG 3);* however, Sandy retorted that if she travelled from afar, she would not deem a short session worthy of the commute:

> *Extract 32, FG 1*
> ***Sandy:*** *If I think if I'm gonna go out my <u>way</u> (.) to go somewhere (.) to learn something new (.) I think if it's just a 45 minute commitment (.) I mean the drive there could be half an hour each way (.) I think if it's just 45 mins I'd just feel like it's not worth my time to go (.) I'm probably more likely to miss it*
> ***Sonia:*** *Mmm (nods head)*

Mala remarked "Distance would play a role" *(line 147, FG 1).* Discussions indicated that sessions should not be too long to tire or bore attendees but should also be long enough to be considered substantial and worth a journey.

*Group-based vs one-to-one sessions*

The moderator asked participants whether they would prefer sessions to be group-based or one-to-one. Most (66%) participants favoured a group-based delivery:

> *Extract 33, FG 2*
> ***Moderator:*** *Okay well that's fair enough (.) while on this topic of delivery (.) would you prefer it in a group setting or 1 to 1?*
> ***Ayesha:*** *Maybe-*
> ***Maryam:*** *I think group (.) group's less pressure*
> ***Ayesha:*** *With one it's like all eyes on you*
> ***Maryam:*** *Yeah I think so*
> ***Adeeba:*** *But then would they concentrate more?*
> ***Ayesha:*** *Yeah cos if I'm-*
> ***Maryam:*** *Well if [they are] there because they want to change then obviously they would*

***Ayesha:*** *Solidarity is the key to everything*

Groups were described as a more favourable, relaxed option. The prospect of having others for companionship, support and solidarity was seen as beneficial. Only 3 men in FG 6 preferred 1-to-1 as Arfan stated: *"…I would prefer to do it on a 1-to-1 with the doctor rather than in a group" (lines 478-479, FG 6)*. Four participants opted for a combination of group-based and one-to-one sessions. However, they had differing opinions on the arrangement and chronology of these sessions:

*Extract 34, FG 3*

***Sunita:*** *Can I start where I'm doing individual (.) so I can see if I like it (.) and then progress into a group-based so I can get that support*

***Neelam:*** *I-*

***Saba:*** *I think I'd probably do it a little bit different I think I'd start off with group-based (.) I'd be like (.) you know like a Weight Watchers programme or something where people go in (.) but something like that where there's a group of people and you don't feel like you need to disclose too much information (.) and then maybe if they do feel they're happy as a group they can share more (.) if not you can stay back don't speak too much about it (.) but if you think it's useful that first session (.) cos it doesn't need to be specifically about you then during that session (.) and then after 3 group sessions the next one is maybe more specifically focused on you (.) I think that might work*

Some participants saw the benefits of a mixed delivery as it drew the benefits of both the group support and focused one-to-one sessions. Different participants felt different delivery styles catered for a better introduction for them to decide if they would continue.

*Group composition*

Of 12 women sampled, 11 either personally preferred a *"Ladies only kinda thing" (line 320, FG 2),* or if they were personally indifferent to gender-segregated classes still recommended this over mixed classes. Conversely men were generally indifferent to gender-segregated classes as Ahmed stated: *"…I think mixed gender would be absolutely acceptable and fine (.) the way I see it is (.) diabetes can affect men and women…" (lines 399-401, FG 4)*. The following accounts were given by women and men in favour of gender-specific classes:

*Extract 35, FG 3*

***Neelam:*** *I thought that's what you had said (laughs) my take is should be separate for men and women (.) cos not all women are comfortable attending classes with men like (.) I know some Muslim ladies they wear the hijab (.) I don't know the full details but I know like (.) when I go to the gym (.) there's those ladies there (.) sometimes they need that [gender-specific environment] (.) sometimes ladies are just not comfortable being there with men (.) especially because it's not their family members*

***Sunita:*** *Yeah I'd still prefer gender-specific*

***Saba:*** *Yeah*

***Sunita:*** *I think so (.) just if you're discussing personal*

***Saba:*** *I think we can relate to each other a little bit better if it's just female or just male (.) it would be easier to have like a straight conversation (.) there might be women that are pregnant (.) stresses as maybe getting married, that kinda thing (.) that would probably be easy for them to relate to (.) whereas if it was mixed (.) they might not be able to disclose that information as easy*

*Extract 36, FG 4*

***Umar:*** *Well (.) (sighs) men and women both work in different ways (.) they work in different paces (.) I feel they should be gender specific (1 sec) not because of religion or anything (.) but I think scientifically men and women they're engineered differently (.) their thinking paces are different (.) personally women overthink so they would take longer (.) whereas men they would hopefully (.) understand the concept and get to understand how to do the thing and get to the results sooner*

*Extract 37, FG 6*

***Abbas:*** *I think cos men and women they think a bit differently as well (.) that's why so yeah*

Of those who recommended gender-specific classes, women argued from a point of comfort, empathising over shared issues and freedom to disclose. In contrast, men regarded themselves as designed differently and more functional to work at a different pace. Neelam's latter points about Muslim women highlighted a religious permutation that they may not be comfortable or permitted to be around men who are not family members. Thus, there may not be a *Cultural-religious acceptability* for some South Asian women to attend classes with unknown men.

Having bespoke classes for different subgroups of South Asians was suggested. All participants (bar Umar) saw no benefit in doing this, for instance Arfan remarked: *"They're all the same (.) yeah like culture-wise everyone is pretty much the same" (lines 449-450, FG 6).* Amit remarked the following:

*Extract 38, FG 4*

***Amit:*** *I don't think you should (.) cos that's again (2 secs) segregating and (.) it's not required (.) cos there's no real reason why a Punjabi diet should be different to a Bengali diet (.) not just diet-wise but whatever the programme is (.) I don't see the reason for that (.) I don't see <u>why</u> it would be logical to have different groups*

Some participants seemed averse to the assumption that they needed to be separated by ethnicity and cited a desire for more cohesion amongst different Asian subgroups. Sunita noted *"…especially with people at our age (.) we're more erm (.) accepting of other people and other religions so I don't see why it should be divided"*. Young South Asians saw

themselves as culturally similar and more accepting of people of varying backgrounds, and as such perceived this suggestion as a slight on their ability to integrate with people of other backgrounds.

*Programme deliverer(s)*

Several participants noted that the programme deliverer should be competent, as Mary notes *"as long as the person is an expert…" (line 729, FG 1)*. Participants had varying views on what background the deliverer should have, with 5 preferring a Mindfulness practitioner, 5 a Clinical Psychologist and others indifferent as long as they were competent. Excerpts below are from those who favoured a Mindfulness practitioner:

> *Extract 39, FG 3*
> ***Sunita:*** *And also I think the label of Mindfulness practitioner (.) makes you more confident (.) cos they can see that the person is specially trained in that area (.) rather than a broad area*

> *Extract 40, FG 1*
> ***Rukhsana:*** *I think the trained Mindful (.) cos then it seems a bit more informal (.) like there's' a bit of stigma attached to Psychologists (.) like they're gonna ask them all sorts of questions*

The professional title of the deliverer seemed to play a role in perception of their competence and ability. Mindfulness practitioners were seen as experts and more knowledgeable about Mindfulness due to their focus in the practice, and that their title connoted a more relaxed approach. The negative connotations attached to Psychologists were frequently raised:

> *Extract 41, FG 5*
> ***Manvir:*** *Because I reckon (.) by just the word "Psychologist" (.) like I know a lot of*

*people have the same understanding and that will [be] intimidating (.) but like a Mindfulness practitioner it seems like he's more (.) teach it (.) he's more of a teacher than a Psychologist*

***Sunny:*** *(nods head) Kinda like obviously the whole name of this is Mindfulness (.) so then people would trust it more because they know that the person is doing it right*

***Indy:*** *Yeah at least you can ask them their experience (.) "How do you deal with this (.) How do you deal with that" (.) as opposed to a Clinical Psychologist who will come in at it from a default clinical viewpoint of "This is what my data tells me how to deal with it," let's say*

***Sunny:*** *A Clinical Psychologist is like sometimes (.) in like Asian community (.) why would you wanna go to a Psychologist, can't you go sort your issue out yourself? (.) so it kinda gets influenced by the older generation (.) so Mindfulness teacher would be a lot better than a Psychologist*

The term "Psychologist" seemed intimidating to some participants due to a perceived unapproachability. Some participants regarded them as less person-centred and more data driven in their approach to dealing with human issues, which caused unease as people want to be treated as individuals. An issue within the Asian community regarding seeking psychological help is that it is seen as an inability to cope and deal with one's own problems. Umar elaborated on the issue: *"they don't wanna be considered as the dumb one in society or someone in need of help because they have mental problems (.) depression is frowned upon" (lines 264-266, FG 4)*. Amit had also noted that the wider community would *"…look down on him" (line 263, FG 4)*.

Five participants felt a Clinical Psychologist would be a better deliverer and were sceptical of the credentials of a Mindfulness practitioner:

*Extract 42, FG 6*

***Arfan:*** *I think it depends on the person (.) like say if you say Mindfulness guy or something I'd think juju baba [a slang term] or something*

***All:*** *(laugh)*

***Arfan:*** *No disrespect to them (.) that's what I would end up thinking (1 sec) so I would rather have someone who's got some educational background in Psychology (.) maybe a nutritionist or something I dunno*

*Extract 43, FG 6*

***Moderator:*** *Well you keep saying "juju" a few times (.) so why don't you explain what you mean by that?*

***Arfan:*** *Like (.) it's like <u>boogie</u> (.) just <u>weird</u> so I dunno (.) they'll give you like [unclear; 16:45] time or something or whatever*

***Moderator:*** *Do you mean like kooky-?*

***Arfan:*** *Yeah yeah yeah (.) they just have weird connotations kinda thing (.) like "What is this? What doctor prescribed this?"*

Five men from FGs 4 and 6 preferred a formally educated deliverer who had relevant scientific qualifications. The term *"juju baba"* (meaning an elder who practiced eccentric or 'kooky' practices) was used to describe Mindfulness practitioners in a derogatory manner. This attitude may emanate from a cultural inclination to avoid alien practices as discussed previously under *Cultural-religious acceptability.* These participants preferred a Psychologist to deliver the programme:

*Extract 44, FG 4*

***Umar:*** *They would be able to respond to the behaviour of the participants and (.) maybe then they're able to alter (.) these sessions the way they would accept it (.) and also benefit them*

***Amit:*** *Yeah they'd get a better understanding of the client*

***Umar:*** *Whereas a Mindful practitioner would just teach the way they know (.) and I don't think they'd be able to read the people*

***Amit:*** *And a Psychologist can bring other things into it if they need to depending on the client (.) the Mindful person won't be able to do that (.) they'll have a very sort of tunnel-vision*

***Umar:*** *Set path*

***Amit:*** *Yeah*

***Ahmed:*** *Err (2 secs) to be honest with you (.) I don't think it really matters as long as it's someone who is um (.) well-versed in their field (.) who knows his or her stuff (.) I think most people are open to information as long as they (.) as long as the person who's delivering is sort of err reputable (.) and not some random person (.) you know what I mean? (.) so yeah*

These participants saw Psychologists as more flexible, adaptable and able to utilise different aspects of their background for the benefit of those attending. Mindfulness practitioners in comparison were regarded to have a narrow skillset and lack of options. Ahmed's last comments represented the 12 participants that were indifferent to the title of the deliverer and preferred someone who would be able to deliver Mindfulness adeptly. Iram shared similar sentiments: *"I'd see how they do it and whether they engage the class and stuff like that (.) that would be the main point of me to choose (.) instead of it being the title and letting that stigma continue" (lines 739-741, FG 1).*

Participants were also asked if a gatekeeper or community leader should co-facilitate the programme in addition to the primary deliverer. Participants were unanimously opposed to this, for example Umar stated *"They would probably feel uncomfortable… I think it would be a deterrent" (lines 251-253, FG 4)*.

*Extract 45, FG 1*

***Sandy:*** *Yeah (1 sec) well as it's a general South Asian group (.) That's going to be attending these sessions I don't think you should have any (.) you shouldn't bring religion into it (.) the fact that you kept the Buddhism part separate as well is a good*

*thing so (1 sec) I probably wouldn't err want (.) I'd probably want someone who's unbiased, independent err knows their stuff (.) rather than an opinionated faith person that would clash with other faiths that would be in the group*

***Sonia:*** *Mmm (nods head)*

***Sandy:*** *So I'd say keep it totally out*

It appears a gatekeeper would not be perceived to enhance delivery due to a lack of expertise in Mindfulness, instead they may adversely affect delivery. Furthermore, the idea of a gatekeeper's inclusion on the basis of tokenism appeared unpalatable:

*Extract 46, FG 3*

***Saba:*** *No (.) I don't think it would be needed in terms of Islam because there's so much (.) to be honest people from my age group would not always say- (.) people that do go to a mosque on a regular basis (.) like we don't really listen to the same type of religious figures (.) that kinda stuff (.) and there's a big divide in terms of the religion and all that kinda stuff (.) and I think it'd be best coming from someone that wasn't a religious figure*

***Sunita:*** *Mmm Yeah I agree (.) erm (.) I think if a religious figure delivered it (.) especially for people of this generation (.) I think it might be slightly intimidated maybe around that person (.) I don't think they'd express all of their views (.) because maybe that person might know (.) err it might be a small community (.) that person might know their family (.) or friends and they might not want- (.) I know these things have to be confidential but you never know what might happen (.) people might discuss things*

Saba noted great variation within single religions in terms of schools of thoughts, indicating that it would not be practical to find an appropriate figure for a wider South Asian audience. A frequently cited issue was if the gatekeeper was known to them, they may inform others within their social circle and break confidentiality. This garnered a fear over privacy which would threaten personal disclosure and ultimately the programme's effectiveness,

something Ayesha referred to as *"community crap" (line 417, FG 2)*. Sunita mentioned the possibility of being intimidated by a community member, this may be due to the fear of disclosing something culturally or religiously unacceptable. Hence part of the reason why the inclusion of a community leader was unfavourable could be related to factors related to *Cultural-religious acceptability*.

*Technological delivery*

Participants were asked about delivering the intervention via an app, and generally saw the potential benefits of an app. However most preferred a face-to-face delivery, citing disadvantages of a technology-only delivery:

> *Extract 47, FG 2*
> ***Ayesha:*** *No because then if I have a question who am I gonna ask? (.) the screen?*
> ***Maryam:*** *Yeah I think I'd take it more seriously if I was there in front of someone*
> ***Ayesha:*** *Exactly (.) you know like in America when they go to fat camp and they actually keep you in check (.) that's what you want cos if you wanted- for a specific purpose it should be for that purpose and it should be some sort figure that's making sure doing it right (.) because what you think is right may not be*
> ***Maryam:*** *Yeah I agree*
> ***Adeeba:*** *Yeah*
> ***Maryam:*** *Yeah cos if it was like that or a DVD I wouldn't like (.) be so serious about it (.) if someone was in front of me doing it as well I would*
> ***Adeeba:*** *I would too*
> ***Ayesha:*** *It's more intimate (.) and it gives more value to what you're doing*
> ***Maryam:*** *I think they have to build that relationship with you as well (.) in order for you to challenge yourself*

Face-to-face delivery was seen as favourable as it allowed for feedback, a point that was raised several times. Such delivery also provided guidance and gave some form of pressure

to attend and practice correctly. Additionally, the interpersonal connection between deliverer and attendees was seen as important for commitment and subsequent progress. Participants saw the utility of an app as a supplementary tool, as Adeeba notes: *"I think maybe alongside it (.) so you actually go to the session and then at home you have the app" (lines 487-488, FG 2)*. Thus, an app was seen as a potentially useful addition that would enrich the Mindfulness learning experience by allowing for continuation of practices at home.

Abbas preferred an exclusively online delivery *"Just so I can work at my own pace (.) like whenever suits me" (line 531, FG 6)*. *"My own pace"* and *"whenever suits me"* indicated he wishes to learn when is convenient for himself, be in control of his daily activities and not be dictated by a structured class. This also shows recognition of this delivery mode's flexibility.

**Research study methods**

*Randomising*

The moderator enquired whether study participants would have an issue with the process of possibly being randomised into a control group and missing out on the Mindfulness programme. Some (36%) participants felt that it would not be a problem, for instance Amit said:

> *Extract 48, FG 4*
> ***Amit:*** *No because they'd understand that they're taking part in the programme and the sample needs to be of such (.) so they'll know the whole point of doing this is to realise if this works so they'll know why they've gotta be in one or the other groups*

Thus, it seems that clarity and expectation management would be a useful tool in study participants understanding the nature of research participation. However, most (59%) participants suggested a concern with the process of randomising participants for the research study.

*Extract 49, FG 3*

***Saba:*** *I don't think they'd be as understanding (.) personally*

***Sunita:*** *Yeah*

***Moderator:*** *Neelam (.) do you think people would have an issue?*

***Neelam:*** *I think so (.) I think people will have a problem like "Why do I have to be here"*

***Saba:*** *Especially if they are committing to it (.) erm I don't think they're gonna be as willing to take part*

***Sunita:*** *I think they'd want something out of it if they're giving you their time (.) they'd want hopefully some benefits*

***Moderator:*** *So you guys seem-*

***Saba:*** *I think there would be an issue (.) but I think what you could do as an incentive or after that (.) so the group that doesn't have that (.) "We will provide you with the full sessions afterwards" or something*

***Sunita:*** *Yeah*

Participants noted that some individuals would have an expectation that if they were giving their time, they need some benefit in return, in the form of the programme. Therefore, giving their time and divulging personal information in exchange for information from their outcome measures would be unsatisfactory. This is evident from Sandy's remarks: *"it's just more time taken out of my busy life (.) with no benefit" (lines 986-987, FG 1)*. Saba (as well as Sonia and Arfan) brought up the possibility of the control group doing this programme at a later date without realising this was a study design known as a delayed or wait-list intervention. If no participant brought up this possibility, the moderator suggested this type

of study design in other focus groups. Delayed interventions were universally seen as more suitable and described as a *"softer blow" (line 628, FG 4)*.

*Number of outcome measures*

The researcher asked participants whether the number of outcome measures would be deemed excessive. Most (91%) participants felt *"that'd be acceptable (.) they're participating in it (.) they know research is (.) um it has to have an extensive range" (lines 638-639, FG 4)*. Ahmed had suggested that some measures be combined:

> *Extract 50, FG 4*
> ***Ahmed:*** *Err (.) I think (.) I'll be honest with you I think maybe you should have two of them (.) like maybe if you had something like if group both of them together like diet and exercise (.) if that makes sense? (.) and they can put down "I ate this I (.) did this exercise" (.) and then you have less (.) you have two instead of three*
> ***Amit:*** *Maybe*
> ***Umar:*** *But then (.) you might be watering down the information you get (1 sec) and I think they might find it helpful to know these things about themselves <u>if you</u> explain it right*

Several participants noted that the information about themselves from completing the questionnaires might be of interest:

> *Extract 51, FG 1*
> **Moderator:** It wouldn't be an issue for you?
> **Mala:** No (.) because you're not really going to get the data you need if you don't (.) get that information (.) so I'd be fine with it
> **Mary:** (nods head)
> **Moderator:** And would you like to have that information fed back to you?
> **Mala:** Mmm (.) yeah (.) that would be helpful yeah yeah
> **Mary:** I'd (.) the fact that I'd receive feedback would make me more inclined to-

**Mala:** Give-

**Mary:** Give out the information

The receipt of feedback about themselves from the outcome measures was seen as valuable and enticing for participation, as it would be regarded as another positive benefit of participation.

*Measuring physical activity*

The researcher asked participants whether they would prefer to use an automated device (an accelerometer) or a self-report measure (weekly recall or daily diary) to measure physical activity in the study. Participants were generally in favour (80%) of an accelerometer:

*Extract 52, FG 4*

***Umar:*** *Accelerometer (.) because as I said it's a lazy option (.) people would prefer that as they wouldn't have to record anything (.) cos well (.) everyone just wants the easy way out*

*Extract 53, FG 5*

***Sunny:*** *I think not writing it [down yourself (.) people would end up lying*

***Manvir:*** *[(laughs) yeah*

***Sunny:*** *Making themselves feel better (.) cos generally for yourself (.) you're not really honest to yourself (.) if someone else was doing it for you then fine (.) but with the electronic one the device that's gonna be a lot more accurate and you can't really err (.) lie about that*

*Extract 54, FG 3*

***Sunita:*** *Err even though the accelerometer (.) is more expensive (.) it will definitely be more accurate (.) and erm (.) probably help your results more (.) of it being reliable*

***Neelam:*** *I think the device is better (.) cos I myself I don't remember what I do (.) on a daily basis (.) so I think Asian people (.) once a week I don't think it'd work*

Participants favoured the accelerometer citing its convenience, lack of effort required on behalf of the wearer, which results in a less demanding experience for the research participant. Participants raised the issue of response bias, whereby study participants may falsify their physical activity levels to appear more acceptable to the researcher or themselves. Furthermore, the accelerometer was deemed more accurate and reliable as human memory was noted to be fallible. In contrast, Ahmed argued the self-report option may be favourable:

> *Extract 55, FG 4*
> ***Ahmed:*** *Um (.) I personally think writing it down yourself (.) the reason being is (.) I think if there's err (.) there'd probably be a bit more of a comforting (.) comfortable writing it down themselves (.) if they got the device they might feel a bit more pressured and not sort of um (.) not do it naturally if you know what I mean*

Ahmed's concerns about the accelerometer stemmed from feeling pressured about having to appear physically active and more 'normal' as per their perceived expectations, and as such they may increase their activities because they are consciously aware of the device on their person. Other concerns about the accelerometer included if they *"take it off to go somewhere" (line 1159, FG 1)* or if they did an activity *"you're doing physical activity like swimming*" *(line 1160, FG 1)*. Thus, the accelerometer was seen as not completely accurate, as it was limited by the fact it could not be worn on all occasions if participants went somewhere and was also limited to land-based physical activity.

*Completing questionnaires: Paper vs online*

Participants were asked for their preference between completing various research questionnaires online or on paper. There was a mix between preferences:

*Extract 56, FG 1.*

***Mary:*** *I wouldn't have even thought of the online option until I started teaching and I realised that my students never used to give any constructive feedback on the forms (.) but they always made the <u>effort</u> online*

*Extract 57, FG 6.*

***Arfan:*** *… I was just in a rep meeting and they (.) when they give the papers out (.) everyone does them (.) but when they send them out online like 5 people do it (.) so it depends if you're doing it face-to-face (.) it don't make a difference (.) if it's like you send a paper (.) from far then they think "Oh I gotta do this" then online would be easier*

Participants were ambivalent as to which of the two options was better; 7 preferred online, 6 preferred paper whilst 7 did not state a preference. Participants offered contrasting perspectives which positioned both having advantages and limitations. All agreed that research participants should be *"given an option"* between paper and online questionnaires.

## Discussion

The primary aim of this research was to examine if a Mindfulness intervention for South Asian young adults (18-35) is culturally acceptable and feasible. Secondary aims included examining whether cultural considerations must be made when developing the programme content, format and delivery personnel, as well as to determine which research methods are most acceptable to this population. These questions were answered using directed content analysis underpinned by a phenomenological approach to draw insights from FG-generated data into their experiences as young adults who have a higher predisposition to developing T2D by virtue of their ethnicity.

Results generated 81 codes grouped into 4 themes. Below the themes are discussed in greater detail in relation to aforementioned theories and literature.

**Personal influences**

Although they were not specifically asked to convey their health awareness, participants displayed some health knowledge. This is in contrast to research by Rankin and Bhopal (2001) which found South Asians had insufficient health knowledge or T2D knowledge to prevent T2D. Rankin and Bhopal sampled a wide age range (16-74 years). It is apparent that the younger adult age group targeted in the present study are more health aware and conscious than their older counterparts (in literature). It must also be stressed that the recruited sample are all working professionals or students engaging in higher education. As such, these findings would not be generalisable to older South Asians, less educated South Asians in the UK or (recent) South Asians who have recently migrated to the UK.

As anticipated, participants reported family history of chronic illnesses such as coronary heart disease and T2D. This supports the Diabetes UK (2016) report of high prevalence of T2D within this ethnic population and emphasises the importance of developing novel methods to improve the lifestyles of South Asians to reduce their risk of developing T2D.

**Acceptability and feasibility**

Participants deemed Mindfulness as an acceptable and relevant tool that would be beneficial to help contend with their stressful daily lives. This finding is encouraging, as any

stress-reductive effects may reduce T2D risk through reduced activation of the neuroendocrine and neuroimmunological pathways and more considered (i.e., healthy) behavioural decisions (Gardner, Wansink, Kim & Park, 2014; Golden, 2007; Procaccini et al. 2014). They reported no cultural-religious conflicts with the proposed intervention. However, participants did note some South Asians, mostly older adults, may not be willing to try principles derived from another religion or culture. Such resistance was usually explained in the context of being borne from a fear of having their religious beliefs adulterated or diluted. Participants acknowledged Mindfulness had broad, fleeting similarities with aspects of their culture and religion. In Dreger et al. (2013), investigators culturally tailored Mindfulness to treat T2D in Canadian Aboriginals. In these group discussions, cultural-religious similarities were seen to be compatible and not at odds with Mindfulness thus they felt there was no need to tailor Mindfulness to fit their own cultural or religious views.

Thirty percent of the male participants in the present study expressed concern over whether all South Asians would embrace Mindfulness, citing lack of motivation as a potential issue. Sriskantharajah and Kai (2006) also reported that South Asians indicated a lack of motivation to practice health-protective behaviour (physical activity in this instance). There are other bodies of research that have found men, irrespective of ethnicity, to have a lack of motivation to use services or engage in pro-active lifestyle behaviours for the betterment of their health. Seymour-Smith, Wetherell, and Phoenix (2002), in a qualitative (discursive analysis) study, found men unmotivated to visit their doctor at the onset of any symptoms regardless of severity. They were often only persuaded to eventually consult their doctor by their spouse or partner. The authors concluded help-seeking behaviour would be perceived as emasculating and at odds with the mens' concept of masculinity. Sabinsky, Toft, Raben,

and Holm (2007) found a sample of overweight men with aim of weight loss generally were not motivated to engage in dietary interventions. This was in part due to the negative perceptions of "slimming diets" which invokes the idea of a feminising practice. Sabinsky et al. found men to favour an intervention that emphasises effectiveness and performance over aesthetics. It is possible that the men in this present study perceived the proposed Mindfulness programme unfavourable to similar reasons, specifically that Mindfulness' less practical nature may not be perceived as a masculine behaviour. There was also discussion about whether some South Asians would comprehend Mindfulness's utility, which was seen as dependent on a certain level of intellect and education.

The use of the term '(compassionate) body scan' was flagged as potentially concerning, because it may induce an idea that participants would have others gaze at their bodies. This would be uncomfortable in this "reserved", conservative culture. Hussain-Gambles, Atkin and Leese (2006) noted that modesty could be a barrier to participation in clinical trials, especially for 'embarrassing' screenings (e.g. breast or gynaecological). Thus, the naming of this technique may have to be elaborated or altered, and it is imperative that a clear description of the technique is provided up front to all participants.

Participants voiced concern over the feasibility of fitting the programme around busy South Asian lifestyles. Participants noted that South Asian women's family responsibility may preclude participation and that ignoring or failing to prioritise such responsibilities may seem "selfish". Samsudeen, Douglas and Bhopal (2011) investigated health professionals' and community recruiters' perceptions of why it was challenging to recruit South Asians for a T2D and obesity prevention trial and reported similar findings. Earlier research by Choudhry et al. (2001) echoed these findings and provided further context in that they discerned a

theme where migrant South Asian women felt compelled to place family needs before the self. However, this is not an issue exclusive to South Asian culture, Eyler et al. (2003) found that women in African-American groups and rural white groups were less physically active when they had had greater strain due to social roles. O'Driscoll et al. (2014) also supported these findings. They conducted a systematic review investigating physical activity in migrant populations. They also noted that a lack of social support within Somali, other African-Caribbean groups, Muslim and particularly Latino communities for women's physical activity and family responsibilities precluded women's physical activity. Furthermore, the less spousal support women received, the less likely they were to be physically active. Findings from the present study also indicated that the men's work commitments may impede attendance, which is consistent with data from Hussain-Gambles et al. (2006), who found that South Asians felt participating in clinical trials may interfere with work obligations.

**Programme**

The programme name of Mindfulness was deemed acceptable, as it was viewed as neutral and had no connotations that would conflict with cultural-religious beliefs. Additionally, it was seen as something that could be researched by prospective attendees.

In terms of course arrangement, participants felt a good initial impression was important. They suggested scheduling more interesting teachings up front (as perceived by participants), such as compassionate body scan and Mindful eating. Mindful eating proved popular with all participants who deemed it an essential, culturally relevant addition. Research supports the notion that Mindfulness may be appropriate for an ethnic group where obesity and T2D are (partly) caused by poor dietary behaviours (Lawton et al., 2008;

Rankin & Bhopal, 2001), with Mindful eating shown to be effective in aiding dietary intake, portion control and weight management (Beshara, Hutchinson & Wilson, 2013; Miller et al., 2012; Timmerman & Brown, 2012). Participants suggested Mindful eating teachings could be supplemented with traditional health educational materials. It must be noted that young South Asian adults may not be in control of cooking in the home, and as such implementing dietary change must be suggested with sensitivity as it implicates older adults who may be more resistant to changing culinary and serving practices. Thus, this may present a barrier to fully integrating Mindful eating into their daily lives.

Seventy-two percent of participants felt the standard 8-week programme to be too long for South Asians to incorporate into their busy lives, preferring a shorter duration of 4 to 6 weeks. Participants felt individual sessions could be shorter than the 1.5 -2-hour standard class duration; 58% preferred sessions of approximately 90 minutes whilst 42% preferred 45-60-minute sessions. Two-thirds of participants preferred group-based delivery as opposed to one-to-one sessions.

Regarding group composition of Mindfulness classes, females predominantly preferred single-gender classes, citing reasons pertaining to comfort and relatability to similar others. Hussain-Gambles et al. (2006) found similar issues of women precluded from participating in clinical trials due to Purdah issues (the practice in some Islamic and Hindu societies of screening women from strangers, particularly men). However, the difference in findings here compared to Hussain-Gambles et al.'s was that this sample of women suggested South Asian women would choose to avoid mixed gender scenarios themselves, whereas Hussain-Gambles et al. suggested that their husbands would not permit their wives to engage in mixed gender groups. Whomever the permutation originates from, it is clear

there may be some cultural sensitivity around the issue of mixed-gender session delivery of Mindfulness classes for South Asian women.

Participants were undecided over whether a Mindfulness practitioner or Clinical Psychologist would be preferred to deliver the programme. Various advantages and disadvantages of both backgrounds were noted, though ultimately participants recognised that the trait of paramount importance was that the deliverer had to be competent and well-versed in Mindfulness.

The UK National Institute for Health and Care Excellence (NICE) recommends enlisting 'community champions' from within the ethnic minority community when delivering interventions to communities (NICE, 2011). Dreger et al. (2013) enlisted an Aboriginal elder and trained him in Mindfulness to co-facilitate the intervention as a way of gaining community trust and acceptance. When a similar option was suggested to South Asian young adults, all participants rejected the idea. Participants felt that the presence of a community insider who may be known to them or their family and friends would threaten their disclosure of personal information and thus limit their ability to participate fully. Additionally, they felt unconvinced a non-expert of Mindfulness could add value. This was in contrast to Dreger et al.'s study where it was noted that having the elder delivery the programme improved trust and allowed fuller participation. These contrasting findings emphasise the importance of assessing the feasibility of any novel intervention within the target audience, as specific cultural preferences must be understood and honoured to optimise participation.

The potential benefits of delivering an intervention online or via an app were recognised, but only as a supplement to face-to-face delivery. Participants felt a lack of feedback, less pressure to adhere due to no supervision, and no relationship with a deliverer made an app unsuitable for beginners. This was in contrast to Chittaro and Vianello (2014), who reported that naïve meditators (in a sample of Italian undergraduate students) found an app helpful as an introductory method of delivery. This is reminiscent of Plaza et al. (2013) who noted that while many apps are available to people interested in Mindfulness, there are few clinical trials examining their effects on Mindfulness or health outcomes. Mani, Kavanagh, Hides and Stoyanov (2015) reviewed the content of selected high-quality mindfulness mobile apps but found most had low fidelity to a typical Mindfulness programme and were predominantly guided meditation apps. Therefore, until more Mindfulness-orientated apps are released and have their effectiveness examined, it may be wiser to avoid using an app as a primary delivery mode in young South Asian adults.

**Research study methods**

Fifty-nine percent of participants felt that there may be discontent caused by employing a randomised control trial study design, potentially causing them to miss out on the potentially beneficial experimental group intervention. As such, a delayed intervention was seen as the most suitable solution to ensure participation. Thompson et al. (2008), in an intervention aimed at reducing diabetes in an at-risk group (Native Americans), also found that the prospect of a delayed intervention to the control group improved recruitment and retention in the study. Their participants felt that this type of study design indicated a commitment to their community beyond the span of the research. Participants in the present study were asked if the number of outcome measures was acceptable. A majority

felt that the measures were fine, particularly as the personalised feedback may be useful to them. With regards to measuring physical activity levels, 80% of participants favoured using an accelerometer due to its accuracy, ease of use, minimal effort required to record data, and that it is was seen as being resistant to infallible memory or deceit. When completing questionnaires, participants' views were evenly split between a preference for online or paper questionnaires. All participants agreed that giving an option between the two would be useful.

**Relation to ecological model**

Throughout this thesis, the Community energy balance model has been used as an overarching framework to better comprehend and contextualise the South Asian perspective to health by encompassing facilitators and barriers to a healthier lifestyle across various societal levels. Clearly, these formative findings can be mapped to this chosen ecological model (*see Figure 10*). At the most proximal (intrapersonal) level, the 'People' level, the personal influences theme shows that the sample do demonstrate health knowledge and that a lack of knowledge is less likely to be an impediment to improving their health, and as such would not be a point of intervention when designing the programme. It is also apparent that the (perceived) attitudes of older generations can inhibit their willingness to experiment with alien practices. Conversely younger generations are proposed to have a more open-minded attitude to venture beyond the normative practices of their culture. Hence, differences in acculturation might mediate whether they adopt non-South Asian practices whereby younger generations are more willing to explore practices from outside their culture. Furthermore, the elder generations are proposed to be less knowledgeable, possibly due to being less technologically inclined than younger counterparts.

At a slightly less proximal level, the 'Families' level is concerned with interpersonal factors, it is apparent immediate social responsibilities can impede South Asian women's ability to seek out self-enhancement classes for physical activity or other activities. Similarly, men have a duty to act as providers and as such are likely to lead busy working lives thus time constraints present a barrier to engaging in healthful activities. This is also related to the type of minority status they fall under. If they are unestablished, new or socially disadvantaged this could manifest in long working hours, potentially across multiple jobs, to maintain financial stability.

On a more distal macro-social level of the model, the 'Ethnic minority community level', South Asian communities are perceived to be highly allegiant to their religious upbringing and thus any programmes that appear to teach information from another faith that may threaten their religious beliefs would be avoided even if they are potentially beneficial. Thus, communal attitude of preserving one's religious beliefs affects practices. Additionally, a concern over privacy and the wider community being aware of one's lifestyle practices may dissuade South Asians from attending classes especially if a community or faith leader were to be present at a class. Thus, a community-wide trait of safeguarding privacy in what is perceived to be a 'nosey' culture can influence behaviours.

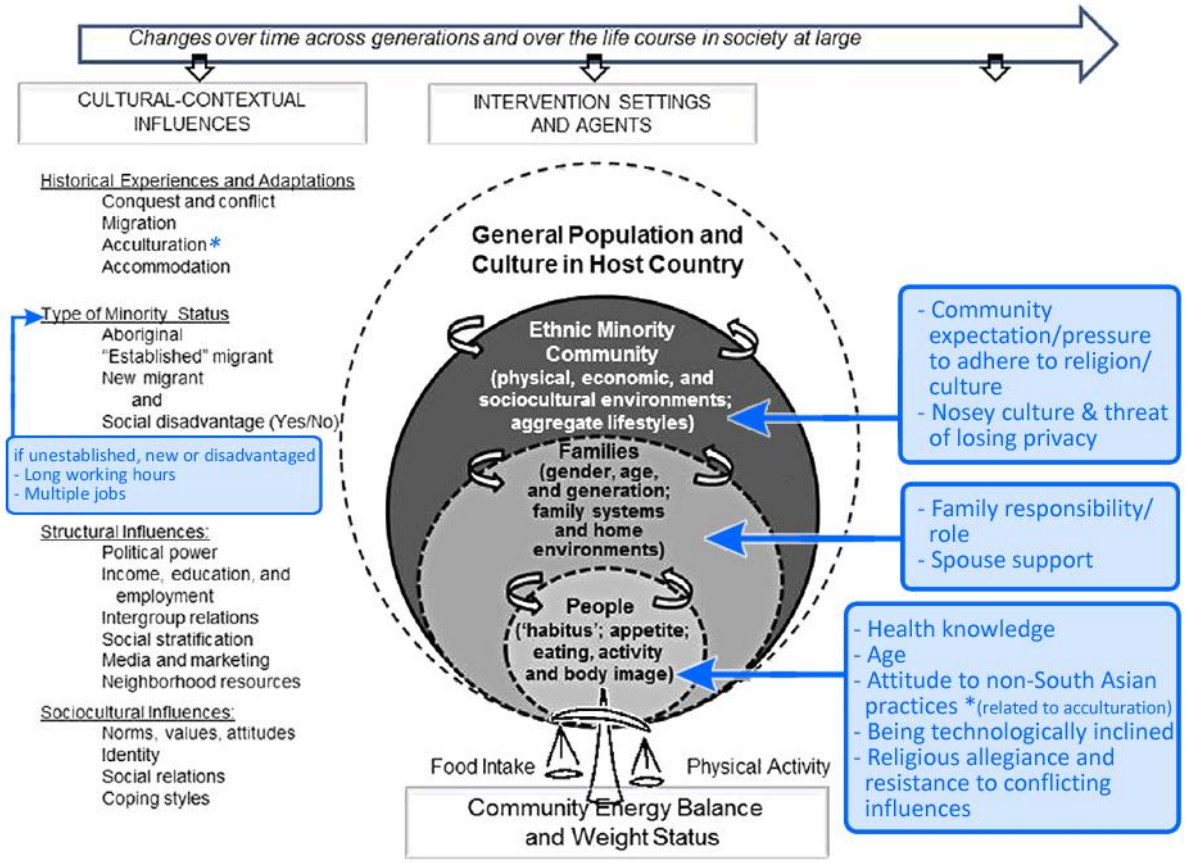


*Figure 10: Results mapped on to Kumanyika et al.'s (2012) Community energy balance model*

**Reflexivity**

The principal investigator and FG facilitator is a doctoral researcher of South Asian descent and Muslim. These traits were discernible by South Asian participants due to his appearance and Islamic forename. It was likely that these traits influenced Muslim participants to use specific terminology without elaboration, as they would have assumed the facilitator shared certain cultural-religious knowledge for example the word "Zohr". For the non-Muslim participants, it may have had influenced their responses and precluded them from elaborating terms fully due to them assuming the facilitator understood them. However, it may have been advantageous to have an ethnically similar facilitator because this would have allowed participants to delve deeper into issues regarding Mindfulness acceptability and catered for more profound cultural-religious discussions as opposed to

defining terms or cultural aspects. When one participant mentioned that Mindfulness may assist Islamic prayer, this may have been salient due to his background and so he asked people in other focus groups whether they agreed with this suggestion. The principal investigator's background would inevitably bear some influence over analysis and interpretation of data. For instance, responses that align with or affirm personal experiences or observations might be better understood and as such more likely to be quoted.

The principal investigator also has a background in Psychology. Though this background may influence some to be biased towards a proposed psychological intervention, the principal investigator has been schooled to understand that empirical evidence can suggest a proposed intervention may be effective. However, his view is that until there is tangible evidence of an intervention's effectiveness in a new population, it is unethical to make claims beyond what is reported in the scientific literature about the known efficacy of Mindfulness. The principal investigator has a family history of T2D, however it is felt that this did not introduce any strong bias into the research. Rather, it acted as an additional motivator for gaining a comprehensive, scientifically informed understanding of a relevant issue.

**Limitations**

As the researcher conducting the focus groups is male, this may have inhibited the all-female FGs from full disclosure of pertinent issues. This also may have limited discussion of more sensitive topics or personal issues, with participants possibly wary of facing potential repercussions for their contributions. In particular, it could have precluded them from elaborating why some South Asian women may be uncomfortable with mixed gender

classes. If this study was to be repeated, it could instead utilise a facilitator of the same gender in single-sex FGs. However, this limitation was not considered severe, as all-female FGs were fruitful with varied discussions arising from relatively few prompts by the facilitator. Though focus groups have their strengths, they can be limited as participants may not wish to disclose or discuss sensitive information in a group setting (Kitzinger, 1994). A final limitation was that data coding was only conducted by one data coder, thus prevented triangulation of code categorisation.

**Recommendations for future research**

The main recommendations for a Mindfulness-based intervention for South Asian young adults would be to incorporate Mindful eating and to have single-gender classes. This was deemed the most important change to typical Mindfulness programmes and seen as a relevant tool for enhanced healthy lifestyle behaviour. The (compassionate) body scan technique requires either a name change or elaboration when presented on paper or verbally. As South Asians are often religiously inclined, interventions should avoid being scheduled on days of religious significance. Deliverers of such a programme would be acceptable as long as they were proficient in Mindful practice. Researchers should also avoid the use of a community or faith leader as a co-facilitator as this could be a deterrent. A shorter overall programme duration is suggested due to the busy lifestyles of this population. Finally, as Mindfulness appears acceptable and feasible to this population, future feasibility research could explore other MBI applications for South Asians. Considering the aforementioned stress-related pathways to illness, research could investigate MBIs for hypertension and coronary heart disease (both prevalent in this population), obesity (as it is comorbid with diabetes) or mental health.

**Conclusions**

In summary, results suggest young South Asian adults would consider participating in a Mindfulness intervention to improve lifestyle behaviours, particularly Mindful eating, to reduce their risk for T2D. With the incorporation of Mindful eating, typical Mindfulness practices were deemed appropriate for members of this cultural background if implemented with a younger rather than older adult population. Single gender classes are preferred among South Asian women. Results also suggest a preference for a qualified, experienced Mindfulness practitioner without the aid of community or faith leaders. A shorter programme duration and slightly shorter session length may be more feasible for this population.

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# Chapter 4:
# The Implementation and Evaluation of a Mindfulness-based Feasibility Intervention for Female South Asian Young Adults Living in the UK

*Note:* This paper is currently under review as: Noordali, F., Cumming, J., Arkless, S. and Thompson, J. L. (n.d.). The Implementation and Evaluation of a Mindfulness-based Feasibility Intervention for Female South Asian Young Adults Living in the UK. *Journal of Health Psychology.*

# Chapter 4: The Implementation and Evaluation of a Mindfulness-based Feasibility Randomised Controlled Trial for Female UK South Asian Young Adults

## Overview

**Objective:** This study builds upon the previous study by implementing its recommendations in a feasibility study. This study aimed to examine the feasibility and acceptability of the Mindfulness intervention delivered to young South Asian women, compare the potential perceived programme effects with quantitatively measured outcomes, and explore potential outcome variables for a future, full-scale trial.

**Methods:** Participants were 39 young adult South Asian women (aged 19-35 years). An RCT design with a delayed intervention control group was utilised. The experimental group received a modified 8-week group-based face-to-face Mindfulness programme with the incorporation of Mindful eating. Measures of Body Mass Index (BMI), resting blood pressure, Mindfulness, stress, anxiety, depression, health-related quality of life, dietary intake and objective physical activity were assessed pre-and post-intervention. A post-intervention focus group with the experimental group was used to explore feasibility and acceptability and perceived programme effects. Perceived effects were compared to quantitative outcome results.

**Results:** Overall, participants reported the intervention was acceptable and complementary to their religious beliefs and cultural norms. They enjoyed the deliverer's approach and programme format and were averse to alternative modes of delivery such as on-line or co-delivery with community/faith leaders. They suggested increasing Mindful eating content. Participants' perceived reduction of stress and anxiety were consistent with objectively measured changes in these variables. Quantitative measures did not support perceptions of

improvements to depression and Mindfulness. Minor dietary changes were perceived but not objectively supported. Systolic blood pressure, emotional wellbeing and energy/fatigue were improved but BMI remained unchanged. Most participants reported not changing physical activity, which was supported by objective measures.

**Conclusions:** This group of young South Asian women reported that a modified Mindfulness intervention is acceptable and feasible as a holistic diabetes prevention strategy. Findings suggest a future full-scale trial is warranted with the incorporation of more Mindful eating content. Following the contention that stress (via neuroendocrine, neuroimmunological and behavioural pathways) may potentiate T2D onset, the DASS21 (stress, anxiety, depression scale) is recommended as primary outcome.

**Keywords:**

Mindfulness, South Asian, diabetes prevention, feasibility, qualitative research

## Introduction

Considerable amounts of resource and research are focused towards Type 2 diabetes prevention (Ahmad & Crandall, 2010). Diabetes prevention is especially pertinent when considering its rising incidence (Ingelfinger & Jarcho, 2017) and personal, societal, and economic burden (Bommer et al., 2017). Another alarming trend is that the onset of T2D has become increasingly earlier in the lifespan, as a greater proportion of young people develop the illness (Mayer-Davis et al, 2017). Therefore, pre-emptive strategies are crucial for reducing diabetes risk in high-risk populations, and for reducing healthcare costs. People of South Asian descent have a higher predisposition to developing diabetes compared to other ethnic groups which is exacerbated by poor health behaviours, such as unhealthy diet and physical inactivity. (Kooner et al., 2011; Shah & Kanaya, 2014). Hence it is important to find novel ways of promoting health-protective lifestyle changes earlier in the lifespan, to prevent or at least delay diabetes onset within this population. Additionally, it is believed excessive or prolonged activation of the neuroendocrine and neuro-immunological pathways can lead to the release of hormones and expression of biological processes that potentiate impaired glucose and lipid metabolism (Golden, 2007; Procaccini et al. 2014). Stress can also trigger short-term coping behaviours which manifest as habitual, unhealthy lifestyle choices (unhealthy food selection or physical inactivity). Mindfulness may be appropriate for counteracting such stress effects (Creswell, 2017).

Mindfulness entails the psychological process of directing attention to the present moment's experiences with acceptance (Kabat-Zinn, 2013). Though initially envisioned for stress reduction, it has since had varying applications including health promotion and illness management (Ngô, 2013; Noordali, Cumming & Thompson, 2015). Gilbert and Waltz (2010)

established relationships between Mindfulness scores on a self-report scale and health behaviours, specifically physical activity and dietary behaviour, in a sample of young adult students. Higher Mindfulness scores were associated with increased fruit and vegetable consumption, physical activity, and self-efficacy. Beshara, Hutchinson, and Wilson (2013) found adults who reported higher levels of Mindfulness ate more Mindfully and self-reported better portion control, and that Mindful eating mediated the association between Mindfulness and portion control. Tapper et al. (2009) conducted a randomised control trial (RCT) of a Mindfulness programme in predominantly white obese women aged 19–64 years. They found that the Mindfulness group had significantly greater increases in physical activity and a decrease in both binge-eating and Body Mass Index (BMI) at 6 months follow-up than control participants.

Collectively, these findings suggest Mindfulness can catalyse health-protective changes such as promoting a healthier diet and increasing physical activity. Additionally, Mindfulness has long established benefits on psychological health by reducing stress, anxiety, and depression, and improving behavioural regulation and emotional reactivity in clinical and healthy populations (Chiesa & Serretti, 2009; Keng, Smoski & Robins, 2011). Additionally, it has been found to improve self-reported quality of life (Nyklíček & Kuijpers, 2008). Mindfulness can elicit beneficial physical and mental health outcomes; however, underlying mechanisms for these effects are unclear. Creswell and Lindsay's (2014) "stress buffering" account suggests Mindfulness reduces stress, stress-induced disruptions to health behaviour, and lessens stress-reactivity responses (through aforementioned pathways), ultimately reducing diabetes risk and enabling healthier outcomes. Specifically, possessing greater awareness and acceptance of one's experiences is suggested to ameliorate stress by

identifying early signs of stress, minimising rumination and enabling individuals to invoke more effective coping strategies in response to stressors. Ultimately, it was decided a Mindfulness intervention was worth examining in a new population.

An integral developmental step in intervention design involves assessing the feasibility of potential interventions and whether they have a propensity to be efficacious over a multitude of aspects and are thus appropriate for further testing (Bowen et al., 2009). Such aspects include a suitability to the target population, practicality, and acceptability within the target sample. Currently there are no trials investigating the acceptability and feasibility of delivering a Mindfulness-based intervention to young adult South Asians in the UK. Thus, it was deemed necessary to implement a small-scale feasibility study in this population. We employed an RCT with a delayed intervention control group using an intention-to-treat approach, to begin to address this gap in the literature. The aims of this study were to:

1. Examine whether a Mindfulness-based programme for young South Asian women would be acceptable and feasible;
2. Explore the acceptability of measuring a range of objective outcome measures (e.g., depression, anxiety and stress, Mindfulness, health-related quality of life, BMI, blood pressure, diet, physical activity and sedentary time);
3. Compare the perceived programme effects against objectively measured outcomes with the experimental participants who participated in the modified MBI feasibility study;
4. Assess changes in these outcome variables to identify a suitable primary outcome measure for a future, full-scale trial; and
5. Establish the sample size needed to appropriately power a future, full-scale trial.

## Methodology

### Design

This feasibility study employed an RCT design. The experimental group received an 8-week Mindfulness course modified for young adult South Asian women delivered on Saturday mornings. The control group maintained their current lifestyle and were offered a delayed Mindfulness intervention upon completion of the study. Additionally, a mixed methods examination compared perceived changes and objective measures of various outcomes resulting from Mindfulness intervention.

### Recruitment and sample size

As described in Chapter 3, a modelling phase preceded and informed cultural adaptation of this study. One recommendation was for single-gender classes. For practical and financial reasons, it was only possible to run one class during the feasibility study. This dictated that a choice would have to be made to deliver to one gender only. Women were selected as they exhibited more interest than male counterparts during the modelling phase.

The inclusion criteria were women aged 18-35 years who self-identified as being of South Asian descent. South Asian descent was defined as having ancestry from any of the following countries: India, Pakistan, Bangladesh, Sri Lanka, Afghanistan, Nepal, Maldives, or Bhutan (SAARC, 2017). After ethical approval was obtained from the University of Birmingham STEM ethics committee (ERN_15-0547), the sample was recruited between October 2016 to January 2017 via dissemination of flyers to the public, using posters in community settings, and snowballing through recruited participants.

While discussing the programme early on, the Mindfulness practitioner made it clear she had the capacity to sufficiently attend to no more than 25 participants. A class exceeding this number would compromise her ability to teach the programme effectively. Therefore, a maximum sample size of 50 was agreed (to account for half the sample eventually being randomised to the control group).

**Intervention**

The intervention delivered was based on Segal, Williams and Teasdale's (2002) manualised Mindfulness-based cognitive therapy (MBCT) programme. This version of Mindfulness was used as it was the version the practitioner was familiar with and comfortable delivering. Furthermore, it has considerable empirical support of its effectiveness in alleviating psychological distress (Chiesa & Serretti, 2011; Gu et al., 2015).

As recommended by UK NICE (2012), community interventions should consider cultural-religious beliefs and practices during development. To determine aspects of this programme that might need to be tailored to the target audience, a modelling phase (Chapter 3) was conducted with 22 young adult South Asians (men, n=10; women, n=12) using focus groups. Participants were presented with an overview of Mindfulness before examining their perceptions of it and whether cultural adaptations in the MBCT programme were required. Results from this modelling phase included the following adaptations for this population: 1) single gender classes; 2) incorporating Mindful eating content; 3) having the intervention delivered by a qualified and experienced Mindfulness practitioner; 4) no co-delivery from community/faith leaders; and 5) reducing the number of sessions.

All but the last suggested adaptation were implemented to modify the intervention tested in the present feasibility study. This decision was based on prior research reporting that ameliorative changes in the neuroplasticity of the brain are proportional to time spent practicing Mindfulness (Luders, Toga, Lepore & Gaser, 2009; Vestergaard-Poulsen, 2009), and that neural changes can be observed after 8 weeks (Hölzel et al, 2011). A PowerPoint presentation (in week 4) expounding Mindfulness's theoretical rationale and evidence was a novel addition from the practitioner to the modified intervention. The intervention programme included 8 weekly 2-hour sessions featuring meditative, breathing control and attentional practices in addition to some light yoga *(see Table 9)*. Daily home practice was encouraged with the aid of a provided manual and CD. Due to practicality and abiding by the practitioner's usual delivery format, a whole-day session was not utilised, unlike the format followed by Segal et al. (2002). During the modelling phase, the naming of the body scan technique was suggested to be ambiguous and may lead to misinterpretation. In consultation with the practitioner, the name was retained as it could be researched online if participants wanted to build on their in-class practice when at home. Additionally, the practice was clearly detailed in the manual given to all participants and by the practitioner in week 1. A structured approach to intervention design (such as intervention mapping or 6SQuiD) were not used, as this study was not developing a novel intervention but adapting an existing, empirically supported intervention.

*Table 9: Traditional programme content and tailored adaptations in current programme*

| Week | Traditional MBCT course | Tailored adaptations |
|---|---|---|
| **1** | **Automatic pilot**<br>• Class orientation<br>• Discuss, in pairs, intention for coming<br>• Raisin exercise<br>• Body scan practice<br>• Mindful breathing<br>• *2-3 mins Breath focus*<br>• *Homework: Body scan (6 out of 7 days) &* | **Automatic pilot and Mindful eating**<br><br><br><br>*Body scan practice explained clearly to avoid potential misinterpretation*<br><br>Addition:<br>• *Homework: Eat a meal Mindfully (at least* |

| | | |
|---|---|---|
| | *Mindfulness of a routine activity* | *once this week)* |
| **2** | **Dealing with barriers**<br>• Body scan practice<br>• Thoughts and feelings exercise<br>• Pleasant events calendar<br>• 10-15mins seated meditation<br>• *Homework: Body scan (6 out of 7 days), 10-15 mins of Mindful breathing (6 out of 7 days), pleasant events calendar* | **Dealing with barriers**<br><br><br><br>Addition:<br>• *Homework: Slowing down eating exercise (1x a day)* |
| **3** | **Mindfulness of the breath**<br>• 5 mins "seeing" or "hearing" exercise<br>• 30-40 mins seated meditation<br>• Practice and homework review<br>• 3 mins breathing space and review<br>• Mindful stretching and review<br>• Mindful walking and review<br>• Unpleasant events calendar<br>• *Homework: Seated meditation with stretches (3x a week), Yoga and Body scan (3x a week),* unpleasant events calendar (daily), 3 mins breathing space (daily) | **Mindfulness of the breath and the body in movement**<br>Additions:<br>• *Mountain meditation during seated meditation*<br>• *Basics of sitting (posture)*<br><br><br>• *Homework: Reconnecting with fullness cues exercise (1x a day)* |
| **4** | **Staying Present**<br>• 5 mins "seeing" or "hearing" exercise<br>• 40 mins seated meditation<br>• 30-40 mins seated meditation<br>• Practice and homework review<br>• 3 mins breathing space and review<br>• Watch first half of Mindfulness-based stress reduction video and discuss<br>• *Homework: Seated meditation (6 of 7 days), 3 mins breathing space (daily), 3 mins breathing space for coping (when unpleasant feelings arise)* | **Staying Present**<br><br>Additions:<br>• MBCT theory and evidence PowerPoint presentation<br>• *Homework: Intention for eating (resisting stress eating) exercise*<br><br>Omissions:<br>• MBSR video |
| **5** | **Allowing/ Letting be**<br>• 30-40 mins seated meditation<br>• Practice and homework review<br>• Breathing space and review<br>• Read selected poem<br>• Watch second half of Mindfulness-based stress reduction video and discuss<br>• 3 mins breathing space for coping<br>• Watch second half of Mindfulness-based stress reduction video and discuss<br>• *Homework: Seated meditation (6 of 7 days), 3 mins breathing space (as in week 4)* | **Allowing/ Letting be**<br><br><br><br>Omissions:<br>• MBSR video<br><br><br><br>Addition:<br>• *Homework: Food craving exercise (once this week)* |
| **6** | **Thoughts are not facts**<br>• 30-40 mins seated meditation<br>• Practice and homework review<br>• Preparation for end of course<br>• Moods, thoughts, and alternative | **Thoughts are not facts** |

| | | |
|---|---|---|
| | viewpoints exercise<br>• Breathing space and review<br>• *Homework: Mindful practice (body scan, mindful movement and seated meditation) (40 mins daily), 3 mins breathing space (as in week 4)* | Addition:<br>• *Homework: Food craving exercise (at least once but write emerging thoughts to share in class)* |
| **7** | **How can I best take care of myself?**<br>• 30-40 mins seated meditation<br>• Practice and homework review<br>• Exercise to explore links between activity and mood<br>• Generate list of pleasure and Mastery activities, how best to plan these activities<br>• Identifying depression relapse cues and actions to deal with relapse<br>• 3 Min breathing space or Mindful walking<br>• *Homework: Select a practice you will intend to use regularly, 3 min breathing space (as in week 4), develop early warning system for detecting relapse and appropriate action plan* | **How can I best take care of myself?**<br>Omissions:<br>• Identifying depression relapse cues/actions to deal with relapse<br>Addition:<br>• *Homework: Prepare a special meal (bring intention to nourish yourself during meal)* |
| **8** | **Using what has been learned to deal with future moods**<br>• Body scan practice<br>• Practice and homework review<br>• Review whole course<br>• Disseminate questionnaires for participants to give personal reflections<br>• Discuss how to maintain momentum and discipline<br>• End class with a concluding meditation | **Acceptance and change**<br>(same content but under a different title) |

A professional Mindfulness practitioner delivered the course. This instructor is registered with the UK Network for Mindfulness-Based Teacher Training Organisations and has 7 years of experience in delivering Mindfulness-based courses in a variety of settings. Additionally, the practitioner holds a Master's degree in teaching Mindfulness. Furthermore, she has trained with renowned Zen Master and Mindful eating expert Dr Jan Chozen Bays. Based on results from the modelling phase, and also on the views of the research team, it was felt that this level of practitioner expertise in Mindful eating was critical to the tailoring and delivery of the programme for this study.

Weekly sessions took place in a booked room with a large floor space at the University of Birmingham. Yoga mats were provided for all participants to sit on for the meditative practices. Light, healthy refreshments were also provided.

**Randomisation**

Following baseline data collection, participants were randomised to either the experimental or control group. As in Arifin (2012), an independent researcher used IBM SPSS 24 software and a random number generator to provide a random sequence. In line with recommendations for allocation concealment, the lead researcher was not involved in the sequence generation or the allocation concealment steps that assigned participant ID numbers to either the experimental or control group (Clark, Fairhurst, & Torgerson, 2016).

**Procedure and outcome measures**

The following measures were completed at baseline and at the end of intervention delivery. Questionnaires: Depression, anxiety and stress traits were measured using the DASS21 scale (Lovibond & Lovibond, 1995), which is valid and reliable in non-clinical samples (Appendix E) (Henry & Crawford, 2005). As suggested in a systematic review on Mindfulness interventions for diabetes (Noordali et al., 2015), a Mindfulness measure, the MAAS scale, was administered (Appendix F) (Brown & Ryan, 2003). The validity and reliability of this scale has been assessed in University student samples (Cronbach's $\alpha$= 0.89), indicating utility in objectively determining an individual's Mindfulness level (MacKillop & Anderson, 2007). To assess quality-of-life, the SF-36v2 was used, which is a widely used and reliable short form questionnaire (Appendix G) (Ware, Snow, Kosinski, & Gandek, 1993). Dietary behaviour was assessed using the UK Diabetes and Diet Questionnaire (UKDDQ) (Appendix D) and short

individual diet-focused interviews (Appendix E). The UKDDQ is a valid and reliable tool that assesses an individual's diet in those with or at risk of diabetes (England et al., 2017). Interviews were semi-structured to allow the researcher to probe interesting emerging topics (Appendix E).

Anthropometric measures: BMI, blood pressure, objective physical activity and sedentary time: Height was measured to the nearest 0.1 cm using a Seca 213 stadiometer, and weight was measured to the nearest 0.1 kg using a Seca 899 digital scale. Following 5 minutes of seated rest, systolic and diastolic blood pressure were measured to the nearest mmHg using an Omron M10-It monitor. All the above measures were taken three times with the mean of the closest two values used as the final value. Physical activity and sedentary time were objectively measured using accelerometers (ActiGraph GT3X). The cut-off for valid accelerometry data was 10 hours daily for a minimum of 4 days (Celis-Morales et al., 2013). Sixty second epoch intervals were selected in keeping with most adult accelerometry literature (John, Tyo, & Bassett, 2010). In this study, non-wear periods were outlined as zero activity counts for more than sixty consecutive minutes. Freedson (1998) cut points were used to interpret time spent at each of physical activity intensity level (Freedson, Melanson & Sirard, 1998). These cut points have already been used in South Asian physical activity research, thus were deemed to be suitable. Furthermore, choosing these cut points catered for comparisons with existing literature (Curry and Thompson, 2015). The researcher demonstrated the correct orientation and positioning (Matthew, 2005), and instructed participants to wear it during all waking hours (apart from when swimming and bathing) for the following 7 consecutive days. Acceptability and feasibility were assessed via post-intervention focus group with the experimental group (Appendix F).

**Data analyses**

An intention-to-treat analysis approach was employed for quantitative data. Multiple imputation was conducted to overcome missing data issues (Patrician, 2002). T-tests for independent samples were used to investigate potential differences on variables between groups at baseline. Repeated-measures ANOVA was used to examine the time-by-group interaction effects. For focus group analysis, discussions were transcribed verbatim with pseudonyms used, and transcripts analysed using deductive directed content analysis (Elo & Kyngas, 2008). The New World Kirkpatrick Model was used to evaluate the programme (Kirkpatrick, 2009). This model evaluates the efficacy and success of a programme across 4 levels *(Table 10),* offering a framework for a comprehensive assessment. T-tests for paired samples were used to investigate potential differences in continuous variables from baseline to post-intervention (for the experimental group only). Sample size was calculated at 80% power level using a 2-Sample, 2-Sided Equality calculation with means and standard deviations (Chow, Shao & Wang, 2008).

*Table 10: The New World Kirkpatrick Model*

| | |
|---|---|
| **Level 1: Reaction** | **The degree to which participants find the training favourable, engaging and relevant**<br>• **Customer Satisfaction**<br>• **Engagement (New world addition):**<br>**The degree to which participants are actively involved in and contributing to the learning experience**<br>• **Relevance (New world addition):**<br>**The degree to which training participants will have the opportunity to use or apply what they learned in training on the job** |
| **Level 2: Learning** | The degree to which participants acquire the intended **knowledge**, **skills**, **attitude**, **confidence** and **commitment** based on their participation in the programme |
| **Level 3: Behaviour** | The degree to which participants apply what they learned during training when they are back on the job<br>• **Required Drivers (New world addition):**<br>Processes and systems that reinforce, encourage and reward performance of critical behaviours on the job |

| | |
|---|---|
| **Level 4: Results** | The degree to which targeted outcomes occur because of the training and the support and accountability package<br>• **Leading indicators (New world addition):** Short-term observations and measurements suggesting that critical behaviours are on track to create a positive impact on desired results |

# Results

## Recruitment and attrition

Seventy-nine individuals expressed an interest in participating *(Figure 11)*. Fourteen individuals were excluded for not meeting inclusion criteria: age (n=3), ethnicity (n=9) and gender (n=2). Of the initial respondents, 41 arranged a baseline measure visit; 2 did not attend the scheduled visit despite follow-up by the research team. The remaining 39 women (mean age 23.7 ± 4.3 years) were enrolled in the study, with 20 and 19 randomised to the experimental and control groups, respectively.

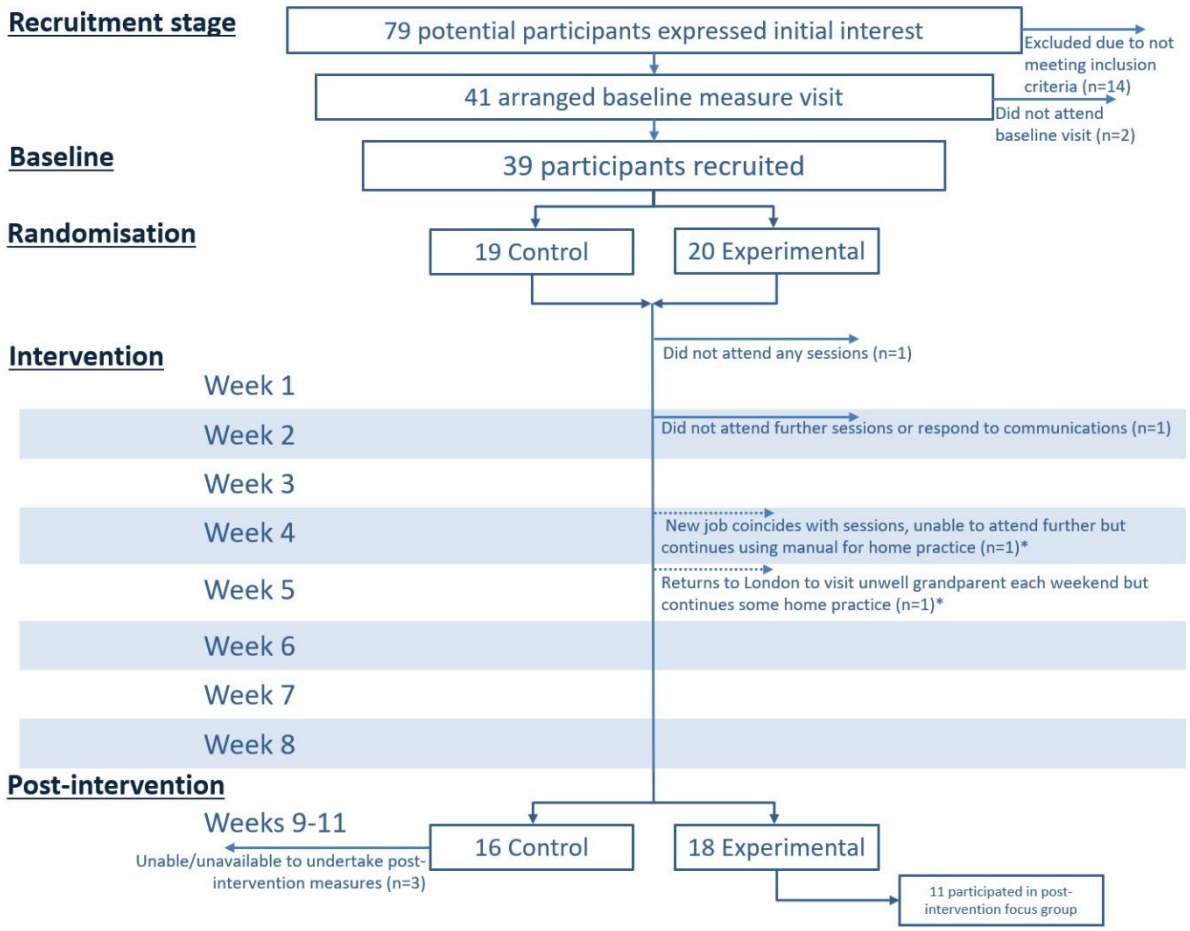


*Figure 11: Flow diagram of participant enrolment, allocation, and attrition.*
** denotes participants who could no longer attend sessions but were able to participate in post-intervention assessments.*

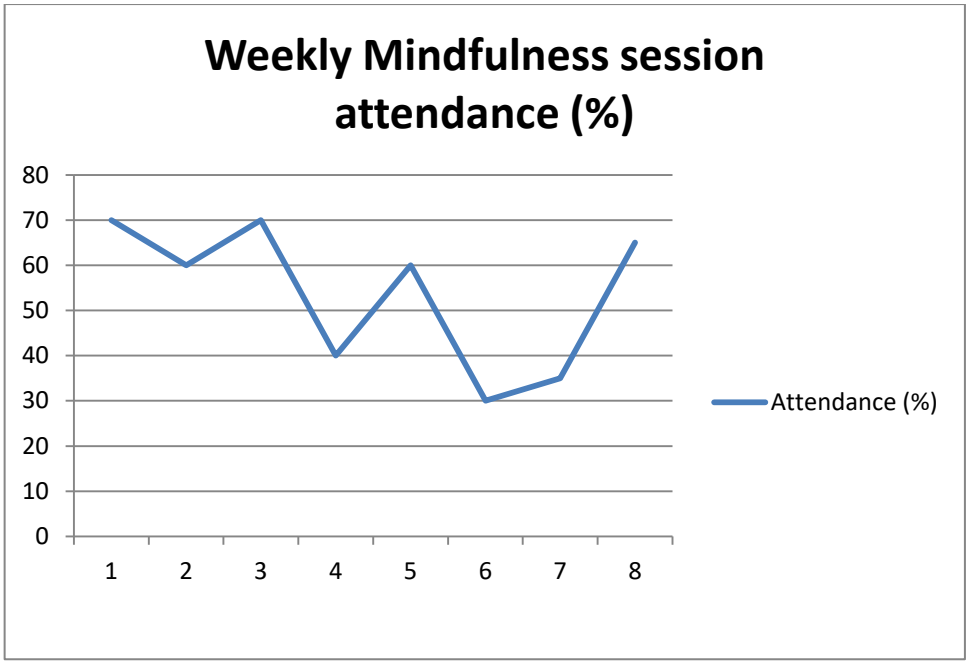


*Figure 12: Attendance percentage per session*

The mean attendance rate for the experimental group was 53.8%, with attendance ranging from 30% to 70% across the 8 sessions. The mean (±SD) number of sessions attended per person was 4.3 (± 2.29). In *Figure 12* above, the percentage of participants in attendance for each session is displayed. Two participants attended 100% of the sessions. One participant did not attend any sessions and did not reply to any further communication. During the programme, 2 dropped out for reasons external to the course, whilst 1 dropped out without explanation or response to communication. The control group was offered a delayed intervention, of which only 3 expressed interest in attending once the intervention period was completed. Despite expressing interest, no control participants followed through with attending due to various reasons, predominantly the onset of wedding season and ensuing familial commitments. This suggests that time of year is a factor for feasibility of delivery of an intervention programme. The overall attrition rate for individuals who left the study completely without participating in post-intervention assessments was 12.8% (n = 5). Interestingly, exploratory correlational analyses revealed higher attendance was associated

with lower post-interventon anxiety and higher UKDDQ score. The characteristics of drop outs from the intervention and minimal attenders (those who attended fewer than 3 sessions) were checked. However, outcome values were not beyond the standard deviation for any measure.

**Demographic characteristics and baseline group comparisons**

*Table 11* below displays the demographic characteristics and baseline mean data for both groups. When the experimental and control groups were compared at baseline, the groups differed significantly on the following variables: depression, some SF-36v2 subscales (physical functioning, energy/fatigue and social functioning), moderate-to-vigorous physical activity, and sedentary time. Additionally, all but 2 control participants were educated up to at least bachelor's degree level. The remaining two were educated to GCSE and A-Level.

*Table 11: Baseline mean data for both groups in the feasibility study.*

| Measure | Intervention group | Control group | Total |
|---|---|---|---|
| **Age** | 22.35 (± 2.79) | 25.10 (± 4.25) | 23.69 (± 3.79) |
| **BMI (kg/m$^2$)** | 21.81 (± 3.56) | 23.25 (± 3.55) | 22.51 (±3.63) |
| **Systolic BP** | 106.40 (± 11.11) | 107.97 (± 11.08) | 107.18 (± 11.04) |
| **Diastolic BP** | 75.10 (± 8.75) | 78.37 (± 0.63) | 76.69 (± 9.20) |
| **Depression** [a] | 11.80 (± 8.75) | 6.56 (± 4.74) | 9.28 (± 7.51) |
| **Anxiety** [a] | 12.00 (± 7.43) | 7.17 (± 6.60) | 9.69 (± 7.40) |
| **Stress** [a] | 16.80 (± 9.37) | 13.75 (± 9.84) | 15.33 (± 9.66) |
| **Mindfulness score** [b] | 3.93 (± 1.11) | 3.95 (± 0.93) | 3.93 (± 1.02) |
| **Physical functioning (%)** [c] | 88.50 (± 11.25) | 81.31 (± 21.44) | 85.00 (± 17.28) |
| **Role limitations due to physical health (%)** [c] | 90.00 (± 30.78) | 95.01 (± 22.36) | 92.31 (± 26.99) |
| **Role limitations due to emotional problems (%)** [c] | 70.00 (± 27.01) | 89.47 (± 31.53) | 79.48 (± 40.90) |
| **Energy/fatigue (%)** [c] | 41.50 (± 15.82) | 47.29 (± 21.55) | 44.36 (± 18.92) |
| **Emotional wellbeing (%)** [c] | 55.00 (± 21.94) | 56.61 (± 21.35) | 55.79 (± 21.62) |
| **Social functioning (%)** [c] | 66.25 (± 28.71) | 63.74 (± 21.38) | 65.06 (± 25.35) |
| **Pain (%)** [c] | 79.12 (± 20.00) | 70.81 (± 23.55) | 75.13 (± 22.08) |
| **General Health (%)** [c] | 59.68 (± 20.42) | 57.49 (± 21.92) | 58.65 (± 21.05) |
| **UKDDQ score** [d] | 3.17 (± .65) | 3.22 (± 0.63) | 3.19 (± 0.63) |
| **MVPA (min/day)** [e] | 35.53 (± 20.09) | 45.03 (± 28.75) | 39.71 (± 25.84) |
| **Sedentary time (min/day)** | 406.47 (± 90.60) | 440.34 (± 151.15) | 423.92 (± 128.86) |

[a] Depression, Anxiety & Stress; lower values represent better psychological state. [b] Mindfulness; higher values indicate greater Mindful trait. [c] Subscales for the SF-36v2; higher values represent better quality of life. [d] UK Diabetes and diet questionnaire; scores range 0-5, higher values indicate positive dietary changes. [e] Moderate-to-vigorous physical activity.

**Post-intervention focus group results**

The post-intervention focus group aimed to investigate whether these participants perceived the programme as acceptable, practical and beneficial. Eleven of the 20 individuals randomised participated in this focus group (*Table 12*).

*Table 12: Summary of post-intervention focus group participants*

| Pseudonym | Nationality/ ethnicity | Age | Religion | Occupation | Education level |
|---|---|---|---|---|---|
| **Hina** | British Mauritian | 23 | Muslim | [redacted] | Doctoral study |
| **Sonam** | British Indian | 26 | Sikh | [redacted] | Doctoral study |
| **Zeenat** | British Pakistani | 25 | Muslim | [redacted] | Doctoral study |
| **Muneeba** | British Pakistani | 21 | Muslim | [redacted] | Degree |
| **Mariam** | British Pakistani | 22 | Muslim | [redacted] | Degree |
| **Naswirah** | British Pakistani | 20 | Muslim | [redacted] | Degree |
| **Neelofer** | British Pakistani | 24 | Muslim | [redacted] | Master's |
| **Falah** | British Pakistani | 22 | Muslim | [redacted] | Master's |
| **Zafeera** | British Indian | 30 | Muslim | [redacted] | Postgraduate diploma |
| **Humaira** | British Bengali | 26 | Muslim | [redacted] | Degree |
| **Safa** | British Pakistani | 19 | Muslim | [redacted] | Degree |

Open coding yielded 103 codes which were subsequently compartmentalised into the following 3 main themes: Acceptability and Feasibility, Programme Characteristics, and Research Study Methods. These main themes were comprised of several sub-themes *(Figure 13)*.

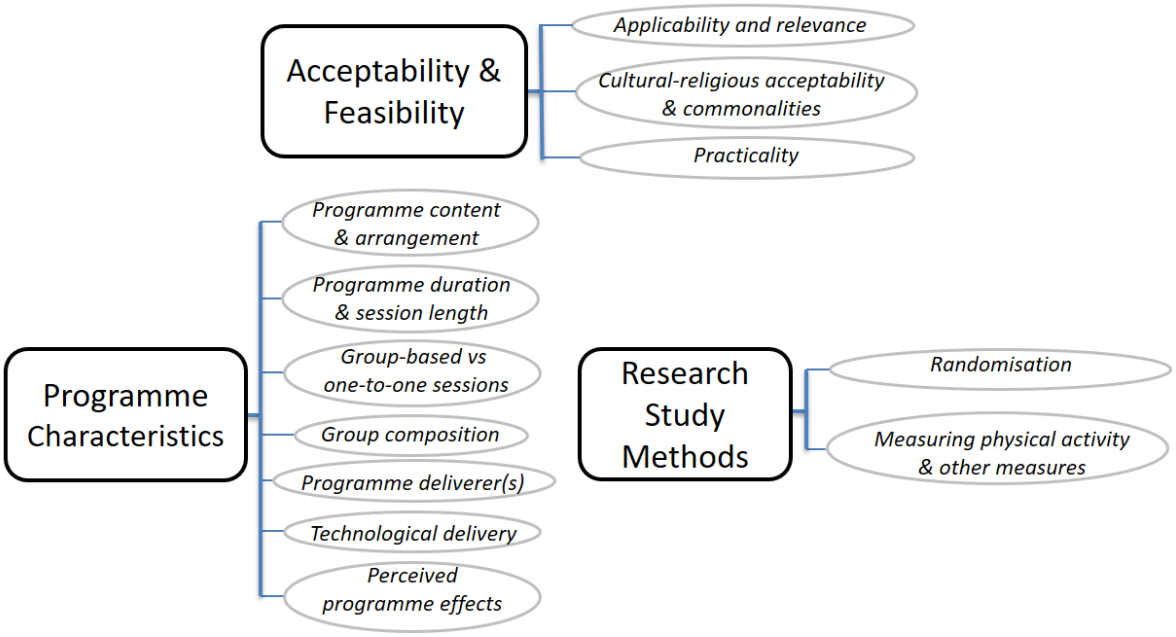


*Figure 13: Focus group main themes (bolded rectangles) and sub-themes (ovals).*

Acceptability and feasibility

*Applicability and relevance*

Participants disclosed anecdotes where they found Mindfulness techniques useful by enabling sagacity. For example, in martial arts bouts for Muneeba: *"In the fight I'm gonna be calm … I'm just gonna plan"*, and in *"public speaking"* for Humaira because of her daily *"body scan"* practice. The technique of body scan provided Muneeba with greater mental clarity to approach her fight more tactically and judiciously, suggesting that Mindfulness can be used to effectively channel aggression, and is not limited to managing only melancholic emotions. Both mentioned *"anxiety was eased"*, suggesting as per Kirkpatrick's Results level, a leading indicator of early positive results that reinforce continued Mindful practice.

Most participants benefitted from practicing the techniques as taught, yet some preferred adapting practices to their own liking. For instance, when *"stressed"*, Naswirah stated: *"I found that quite useful- the ideas behind it rather than the actually kind of lying there and meditating"*. Referring to Kirkpatrick's level 3, it appears Mindfulness does not

have to be applied fully to yield benefits. Interestingly, Mariam raised a point that though she does not currently need these skills, she considered them good to have for *"the future"*. Considering Kirkpatrick's 'relevance' construct under reactions, it is notable the success of the programme does not require skills to be presently relevant. Instead, the required driver is that they may become useful.

Humaira exhibited confidence there would be *"interest"* in the programme as advertised, using Mindfulness to cultivate a healthier lifestyle: *"there's a huge demand"*, especially since it is relevant to their collective concerns about diabetes prevention. However, she was unsure if other South Asians would persist upon finding the programme was not about delivering practical advice: *"whether they'd stay once they… actually realise it's more about Mindfulness than actual healthy eating"*.

*Cultural-religious acceptability and commonalities*

Five participants noted Mindfulness enabled improved focus during prayer. Zeenat and Falah noted difficulties focusing in prayer motivated their interest in Mindfulness, demonstrating its relevance and acceptability within their religion and culture. Falah added *"the combination"* of Mindfulness and prayer helped *"manage my stress and cope better".* Zeenat observed accepting momentary distractions and self-compassion allowed her to regain focus during prayer: *"…it's about being kinder to yourself as well"*.

> *Extract 1*
>
> ***Zeenat:*** *Erm (.) I think when I'm praying (.) so I really struggle and it's been something that I've been struggling with for a while more than usual (.) and it's probably one of the reasons why I ended up signing up to this course (.) cos I was (.) struggling to manage my thoughts and then the emotions that that would be provoked because I get really stressed when my mind wanders when I'm praying…*

Mindfulness was perceived complementary to religious ideals, indicating suitability for South Asian women as they would not adopt practices conflicting their religions- a required driver for continued practice. Adding credence to Mindfulness sharing similarities to Islam, Zeenat cited a prominent Islamic institute, *"Zaytuna college"*, does *"train people in Mindfulness"* in conjunction with their own teachings, suggesting relevance to Muslims.

*Practicality*

Participants' reaction to the time of week appeared positive. Zafeera noted Saturdays were the best day to schedule sessions: *"Cos weekdays (.) you know at the end of the day people are tired (.) demotivated (.) this was for me (.) a nice way to kickstart the weekend (.) barring a couple of work commitments (.) I thought it was a good place to time it".*

Programme Characteristics

*Programme content and arrangement*

Individual differences in self-reported favourite skill were discernible: "*everyone's taken something different (.) no-one's saying the same thing*". Three participants favoured body scan, whilst 5 found it difficult; 2 favoured Mindful walking whereas 1 did not enjoy it; 1 liked Mindful eating whereas another found it ineffective; 2 enjoyed breathing exercises most, 1 liked the mountain exercise most, and 2 cited yogic activity among their favourite practices. At least 1 participant favoured each skill, indicating the importance of a wide array of Mindful techniques being taught. Similarly, there was no expression of strong dislike for any skill. The women who did not like body scan all cited their restless proclivity as an impediment to adopting it. Considering Kirkpatrick's model, the required driver for

continued Mindful practice appears that each skill must be relevant to individual participant needs and inclinations.

Three participants felt there was less Mindful eating content than anticipated. They assumed from advertisements *"the emphasis was on Mindful eating"* to *"change and manage our eating habits"*. Nevertheless, their reaction was positive as they felt satisfied with the course due to *"clear benefits"*, instead stating *"maybe another element of Mindful eating would have been more beneficial for the sake of the actual purpose of the study,"* rather than participants needing it. Humaira suggested adding *"maybe like ten minutes each session"*. More Mindful eating content may enhance their knowledge, skill and confidence for this concept.

The practitioner introduced a novel addition in week 4; a presentation regarding Mindfulness' rationale, mechanisms and evidence, which participants valued. Zafeera explained it resolved her initial uncertainty over the course's purpose and catalysed her *"to get really committed to the home practice"*. However, they preferred, as Sonam stated, to have the *"theory at the start"* to enhance learning via improved knowledge, commitment and attitude of Mindfulness.

*Programme duration & session length*

The discourse of the participants in this feasibility study were in contrast to the views of the young South Asian adults who participated in modelling phase focus groups with regard to programme duration. Intervention participants intimated that if the content was condensed into fewer weeks, the same progress would not have been made due to insufficient time to proficiently learn Mindfulness. They felt that "*8 weeks was perfect"* to

*"appreciate the course and develop"*. Typical Mindfulness sessions last up to 2 hours; all sessions in this programme were 2 hours in duration. Despite acknowledging difficulty attending during some weeks depending on external influences, participants remarked this duration was apt to cover the course content at a reasonable pace: *"I wouldn't have changed it… 2 hours seems to be the right amount of time to cover the amount that she did"*. Clearly, ample time is a required driver to implement learnings. It is nonetheless important to note that these participants signed up to an 8-week programme; thus, this focus group does not capture views of people who may have been dissuaded from participating by the programme duration.

*Group-based vs one-to-one sessions*

Participants valued group-based delivery, citing the importance of *"group dynamics"*. Co-participation motivated perseverance until positive effects emerged: *"Well they're* [co-participants] *managing it so I think I'm gonna keep going and see if I can do it"*. Falah also noted discovering *"other people experiencing the same thing"* helped consolidate stressors were not exclusive to her, and she could address personal issues with more input and support. The group dynamic was also discussed as disinhibiting reluctance to engage: *"if that's not there then I think we're less likely to speak"*. Referring to Kirkpatrick's Model, this aspect of group engagement whereby participants positively affected the learning process appeared to improve the learning experience. When asked if they would consider participating in an intervention delivered via one-to-one sessions, they unanimously likened this approach to *"therapy*", framing attendees as defective. Whereas they felt that being in a group setting helped them to contextualise their problems as not being idiosyncratic.

*Group composition*

Participants agreed that single-gender sessions were most appropriate. Falah elaborated: *"…I would feel more comfortable when it's just females especially, with the yoga and the body scans just lying there"*. Participants stated that performing yogic activity in view of males would be off-putting due to cultural norms of female modesty. Participants anticipated incompatible gender differences in engagement in Mindfulness due to male counterparts' lack of *"maturity".* They also considered narrow age parameters beneficial for the group dynamic due to shared experience and greater empathy for each other:

> *Extract 2*
> ***Neelofer:*** *…we all have individual differences (.) but are at a similar stage of life and we can kinda understand each other's difficulties (.) like I'm not studying at the moment but I was just studying very recently (.) so I can relate to that whereas if you had somebody who was in their 50s and just been diagnosed with an illness and that's what their worry is about (.) I would try to relate to that- I probably wouldn't be able to cos I have not had experience of that*

Participants unanimously opposed the suggestion of separate classes for the different national, religious, or cultural South Asian groups due to no discernible benefit. They felt that all South Asian groups share enough similarities to appreciate a Mindfulness programme together; as *Zeenat* noted *"it doesn't matter (.) I don't feel like Asians divide themselves"*.

*Programme deliverer(s)*

Participants had a positive reaction to the practitioner. Her passion, approachability and competence stimulated, and was a driver of, their engagement. Discourse purported they could learn the skills sufficiently from her to apply them to their lives. Participants

discerned the practitioner was sufficiently experienced to surpass teaching Mindfulness superficially:

*Extract 3*

***Zafeera:*** *…you can tell when someone's teaching you from a book and you can tell when they're teaching from experience, and she was definitely teaching from experience*

Interventions for ethnic minority groups sometimes utilise a co-deliverer from the same cultural/faith background to garner trust and endorse the programme. Participants felt this was *"not necessary"* for their generation, who have a more multi-cultural upbringing than their parents. Discourse indicated including faith or community leaders was off-putting due to a perceived *"nosey"*, scrutinising culture. Moreover, Zeenat highlighted it would be *"difficult doing yoga stretching in front of-"* a (likely-to-be) male faith leader as it would defy their preference for a female deliverer. Participants anticipated including faith leaders to be detrimental due to misinterpretation of programme content and overzealous censorship, as Neelofer remarked "*there'll always be something that they're not okay with"*.

*Technological delivery*

Participants' opinions of alternative delivery methods were explored to gauge their views on the importance of face-to-face delivery. Participants stated they preferred having an instructor and being part of a group for social support and feedback. Zafeera also noted practical issues with apps, as the responsive and adaptable ability of a human practitioner cannot be replicated through technological means:

*Extract 4*

***Zafeera:*** *And how would you do that anyway? (.) I mean she picked up on so much that was going on in the room (.) she could tell when a noise walked in and we were*

*distracted she would bring us back (.) you know she would pick up on people fidgeting or (.) there are so many things that she needed to be there for (.) you couldn't replace that*

Participants also felt "conceptually (.) having an app or an online lecture just feels at odds with the idea of Mindfulness". Nevertheless, participants felt the provided "CD is useful (.) because I can't remember everything that [the practitioner] says", hence technology could still be advantageous if supplementing rather than supplanting human-led delivery.

*Perceived programme effects*

Participants declared various psychological and behavioural benefits due to Mindful practice. All participants reported experiencing ameliorative psychological effects as the programme variably reduced anxiety, stress and worry whilst improving self-compassion:

*Extract 5*

***Safa:*** *It* [Breath control] *helps when I have anxiety (.) cos when I have anxiety I start to feel really hot (.) but with the breathing (.) it gives me peace in a way (.) relaxed (.) feel relaxed*

Ostensibly, participants felt Mindful practices facilitated focus to the present moment, away from stressors through different practices: Mindful walking allowed Sonam to *"separate yourself from like work tensions"*; and the mountain exercise helped Hina *"stop worrying about what's happening next and help me zone into right now"*. Self-compassion (*"I'm a bit more easy on myself now whereas before I was quite harsh on myself"*) helped Falah *"manage my negative thoughts"* and *"stress"*. These are examples of successful applications of learnings.

Participants also discussed possible behavioural outcomes, particularly dietary behaviour. Two participants noted a more acute awareness of their satiety through which they regulated daily food intake decisions, Falah explained *"I'll just eat until I'm full"*. Again, participants felt they successfully applied learnings with early benefits- a leading indicator of positive future results. Mindfulness alleviated another dietary issue, comfort eating, in 4 women in two distinct ways. Hina through stress reduction: *"now I've managed my stress… I don't resort to eating junk"*. Whereas 5 women indicated they comfort ate less by applying the acquired skill of greater awareness (of satiety) to avoid unnecessary consumption:

*Extract 6*

***Muneeba:*** *Yeah it did (.) I find myself comfort eating less (.) before I would just see a chocolate and I would just go for it (.) I would just eat it (.) now I'm just like "Okay I'm not really hungry (.) do I need to eat it? (.) and then I won't eat it" (.) so it's helped*

Participants also discussed how the programme prompted changes in physical activity. Zafeera found the body scan practice helped her notice how her "*body is feeling*" *and realise "You have to be more active (.) you have such a sedentary lifestyle".* She noted *"it's too early to tell but I think it's made a bit of a difference"*. Contrarily, Mariam specified *"I don't think Mindfulness has"* elicited any attitudinal or motivational shift towards physical activity. However, Mariam was already physically active, and as such may not have needed Mindfulness to maintain current physical activity levels.

Research Study Methods

*Randomisation*

Though participants would have preferred to know their group allocation sooner than 2 weeks before the first session, they felt satisfied with the explanation of the scientific rationale in utilising randomisation:

> *Extract 7*
> ***Neelofer:*** *It's not like it was stressful (.) I mean sure it's nice to know sooner but at the same time it's not something that bothered me (.) and I understood why you had to do it*
> ***Hina:*** *Yeah you explained why you were doing the randomisation so it was fine I think*

Participants acknowledged not receiving Mindfulness immediately might frustrate control participants, yet they felt the offer a delayed intervention was fair compensation. Nevertheless, as control group participants did not partake in the focus group, it is unclear if they would have agreed with their counterparts in the Mindfulness group.

*Measuring physical activity and other measures*

Participants expressed no major issues with accelerometry. Its proposed alternative, a self-report physical activity diary, was viewed unfavourably due to its fallibility and potential participant dishonesty resulting in a less objective and reliable measure. Participants deemed all other research measures (height, weight, blood pressure, questionnaires, interviews, and the focus group) were an acceptable part of their research participation experience.

**Comparison of quantitative and perceived programme effects (experimental group)**

*Table 13* includes all means and standard deviations for variables at baseline and post-intervention for the intervention group only. These analyses are important to contrast against participants' perceptions of results. There were significant pre-post intervention changes for anxiety, stress, energy/fatigue, emotional wellbeing, and systolic blood pressure.

*Table 13: Outcome measure means for the intervention group at baseline and post-intervention.*

| Measure | Intervention group baseline means | Intervention group post-intervention means | Significance levels |
|---|---|---|---|
| **UKDDQ score** [a] | 3.17 (± .65) | 3.30 (± .66) | .235 |
| **Mindfulness** | 3.93 (± 1.11) | 4.15 (± .85) | .404 |
| **Depression** [b] | 11.80 (± 8.75) | 9.15 (± 7.21) | .136 |
| **Anxiety** [b] | 12.00 (± 7.43) | 6.90 (± 4.43) | .003 |
| **Stress** [b] | 16.80 (± 9.37) | 12.22 (± 8.94) | .024 |
| **SF-36v2: Physical functioning (%)** [c] | 88.50 (± 11.25) | 90.90 (± 9.07) | .220 |
| **SF-36v2: Role limitations due to physical health (%)** [c] | 90.00 (± 30.78) | 88.50 (± 11.25) | .577 |
| **SF-36v2: Role limitations due to emotional problems (%)** [c] | 70.00 (± 27.01) | 65.00 (± 28.93) | .716 |
| **SF-36v2: Energy/fatigue (%)** [c] | 41.50 (± 15.82) | 53.91 (± 17.51) | .001 |
| **SF-36v2: Emotional wellbeing (%)** [c] | 55.00 (± 21.94) | 65.16 (± 21.52) | .022 |
| **SF-36v2: Social functioning (%)** [c] | 66.25 (± 28.71) | 76.17 (± 25.00) | .168 |
| **SF-36v2: Pain (%)** [c] | 79.12 (± 20.00) | 72.07 (± 20.03) | .080 |
| **SF-36v2: General health (%)** [c] | 59.68 (± 20.42) | 62.04 (± 21.13) | .409 |
| **BMI (kg/m$^2$)** | 21.81 (± 3.56) | 22.62 (± 3.28) | .111 |
| **Systolic blood pressure (mmHg)** | 106.40 (± 11.11) | 101.20 (± 8.39) | .023 |
| **Diastolic blood pressure (mmHg)** | 75.10 (± 8.75) | 71.56 (± 6.63) | .100 |
| **MVPA (min/day)** | 35.53 (± 20.09) | 31.53 (± 15.88) | .357 |
| **Sedentary time (min/day)** | 406.47 (± 90.60) | 412.24 (± 90.22) | .802 |

Paired sample t-test was conducted to examine intervention effects between baseline and post-intervention for all continuous variables. [a] UKDDQ scores range from 0-5. Higher scores indicate better dietary behaviours. [b] For depression, anxiety and stress lower scores indicate better psychological profile. [c] Higher percentages indicated better quality of life i.e. better physical functioning, less role limitations due to physical health or emotional problems, more energy, better emotional wellbeing, pain resilience, and better general health.

Below, results for outcomes are organised first according to those which had a match between perceptions and objective measures (stress, anxiety, energy/fatigue, and emotional

wellbeing (both from the SF-36v2 scale)). Second, by any benefits objectively observed but not mentioned qualitatively (systolic blood pressure). Third, by perceptions of no change that were matched by objective measures (physical activity/sedentary time). Next, by outcomes that did not match between perceptions and objective measure (depression, Mindfulness, and dietary behaviour). Physical functioning, role limitations due to physical health, role limitations due to emotional problems, social functioning, pain, and general health (all from the SF-36v2 scale), diastolic blood pressure and BMI were not discussed qualitatively and did not indicate a statistically significant change, thus were not included in this section. Lastly, additional topics that emerged during the qualitative measures are discussed.

Stress

Stress-reduction was the most frequent qualitatively-reported effect. Twelve experimental group participants claimed they felt Mindfulness training was beneficial for stress during the focus group or interviews: *"if I felt a bit stressed or had loads of thoughts coming in (.) then I'd do like the breathing exercise"* (Naswirah, focus group). Other skills perceived effective for stress-reduction included body scan and self-compassion. Mapping results to Kirkpatrick's model, it appears participants had a committed, pro-Mindfulness attitude (level 2), perceived that they could effectively implement skills into their lives (level 3) and experience beneficial results (level 4). There was a statistically significant decrease in stress from baseline (M = 16.80 ± 9.37) to post-intervention (M = 12.22 ± 8.94), $t(19) = 2.498$, $p = .022$. Results suggest Mindfulness was effective for stress-reduction, reflecting participants' perceptions.

Anxiety

Six participants perceived Mindfulness benefits for anxiety. Muneeba noted the body scan was useful to her: *"and it really helps cos like the anxiety was eased as well a bit"*. Other skills perceived to be useful for coping with anxiety included Mindful walking and Mindful breathing. As per Kirkpatrick's model, participants found real-life uses where they could apply their acquired skills (level 3) and felt positive results (level 4). To those who deemed Mindful walking relevant to their needs (level 1), it yielded the desired result of anxiety-management (level 4). There was a statistically significant decrease in anxiety from baseline (M = 12.00 ± 7.43) to post-intervention (M = 6.90 ± 4.43), $t(19) = 3.426$, $p = .003$. Results suggest Mindfulness was led to reduced anxiety, supporting participants' perceptions.

Energy/fatigue and emotional wellbeing (subscales of the SF-36v2)

For energy/fatigue, only 4 participants alluded to improved levels of energy or less fatigue. Iqra mentioned: *"if I feel tired or sluggish I realise I'm dehydrated (.) so just drink water".* As per Kirkpatrick's model, this shows successful implementation of the acquired skill of body awareness (level 3) and being able to respond to yield results: improved energy (level 4). Results from objective measures of energy/fatigue indicated a statistically significant improvement from baseline (M = 41.50% ± 15.81) to post-intervention (M = 53.91% ± 17.51), $t(19) = -3.749$, $p = .001$. This suggests Mindfulness helped ameliorate feelings of low energy/fatigue, confirming their perceptions.

Six participants perceived improved emotional wellbeing, for instance Nahida noted: *"It mostly helped my mind (.) to calm me down (.) especially during stressful times".* Mapping on to Kirkpatrick's model, it is apparent that managing thoughts as taught (level 3) has

resulted in successful stress management that is not governed by knee-jerk emotional reactions but an equanimous mind set, resulting in emotional stability (level 4). Results from objective measures of emotional wellbeing (a subscale of the SF-36v2) found a significant increase from baseline (M = 55.00 ± 21.94) to post-intervention (M = 65.16 ± 21.52), $t(19) = -2.498$, $p = .022$. Results suggest the intervention improved emotional wellbeing consistent with their perceptions.

Blood pressure

Participants were unaware of their blood pressure as they did not have it measured routinely due to their relatively young age. As such, none mentioned it, nor related phenomena such as palpitations, in interviews or the focus group. Results from objective measures of blood pressure indicated a statistically significant decrease in systolic blood pressure from baseline (M = 106.40 ± 11.11) to post-intervention (M = 101.20 ± 8.39), $t(15) = 2.472$, $p = .023$. Results suggest Mindfulness was effective for reducing systolic (but not diastolic) blood pressure. However, it is important to note that participants' systolic and diastolic blood pressure values were well within the healthy range.

Physical activity and sedentary time

Sixteen (of the 18 to participate in post-intervention qualitative measures) reported not changing their engagement in physical activity. The end of the programme coincided with the commencement of examination period for participants, who were predominantly students. As Asiya mentioned: *"Yeah but also revision period and everyone's just sitting down and working".* Regarding Kirkpatrick's model, despite potentially successful learning skills (level 2), the required drivers for implementation are for a conducive personal

circumstance to increase physical activity (level 3). Statistical analyses of accelerometry data indicated no significant changes in physical activity or sedentary time between baseline and post-intervention, suggesting the intervention did not have an impact on participants' physical activity or amount of time spent sedentary, confirming their self-reported perceptions. Notably 2 participants indicated attempting to increase their physical activity, and these individuals were not students thus not impinged by exam preparation. When their data were examined, there was a quantitative increase in time spent in MVPA and a decrease in sedentary time, but these changes were not statistically significant.

Depression

Only Rezana explicitly discussed feeling "depressed". Nevertheless, 6 others expressed alleviation of depressive symptoms such as negative thoughts. For instance, Falah discussed how the skill of self-compassion enabled her to manage her thoughts: *"so I'd be like "I can't do it" and all sorts of negative thoughts so it just- it taught me to be more…(pause for 2 secs) well easy with myself and realise I can do it".* Other perceived useful skills to manage depressive symptoms included the mountain exercise, Mindful walking and the thoughts are not facts exercises. Regarding Kirkpatrick's third level, these examples show participants applying learned skills to manage personal issues. Despite a baseline to post-intervention reduction in depression, this change was not statistically significant. Results suggest Mindfulness was not effective for reducing feelings of depression, in contrast to participants' perceptions.

Mindfulness

All participants expressed benefits from either a particular Mindfulness skill, the practitioner's tutelage or more explicitly a better understanding of what Mindfulness entails. Zeenat noted: *"I feel like we've all seen you know (.) clear benefits and it has changed us all in some way"*. There was variation regarding participants' preferred Mindfulness skill which appeared to reflect their unique individual needs. Participants' discourse appeared to map positively to all levels of Kirkpatrick's model, with a positive reaction, ability to learn and apply skills, then eventually experience leading indicators of early benefits. However, there was no significant difference for Mindfulness scores between baseline and post-intervention, suggesting the intervention did not affect participants' level of Mindfulness as assessed via questionnaire.

Diet

Between baseline and post-intervention, participants' grocery shopping and meal planning habits remained unchanged. Participants expressed some diet or food-related behavioural changes. Through enhanced awareness of satiety, 10 participants reported improved portion control or reduced snacking: *"wait a minute…do I actually want this right now (.) no I'd actually rather have a cup of tea"* (Iqra, post-intervention interview). Several participants expressed Mindful eating enabled greater food enjoyment. Two participants, Asiya and Ravinder, expressed making changes for a more balanced diet by having a better spread of meals throughout the day and lower energy alternatives for some foods. *"I will have some vegetables (.) I will have some meat (.) I will have like wholemeal breads and things (.) like you know the super grains?"* (Asiya, post-intervention interview). As per

Kirkpatrick's model, these individuals appeared to acquire the skill and pro-Mindfulness attitude (level 2) to implement learnings (level 3) and yield moderate dietary change.

The mean UKDDQ scores for the entire intervention group did not change significantly from pre- to post-intervention. Interestingly, in the 10 individuals who expressed any diet-related change, there was a statistically significant increase in UKDDQ score from baseline (M = 3.17 ± .71) to post-intervention (M = 3.63 ± .52), $t(9) = -3.304$, $p < .01$, which is consistent with the perceptions of these individuals. However, when the results for the entire intervention group were examined, it appears that Mindfulness was not effective for improving diet as measured by the UKDDQ.

Notably, 7 participants expressed difficulty in implementing dietary changes because their mothers were the designated cook in the household: *"Yeah just cos my meals are already prepared so I'm eating the same things"* (Waeeza, post-intervention interview). Other barriers to healthier eating included the commencement of exam season (at post-intervention), food cost and availability, time limitations, shelf-life, culinary proficiency and social influences. Participants also expressed that more Mindful eating content could be integrated into the programme. Regarding Kirkpatrick's model, many of these barriers were beyond participants' control and thus affected their implementation of Mindfulness to improve their food-related behaviour (level 3) and subsequently desired results (level 4).

Pain

Energy/fatigue and emotional wellbeing were discussed above. The *SF-36v2* has 6 other subscales, however apart from pain, no participants discussed these outcomes. Only Iqra made one fleeting, anecdotal mention of pain: *"…and breathing into pain (.) like she said*

*if a part of your body hurts (.) act like the breath is going to that part*". Results found no statistically significant change in pain.

Additional findings: Perceived generational differences and influence on sleep

Participants stated their beliefs that older generation women would be less willing to try Mindfulness due to the culmination of mental health stigma and commitment to family duties. Participants posited a South Asian woman's role was to somewhat sacrifice their life to support their family: *"it's just this feeling of "I- my job in life is to revolve around other people""*, defying this role would result in *"guilt"*. They also noted *"we have mental health stigmatised so much in the… community"* which leads to mental healthcare being dismissed as redundant. Participants suggested older South Asian women were less audacious to attempt new practices unlike younger counterparts (such as themselves), hence care was needed if advertising Mindfulness to them: *"sell it to them in a way they find completely non-threatening (.) so you don't mention Buddhism or anything else"*. Therefore, they stated that, unlike themselves, older women needed the approval and recommendation of trusted figures before feeling comfortable to participate; this would include either religious leaders, fellow Muslim women, or their daughters.

Lastly, despite sleep not being an outcome measure, 2 participants mentioned improved sleep quality during their post-intervention interviews. Ravinder stated *"the sleep that I have now (.) it's much deeper even if I have an hour nap, it's better than 6 hours before".*

**Identification of a primary outcome and adequate sample size for a future large-scale RCT**

*Table 14* below features data of quantitative measures at baseline and post-intervention for both groups. Due to the intervention's qualitatively and quantitatively supported stress-reductive efficacy, and considering the aforementioned pathways through which stress can potentiate T2D, the DASS21 scale appears to be an appropriate primary outcome for a future large-scale replication RCT. Moreover, full-scale replications can operationalise Creswell and Lindsay's (2014) stress buffering account to examine whether improved stress management facilitates healthier life choices. Using the G Power programme, a sample size calculation based on change in stress score means determined a total N value of 306 would be needed for adequate power. The acceptability and feasibility of an MBI for South Asians acts as a proof of concept for applying Mindfulness to this population. This is not limited to T2D prevention (or treatment) and has application where South Asians suffer health inequalities such as obesity, hypertension or coronary heart disease. An MBI can also be applied to remedy mental health issues in this population. Depending on the illness condition, the primary outcome will differ i.e. $HbA_{1c}$ for T2D treatment, blood pressure for hypertension, or weight loss for obesity.

*Table 14: Pre- and post-intervention mean scores of repeated measures analyses*

| | | | | Time effect | | Time X treatment effect | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Measure** | **Group** | **Pre** | **Post** | ***F*** | ***p*** | ***F*** | ***p*** | ***d*** | **95% CI** |
| **Depression** [a] | Experimental<br>Control | 11.80 (± 8.75)<br>6.56 (± 4.74) | 9.15 (± 7.21)<br>11.92 (± 9.21) | 5.51 | .02 | 58.68 | <.001* | -0.42 | -1.05 to 0.21 |
| **Anxiety** [a] | Experimental<br>Control | 12.00 (± 7.43)<br>7.17 (± 6.60) | 6.90 (± 4.43)<br>9.21 (± 8.40) | 10.95 | .001 | 56.08 | <.001* | -0.39 | -1.03 to 0.24 |
| **Stress** [a] | Experimental<br>Control | 16.80 (± 9.37)<br>13.75 (± 9.84) | 12.22 (± 8.94)<br>15.42 (± 10.70) | 7.19 | .008 | 33.20 | <.001* | -0.49 | -1.13 to 0.14 |
| **Mindfulness** [b] | Experimental<br>Control | 3.93 (± 1.11)<br>3.95 (± 0.93) | 4.15 (± .85)<br>4.02 (± 0.88) | 6.37 | .012 | 1.90 | .169 | 0.22 | -0.41 to 0.85 |
| **Physical functioning (%)** [c] | Experimental<br>Control | 88.50 (± 11.25)<br>81.31 (± 21.44) | 90.90 (± 9.07)<br>91.65 (± 12.17) | 36.07 | <.001 | 15.65 | <.001* | -0.06 | -0.69 to 0.57 |
| **Role limitations due to physical health (%)** [c] | Experimental<br>Control | 90.00 (± 30.78)<br>90.31 (± 30.79) | 88.50 (± 11.25)<br>95.01 (± 22.36) | .984 | .322 | .984 | .322 | -0.31 | -0.94 to 0.32 |
| **Role limitations due to emotional problems (%)** [c] | Experimental<br>Control | 70.00 (± 27.01)<br>89.47 (± 31.53) | 65.00 (± 28.93)<br>68.42 (± 37.76) | 5.96 | .015 | 8.39 | .004* | -0.08 | -0.71 to 0.54 |
| **Energy/fatigue (%) c** | Experimental<br>Control | 41.50 (± 15.82)<br>47.29 (± 21.55) | 53.91 (± 17.51)<br>47.40 (± 19.25) | 33.47 | <.001 | 32.36 | <.001* | 0.43 | -0.21 to 1.07 |
| **Emotional wellbeing (%)** [c] | Experimental<br>Control | 55.00 (± 21.94)<br>56.61 (± 21.35) | 65.16 (± 21.52)<br>64.23 (± 21.07) | 1.154 | .284 | 50.58 | <.001* | 0.06 | -0.57 to 0.69 |
| **Social functioning (%)** [c] | Experimental<br>Control | 66.25 (± 28.71)<br>63.74 (± 21.38) | 76.17 (± 25.00)<br>71.31 (± 18.91) | 24.86 | <.001 | .290 | .591 | 0.26 | -0.37 to 0.89 |
| **Pain (%)** [c] | Experimental<br>Control | 79.12 (± 20.00)<br>70.81 (± 23.55) | 72.07 (± 20.03)<br>70.28 (± 13.57) | 6.52 | .011 | 4.749 | .03* | 0.11 | -0.52 to 0.74 |
| **General Health (%)** [c] | Experimental<br>Control | 61.81 (± 20.21)<br>57.49 (± 21.92) | 62.04 (± 21.13)<br>59.11 (± 21.02) | 4.19 | .042 | 0.14 | .906 | 0.34 | -0.29 to 0.97 |
| **BMI (kg/m$^2$)** | Experimental<br>Control | 21.81 (± 3.56)<br>23.25 (± 3.55) | 22.62 (± 3.28)<br>23.23 (± 3.31) | 2.41 | .122 | 2.98 | .086 | -1.88 | -2.64 to -1.13 |
| **Systolic Blood Pressure (mmHg)** | Experimental<br>Control | 106.40 (± 11.11)<br>107.97 (± 11.08) | 101.20 (± 8.39)<br>112.72 (± 15.60) | 226.00 | .360 | 91.79 | <.001* | -1.68 | -2.41 to -0.95 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Diastolic Blood Pressure (mmHg)** | Experimental<br>Control | 75.10 (± 8.75)<br>78.43 (± 9.51) | 71.56 (± 6.63)<br>81.82 (± 12.06) | .026 | .873 | 45.83 | <.001* | -1.66 | -2.38 to -0.93 |
| **UKDDQ** [d] | Experimental<br>Control | 3.17 (± 0.65)<br>3.22 (± 0.63) | 3.30 (± .66)<br>3.22 (± 0.59) | 13.80 | <.001 | 13.04 | <.001* | 0.26 | -0.36 to 0.90 |
| **MVPA (mins/day)** [e] | Experimental<br>Control | 35.53 (± 20.09)<br>45.03 (± 28.75) | 31.53 (± 15.88)<br>38.48 (± 21.84) | 13.47 | <.001 | .812 | .368 | -0.43 | -1.06 to 0.21 |
| **Sedentary time (mins/day)** | Experimental<br>Control | 406.47 (± 90.60)<br>440.34 (± 151.15) | 412.24 (± 90.22)<br>454.19 (± 106.56) | 1.88 | .172 | .170 | .680 | -0.52 | -1.16 to 0.11 |

[a] Depression, Anxiety & Stress; lower values represent better psychological state. [b] Mindfulness; higher scores indicate greater Mindful trait. [c] Subscales for the SF-36v2; higher values represent better quality of life. [d] UK Diabetes and diet questionnaire; scores range 0-5, higher values indicate positive dietary changes. [e] Moderate-to-vigorous physical activity. *P<0.05 Experimental vs Control Post-intervention (Repeated measures ANOVA with Bonferroni post-hoc test).

## Discussion

The study's primary objective was to test the acceptability and feasibility of implementing an RCT that investigated the effectiveness of MBCT in young adult South Asian women. The second aim was to explore the acceptability of measuring a range of objective outcome measures. The third aim was to compare the participants' potential perceived programme effects, measured qualitatively, to quantitative data for the same outcome measures. The fourth aim was to establish a primary outcome and the fifth to suggest an adequate sample size. Establishing new diabetes early prevention tools, particularly for this high-risk ethnic group, is imperative considering its personal, societal, and economic consequences (Bommer et al., 2017).

The results from this feasibility study suggest Mindfulness appears feasible and acceptable within this target population and relevant to their diabetes-risk concerns. Participants felt the course was acceptable for themselves and suggested it would also meet the needs of young women of similar ethnic backgrounds. Participants enjoyed the programme content, reporting varying degrees of perceived success when applying skills into their own lives in different applications; academic stress, life stress or health behaviours which may reduce diabetes-risk if practice continues. Moreover, they deemed the programme acceptable and non-conflicting with their religions and culture, with some citing it enhanced focus during prayer. These results are akin to Dreger et al. (2013) who found Mindfulness' secular nature did not conflict with Native American spiritual or cultural beliefs. Mindfulness' acceptability may suggest it is a preferred alternative for psychological support, as compared to professional mental health services. Soorkia, Snelgar & Swami (2011) reported young South Asians are sceptical of professional mental health services due to

cultural mistrust and adherence to South Asian norms, so Mindfulness may be a preferable method to assist in managing stress. Additionally, since the programme was acceptable and feasible, it could be delivered to South Asian women for other purposes such as stress reduction, improving mental health and wellbeing, or reducing cardiovascular risk (by virtue of cardiovascular risk being reduced by the same health-protective behaviours as diabetes).

Experimental group participants in the present study reported various perceived psychological and behavioural benefits. The most frequent perceived effect, stress-reduction, was also observed quantitatively through the DASS21 scale. The experimental group's DASS21 stress subscale scores changed from 'extremely severe' to 'severe' classification at post-intervention. Experimental participants perceived themselves to have been able to learn and apply Mindfulness skills and become better-equipped for stress-management because of the programme. Additionally, they felt improved stress-management lessened stress-induced eating. Similarly, Daubenmier et al. (2011) found that Mindfulness can reduce stress-eating in overweight/obese women. It is possible that stress-management had some influence in the observed increase in emotional wellbeing. Weinstein, Brown and Ryan (2009) used a multi method examination to investigate Mindfulness's effect on stress appraisals, coping and emotional well-being. They found more adaptive stress-management and coping approaches mediated higher scores for emotional wellbeing. Another corollary from stress-reduction may have been the reduction in systolic blood pressure. Other Mindfulness interventions have also yielded a positive effect on systolic blood pressure (Chen, Yang, Wang & Zhang, 2013; van Son et al, 2013). Findings in this study appear to lend support to Creswell and Lindsay's (2014) proposed stress buffering account, as the intervention appeared to reduce stress and subsequently changed some

lifestyle and psychological behaviours and attenuated physiological stress-responsivity. It may also be possible that Mindfulness can abate the stress-induced activation of neuroendocrine and neuro-immunological pathways that potentiate impaired glucose metabolism.

Hofmann, Sawyer, Witt and Oh's (2010) meta-analytic review on the usefulness of MBIs on anxiety and depression found Mindfulness to be effective in clinical populations with benefits maintained at follow-up. Hoffman et al.'s findings support this study's results for (perceived and objective) anxiety and participants' perceived (but not objective) reduction in depression. The experimental group's DASS21 mean anxiety subscale score improved from being classified as 'extremely severe' to 'moderate' for anxiety. However, Hoffman et al.'s findings refute the present study's objective finding of no (objective) change in depression. It is unclear if this modified MBCT intervention impacted on depression or whether the combination of small effects and a small sample size affected statistical power, and also the generalisability of results. Yet considering the extensive depression-ameliorating effect found in the literature, it is worth exploring this particular MBCT adaptation's efficacy in improving depression further, particularly if participants in this study perceived benefits. Another perceived benefit supported by objective measures in the present study was greater energy/less fatigue. Existing literature suggests Mindfulness is beneficial to feeling more energetic and less fatigued in different patient populations (Lengacher et al., 2009; Zangi et al., 2011). Two participants reported improved sleep quality as a result of the programme. Though this was not quantitatively measured in the present study, previous research has shown this to be a commonly reported benefit of Mindfulness (Black et al, 2015; Caldwell et al, 2010; Chiesa & Serretti, 2011).

Participants felt there needed to be more emphasis on Mindful eating and recommended this change for any future intervention offered to young South Asian women. Insufficient Mindful eating content may explain the limited dietary behaviour benefits in participants. Though participants reported some dietary changes with a perceived improved overall diet, yet quantitative results did not support these perceptions. A frequent perception in the experimental group was greater food enjoyment, an outcome not measured by the UKDDQ. Perceptions of being more attentive to portion sizes as consistent with the findings of Beshara et al. (2013), who found a correlation between Mindfulness and portion control as well as Timmerman and Brown (2012), whose Mindfulness intervention resulted in reduced energy intake in perimenopausal women. Several participants noted reduced snacking, which is consistent with Alberts, Thewissen, and Raes (2012) who found an 8-week Mindfulness intervention reduced emotional eating and craving snacks in a sample of women with disordered eating. Participants in the present study expressed a desire for more Mindful eating content to be incorporated, as it was relevant to their needs. It may be that the lack of more content on Mindful eating is reflective of the lack of an objective effect on diet. Participants acknowledged various barriers that limited their ability for making dietary changes, mainly that their mother was responsible for meals. This finding has been reported in other studies of barriers to adopting a healthy lifestyle in South Asians (Patel, Phillips-Caesar & Boutin-Foster, 2012). Other barriers were food cost and availability, time limitations, shelf-life, culinary ability, and social influences. Many of these impediments appeared to be macro-social and perceived to be beyond their individual control. These challenges have also been reported in studies of the general population and other ethnic minorities (Soliah, Walter & Jones, 2012; Story, Kaphingst, Robinson-O'Brien, & Glanz 2007;

Welch et al., 2009; Yeh et al., 2008). Kumanyika's Community Energy Balance (CEB) model accounts for the fact that not all influences of dietary behaviour are controllable with many distal factors having an influence in food choice.

Jenkins and Tapper (2013) found that teaching cognitive defusion, a Mindful eating skill, reduced chocolate snacking (an issue present in the current sample), while Lacaille et al. (2014) tested three Mindfulness skills (awareness, acceptance and disidentification) on cravings, and found disidentification to be most successful in reducing cravings. Both skills could be integrated into the current programme. Moreover, including Mindful eating skills that have been shown to be effective could be used to reduce eating during TV watching, another issue mentioned by participants in our study. Research has shown women's screen-based activities can disturb several processes that regulate food consumption and result in increased energy intake (Braude & Stevenson, 2014).

Qualitative and quantitative results indicate that this intervention did not result in increased physical activity levels, reduce time spent sedentary or reduce BMI. While a change in BMI was not anticipated in this study across such a short intervention period, physical activity intentions or attitudinal shifts may have been possible. However, this study is not alone in this regard. Admiraal et al. (2013) randomised 536 South Asian adults to an intensive lifestyle intervention or control group. Their culturally-tailored intervention included dietary advice, cooking tips, supervised physical activity and bespoke counselling. After a year, participants' weight status and metabolic profile did not improve. They concluded the intervention's ineffectiveness highlighted the practical difficulty in yielding health-protective effects. Williams and French (2011) conducted a systematic and meta-

analytic review investigating the most effective intervention techniques for improving physical activity in healthy adults. They found that 'action planning', 'provide instruction' and 'reinforcing effort towards physical activity' were the techniques that had the greatest influence on increasing self-efficacy, and hence were also the most likely to increase physical activity levels. Therefore, these or similar Mindfulness-based skills that foster greater self-efficacy could be utilised in future delivery of this programme.

Participants in the present study stated they appreciated the practitioner's novel addition of a presentation about the scientific context of Mindfulness. They felt that this should be a permanent fixture but should be scheduled during the first session in the programme. This modification may help participants to attain a greater learning experience by increasing knowledge, attitude, and commitment earlier in the programme (Kirkpatrick 2009).

The current format of 8 weekly 2-hour sessions was not opposed under 'Practicality', thus acceptable as an apt timespan to nurture Mindfulness ability. Shortening the 8-week duration or 2-hour sessions was perceived insufficient to cover the broad content. The variability in preferred Mindfulness techniques suggests the decision to avoid reducing the number of weekly sessions and omitting content from the usual course (as suggested in modelling phase focus groups) was vindicated as there were no apparent consensual favourite techniques. Instead, it seems that accommodating multifarious skills is beneficial by catering to a wide array of individual needs and dispositions thus should be a core element of the intervention. Therefore, the decision to maintain 8 weekly sessions was

acceptable as it was not perceived excessive and allowed inclusion of more skills, prolonged Mindful practice and subsequently greater perceived benefits and less diabetes risk.

Participants discussed the social effects of having a face-to-face (rather than technological), group-based (instead of one-to-one) delivery. They expressed strong beliefs that group dynamics, such as increased support and engagement, enabled a better learning experience. These views are consistent with Bandura's (1998) concept of social modelling, i.e., that people believe in collective efficacy to accomplish health-promotive change. Group-based delivery confers the additional advantage of a higher participant-practitioner ratio, which is helpful for large scale implementation. Furthermore, participants expressed the single-gender group composition to be beneficial and culturally appropriate, which has been commonly reported in other lifestyle behaviour change studies with South Asian women (Babakus & Thompson, 2012). Participants also felt that retaining the 18-35-year age group parameter was important, as trying to deliver the intervention across a wide age range would lead to participants at differing life stages, less shared experiences, and different issues that would be unrelatable to one another. This perceived relatability may derive from reinforcing interactions with similar others, which has previously been identified as a similarity-attraction effect (Berscheid & Walster, 1978).

The modelling phase suggested enlisting a competent, experienced and qualified Mindfulness instructor, preferably the same gender as the intervention participants, echoing Morgan, Young, Smith and Lubans' (2014) criteria for better participant engagement. Indeed, our participants cited these pedagogical qualities as being conducive to helping them learn and implement the techniques successfully. The instructor's encouraging

approach eased their comfort and increased interaction. Thus, we recommend that future trials should also utilise a qualified Mindfulness instructor as opposed to other professionals (e.g. Psychologists or wellbeing practitioners). Participants were averse to supplanting the deliverer with a technological delivery. Other research has also noted technology, notwithstanding its own benefits, cannot replicate face-to-face benefits fully (Beattie, Shaw, Kaur & Kessler, 2009; Kirkpatrick, 2009). Although face-to-face delivery was favoured, participants opposed the idea of having a community or faith leader co-deliver the programme alongside the Mindfulness practitioner. Our participants expressed a view that these leaders are typically first-generation immigrants, who may have conflicting life perspectives, norms and values to their own views as second generation South Asians, as they consider themselves more Westernised and less collectivist. These findings are similar to those reported by Somerville and Robinson (2016), who reported differences between Canadian first and second generation South Asians' educational and life aspirations. Moreover, the current sample were concerned with confidentiality, and feared their disclosures might be shared within the community if a community/faith leader co-delivered the intervention. Gilbert et al. (2007) also found South Asian students more concerned with confidentiality when engaging in psychological services compared to non-Asian students.

Lastly, participants perceived generational differences in terms of the acceptability of the programme. They deemed older generations reluctant to try unfamiliar practices without endorsement or co-attendance from people within their community. Cross-Bardell et al. (2015) conducted qualitative research to examine insights into the development of health promotive lifestyle changes in a South Asian context and found similar results. They also found attending lifestyle programmes with friends or family enabled participation and

engagement. Participants in the present study further described a view that South Asian women are implicitly expected to be self-sacrificial as familial caretakers and are thus committed more to the welfare of others, and less likely to engage in self-care behaviours. Kumanyika et al.'s (2012) Community Energy Balance accounts that type of migrant and migration status - whether recent, acculturated, or socially deprived - can have considerable influence over their lifestyle choices. However, this perceived role is not exclusive to women within South Asian communities, and similar views have also been observed in African American, Vietnamese American, Latin American and Russian women (Abrams et al., 2016; Durand, 2011; Olson, 2015).

Overall, participants found all measurements (questionnaires and objective assessments) to be acceptable. As a feasibility study, the present study was not powered to examine or detect statistically significant changes in outcomes. However, one of the key benefits of Mindfulness is that it can yield physical and mental health improvements by mitigating the effect of stress on health behaviours and coping (Creswell and Lindsay 2014; Niazi & Niazi, 2011). The qualitative and quantitative results in the present study indicate that participants experienced a decrease in perceived stress; as such, stress (measured in this study by DASS21) is recommended as an appropriate primary outcome for a future large-scale trial. Based on our sample size calculations, a total sample of 306 would be required for adequate power (at 80%).

**Strengths and limitations**

A strength of this feasibility trial was that it was a robust study utilising an RCT design. Moreover, this trial's development was informed by adapting an already successful

MBCT programme with cultural considerations by a sample of the target population via a preliminary modelling phase using focus groups. Another strength was that this is a pragmatic, low-cost alternative to existing established diabetes prevention approaches, particularly in its low practitioner-participant ratio. Another strength is that, to our knowledge, it is the first study to compare perceived and objective measures of an MBI to this population, therefore the results reported here illuminate the gap in literature and advance current knowledge. Furthermore, physical activity was measured objectively which is more reliable than self-report in this population (Babakus & Thompson, 2012). One limitation of this study was the sample size, which was relatively small, and as such our findings should be treated with caution. Additionally, this study had a relatively low attendance rate (53.8%). Another limitation is that the sample is not representative of UK South Asian women more broadly, as it consisted mostly of higher educated women. As this study found no MBI effect for physical activity and sedentary time, more research must be conducted to examine novel ways of promoting physical activity and reducing sedentary time within this population. The incorporation of self-efficacy enhancing techniques may be useful in this regard.

**Recommendations for future research and practice**

A recommendation for expansion of this intervention to a full-scale study in young South Asian women would be to begin the first session with an outline of the theory and evidence for Mindfulness, to assist participants comprehend the importance of the key concepts. Additionally, more emphasis on Mindful eating is recommended. Stress (measured

by the DASS21 scale) is recommended as the primary outcome measure with a total sample of at least 306.

**Conclusion**

This original feasibility study demonstrates it is acceptable and feasible to deliver MBCT to young adult South Asian women, a group at high risk for Type 2 diabetes, as an early prevention strategy. The study also found that the perceived effects of a modified MBI were also quantitatively observed for stress, anxiety, energy/fatigue, and emotional wellbeing. The modified intervention has the potential to reduce perceived stress, which can potentially reduce diabetes risk and facilitate healthy lifestyle changes with sustained practice.

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# Chapter 5:
# General Discussion

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## Overview

The purpose of this thesis was to use a mixed-methods design to examine the feasibility of Mindfulness as a diabetes prevention approach for young adult South Asians. A broad range of methodologies were employed: a systematic review, modelling phase entailing a series of focus groups, finally culminating in the design and implementation of a culturally adapted Mindfulness feasibility intervention for the target population.

Kumanyika et al.'s (2012) Community Energy Balance (CEB) model was used as an overarching framework to contextualise determinants of health behaviours more holistically. Specifically, this was deemed appropriate because such ecological models acknowledge that both proximal and distal factors generally have an interactive influence on behaviour. The CEB framework posits that there are 4 levels of influence upon people's health behaviour. The 'People' level accounts for intrapersonal factors such as person's psychological and biological make-up. The 'Families' level focuses on interpersonal relationships. The 'Ethnic minority community' entails the wider community and the sociocultural environment. Lastly, the 'General population and culture in host country' accounts for the most distal, macrosocial factors including general population norms and public policies.

The novel feasibility intervention study within this PhD research provided evidence supporting the potential usefulness of Mindfulness when applied to a new target population, with an aim of stress-reduction and enabling better lifestyle behaviours. Stress is postulated to increase risk for T2D through activation of neuroendocrine and neuroimmunological pathways (Golden, 2007; Procaccini et al. 2014). Specifically, stress activates a series of

biological events through these pathways that lead to the release of biological substances that are associated with T2D onset or risk. Through a behavioural pathway, stress triggers short term stress coping decisional choices such as intake of unhealthy food or physical inactivity (Gardner, Wansink, Kim & Park, 2014). It is possible that Mindfulness-induced stress-reduction can reduce activation of biological pathways and also override implicit (but unhealthy) stress-coping behaviours to ultimately reduce T2D risk. These findings are timely and contemporarily relevant as the incidence of diabetes continues to rise, and with it the associated comorbidities that people of South Asian descent are also more susceptible to developing. This final chapter briefly summarises the main findings from the studies within this thesis and examines them within the context of existing literature. Finally, a discussion of strengths and limitations, direction for future research and implications for policy and practice conclude this chapter.

## Summary of research findings: Systematic review (Chapter 2)

As revealed in the general introduction literature review (Chapter 1), Mindfulness has increasingly been applied to various physical health applications. Diabetes remains a newer application for MBIs. Whitebird, Kreitzer and O'Conner (2009) contended that aspects of Mindfulness, such as non-judgmental awareness, may be beneficial for diabetes management. Until the publication of the systematic review, no literature had compiled and aggregated the effects of MBIs targeted at diabetes. Consequently, the systematic review was conducted to fill this gap in the literature and better comprehend the potential effectiveness of Mindfulness for diabetes. Thus, the systematic review aimed to investigate

the effectiveness of MBIs on physiological and psychological complications in adults with diabetes (Chapter 2).

Due to the scarcity of MBIs for diabetes studies, the systematic search only required a 3-step process that entailed searching for Mindfulness, diabetes and then combining the search results together. The review search culminated in 11 eligible articles that met the inclusion criteria. The studies were from Germany, the Netherlands, USA, UK, France and Canada and had predominantly white samples apart from Dreger, Mackenzie and McLeod (2013) (Aboriginal Canadians). Additionally, all but 3 studies had female majority samples. There was considerable heterogeneity in terms of intervention types, duration and measured outcomes. Six trials used Mindfulness-based stress reduction (MBSR) whereas the other MBIs used other Mindfulness derivatives. Most of the studies followed the typical 8-week duration. The included studies also varied greatly in terms of their physiological and psychological outcome measures.

MBIs appeared to have promising psychological benefits, particularly in reducing stress, anxiety and depression symptoms across several studies. Five studies found improvements in quality of life or similar scales. Dreger et al. (2013) and Schroevers et al., (2013) were the only studies to measure change in Mindfulness specifically. However, they found no post-intervention change. Other psychological results included reductions in worry and improvement in thought suppression. Physical health outcomes were mixed. Four of the 7 studies to measure $HbA_{1c}$ found post-intervention reductions. Blood pressure reductions were observed in 3 studies. Only Miller, Kristeller, Headings, Nagaraja, and Miser (2012) investigated a MBI's effect on diet. They found small-to-medium general dietary

improvements and high-fat food avoidance. The Heidelberger Diabetes and Stress (HEIDIS) study initially found no change in albuminuria yet found a change at 1-year follow-up (Hartmann et al., 2012). Some benefits were lost after 1-year follow-up, however, this is also an issue in other lifestyle intervention (Gillies et al., 2007). Only Teixeira (2010) measured diabetic neuropathy, finding no post-intervention change. Another finding included improved sleep quality in one study (Keyworth et al., 2014). Only 4 studies reported acceptability and feasibility. All 4 of these studies reported that their MBIs were well-received. Notably, Dreger et al.'s (2013) MBI was deemed acceptable by its target ethnic minority sample.

The systematic review concluded by supporting Whitebird et al.'s (2009) contention that the alleviation of stress and other psychological complications might enable positive health behaviour change and subsequently, physical health ameliorations. Relating to the TPB, it may be that the equanimity afforded by Mindfulness strengthened participants' attitudes, perceived behavioural control and intentions towards the pursuit of a healthier lifestyle. Consequently, stronger health-promotive intentions and attitudes resulted in behavioural change and positive health outcomes. Physical health improvements are also likely to manifest through the decreased activation of the neuroendocrine and neuroimmunological pathways (Golden, 2007; Procaccini et al. 2014). Further process evaluation research is needed to ascertain the precise mechanism and contributing factors (as per MRC Process evaluation guidance).

## Summary of research findings: Modelling phase (Chapter 3)

Following the systematic review (Chapter 2) summarised above, it was decided to develop an MBI with a novel adaptation to a high T2D risk ethnic group. Practical and temporal issues precluded obtaining a clinical sample, thus a shift in emphasis to an MBI for T2D prevention was followed. Information from the systematic review (Chapter 2) regarding relevant outcome measures would still be relevant and built upon. Moreover, it does not appear that Mindfulness has been utilised as a diabetes prevention strategy, with the aim of stress-reduction and fostering healthier behaviours in those with higher heritable risk in early adulthood. South Asians were selected as the target demographic as firstly they have the highest diabetes risk in the UK (Ntuk et al., 2014), and secondly because there exists a large population of people of South Asian descent within the city of Birmingham.

An integral step in intervention design involves utilising a modelling phase to better comprehend traits and needs of the target population as NICE (2012) recommend. The main aim of this research was to investigate whether a MBI for South Asian young adults (18-35 years) is culturally acceptable and feasible. Secondary aims included determining whether cultural adaptations are required when developing the programme content, format and delivery personnel, as well as to decide which research methods are most acceptable to this population. Thus, a series of 6 focus groups were conducted for this purpose, 3 all-male and 3 all-female, whose participants were recruited from the target population (young adult, 18-35, South Asian). These participants were recruited through opportunistic, convenience sampling. A semi-structured focus group schedule comprising of 7 topics, worded as exploratory open-ended questions, was used. Questions focused on the potential

acceptability and feasibility of a MBI for the target population, programme format and delivery preferences, and research study methods.

Directed content analysis was used to examine the data systematically into codes organised into broader themes. Focus group data were arranged into 4 themes: Personal influences; Acceptability and Feasibility; Programme and Research Study Methods.

This young adult sample of South Asians demonstrated some health knowledge and understanding of diabetes, which differs from research investigating older South Asians understanding of diabetes who have been reported to tend to externalise the causation away from their personal lifestyle factors (Lawton, Ahmad, Peel & Hallowell, 2007; Rankin & Bhopal, 2001). Relating to the CEB framework's 'people' level, it appears a lack of personal knowledge would not be a hindrance to making well-informed lifestyle change. Participants perceived Mindfulness to be acceptable and appropriate, acknowledging its potential usefulness. Mindfulness' perceived acceptability here reflects other acceptability and feasibility studies investigating Mindfulness' acceptability for different populations (students, people with cancer, diabetes or post-traumatic stress disorder, and even for psychiatric staff) (Greeson, Toohey & Pearce, 2015; Keyworth et al., 2011; Razzaque & Wood, 2016; Strauss, Thomas, & Hayward, 2015; Zimmermann, Burrell & Jordan, 2017). Women generally expressed more enthusiasm and interest than men. Participants also perceived older South Asians to be less willing to try Mindfulness than their younger counterparts would be. The CEB framework's 'Ethnic minority community' level can account for this in that being devoted to their own cultural-religious practices, an alternative practice such as Mindfulness may appear threatening or incompatible to their way of life. This notion

of some South Asians being reluctant to attempt practices beyond their religious-cultural norms is supported by literature (Coward, Hinnells, & Williams, 2012). However, such inter-generational differences in the response to social contexts and structures, which is often mediated by acculturation, is also present in other ethnic minority groups (Renzaho, McCabe & Swinburn, 2012).

In terms of feasibility, there were some concerns due to a perceived busy Asian lifestyle, particularly for older women, who may have family responsibilities and older men who may have multiple work commitments. Again, the busy South Asian lifestyle precluding self-care has also been acknowledged in other research (Bajaj et al, 2013; Joshi, 2012; Lucas, Murray & Kinra, 2013; Mridula, Small & Davey, 2016). This maps on to the CEB framework's 'families' level as cultural roles and responsibilities can influence an individual's ability to attend Mindfulness sessions. Participants in the present research also suggested reducing the number of weekly sessions from the usual format of 8 sessions. Participants deemed the proposed programme content to be acceptable but suggested incorporating more Mindful eating content. Participants expressed a preference for group-based, single gender classes led by a qualified and experienced Mindfulness practitioner without co-delivery from community or faith leaders. Participants vetoed online delivery but did not mind digital supplements to the programme. Participants also deemed the proposed research methods to be acceptable.

## Summary of research findings: Feasibility intervention (Chapter 4)

The modelling phase focus groups (Chapter 3) resulted in several recommendations to make a MBI more appropriate for young adult South Asians: single gender classes; that

the course deliverer be experienced and qualified in Mindfulness and not be assisted by any community or faith figure; inclusion of Mindful eating teachings; and reducing the number of sessions. The feasibility intervention included most of these recommendations. Classes were designed to be single-gender and since women showed more interest and some men showed uncertainty over the concept of Mindfulness, it was decided to trial the programme with women. An experienced Mindfulness practitioner was appointed to lead the sessions unaided. Mindful eating was incorporated into the programme with homework and any in-class stressful situation examples being made to be food-oriented. The one recommendation that was not implemented was to shorten the number of sessions. After numerous discussions between the lead researchers and the practitioner, it was decided to keep to 8 sessions. This was also because various research has demonstrated enhancement of the brain's neuroplasticity (increased cortical thickness, increased grey matter density in the brain stem, larger hippocampal and frontal volumes of grey matter) is proportional to time spent practicing (Lazar et al., 2005; Luders, Toga, Lepore & Gaser, 2009; Vestergaard-Poulsen, 2009) and that neural ameliorations are discernible after 8 weeks (Hölzel et al, 2011). Additionally, the practitioner felt it would be unwise to give participants less than the 'full dose' of the programme, as the numerous teachings were deemed equally important when combined as separate skills, subsequently strengthening the effectiveness of the programme. Lastly, using an 8-week programme allows this study to be compared to the majority of other Mindfulness research. The study used a randomised control trial (RCT) design and had 39 participants. The experimental group received the tailored Mindfulness programme and the control group continued life as usual but were offered the option of a

delayed intervention. At post-intervention a focus group with 11 participants of the experimental group was used to explore feasibility and acceptability.

The feasibility intervention was well-received and deemed acceptable by the experimental group participants, similar to the 4 studies (Dreger et al., 2013; Gregg et al, 2007; Schroevers et al., 2013; Teixeira, 2010) in this thesis' systematic review that had assessed acceptability and feasibility (Chapter 2). To elaborate, they found the content useful, relevant and non-conflicting to their religious and cultural lifestyles, similar to research with other ethnic or minority groups (Asian American, African-American, Arabian, Aboriginal Canadian and Latino) (Daley, Pace, Berg, Menon, & Szalacha, 2016; Dreger et al., 2013; Fuchs, Lee, Roemer, & Orsillo, 2013; Hall, Hong, Zane & Meyer, 2011; Thomas, Raynor & Bakker, 2016; Woods-Giscombé & Black, 2010). Though this thesis is concerned with T2D prevention, findings within act as a proof of concept for Mindfulness for South Asians. This caters the opportunity for MBIs to be used for a range of conditions such hypertension, obesity, coronary heart disease, and various mental health issues. Additionally, following acceptability in this ethnic group, Mindfulness can be trialled in other ethnic groups which suffer health inequalities for chronic health conditions where stress-reduction would be beneficial.

Different participants favoured different Mindful skills based on their idiosyncrasies and individual needs, supporting the usefulness of the skills, the decision to maintain an 8-week format and a breadth of taught content. However, participants felt that more Mindful eating content could be included. The deliverer's approach was well received and deemed conducive to successful acquisition and implementation of the Mindful skills. This is

reminiscent of Rixon et al.'s (2016) systematic review assessing the fidelity of health intervention research which noted the importance of competent delivery from intervention deliverers. Despite participants perceiving that self-taught Mindfulness would not have been effective, Cavanagh, Strauss, Forder and Jones' (2014) systematic review investigating self-help Mindfulness interventions suggested that self-help interventions yielded improvements in measures of depression, anxiety and Mindfulness/acceptance. Participants were averse to alternative delivery options such as online or co-delivery with a member of the community, similar to modelling phase (Chapter 3). A systematic review by O'Mara-Eves et al. (2015) looking at the differential effects of various aspects of public health interventions found that the deliverer background (whether community members, peers, health professionals, or educational professionals) did not explain any variation in intervention effectiveness. Therefore, despite delivery from community leaders not being problematic for other ethnic minorities, it is a deterrent to participate for South Asians, rendering this a unique difference.

Participants reported perceived psychological benefits such as reduced stress, anxiety, depressive traits, worry and increased self-compassion. Statistical tests performed on the pre- and post-intervention outcome measures of those who expressed each respective psychological change supported their perceived stress reduction but did not match for anxiety, depression or health-related quality of life. A subsequent result of stress-reduction may have been the objective finding of reductions in systolic blood pressure. This appears to lend support to the stress-related neuroendocrine pathway to illness as it suggests stress to have a physiological effect. Participants stated that they were able to acquire and understand the Mindfulness skills in order to implement them into their lives.

However, their Mindfulness scores did not change at post-intervention. This contrast between perceived and quantitative Mindfulness change was also found in Dreger et al. (2013) (as described in Chapter 2). Additionally, D'Abundo, Sidman, and Fiala (2016) also found no positive changes in post-MBI Mindfulness scores in a student sample. They suggested the rigours of the end of the academic semester may have had an adverse effect on Mindfulness scores, which could also be possible within this thesis' student sample whose post-intervention measures were taken prior to their examination period. It is also possible that the MAAS scale is not sensitive enough to detect acute changes in Mindfulness, thus leading to null findings. MBIs' psychological benefits are also commonly observed in numerous other studies (Goyal et al., 2014; Gu, Strauss, Bond, & Cavanagh, 2015). While discussing improvements in self-compassion and suppression of negative thoughts, participants also conveyed more positive attitudes and perceived behavioural control - constructs of the TPB. Subsequently improvement in these constructs could explain possible behavioural changes (such as utilisation of Mindful skills) that resulted in the ameliorated general mind set participants expressed.

Health behaviour change was mixed. Regarding diet, participants generally reported making slight amendments to their diet, primarily reducing snacking, and felt they had made reasonable progress. Improvements in general diet were slight and mainly entailed reducing snacking. Effectiveness in reducing snacking and emotional eating was also found in a literature review examining MBI effectiveness in obesity-related eating behaviours (O'Reilly, Cook, Spruijt-Metz & Black, 2014). These results are akin to those of Miller et al. (2012) (as reported in Chapter 2's systematic review). O'Reilly et al. (2014) noted that of 3 studies to investigate an MBI's effect on general diet, 2 were successful (Timmerman & Acton, 2001;

Timmerman & Brown, 2012) with the apparent difference due to inclusion and emphasis of Mindful eating content. Such results dissipate Wansink's (2016) contention that Mindful eating is not as effective as minimising subconscious cues as participants were able to resist unhealthy snacks without having to minimise encountering them. Accordingly, results from this thesis are similar to literature in that the MBI elicited changes in emotional eating and snack reduction however there were only slight changes in general diet as this MBI had comparatively less Mindful eating content than studies which elicited positive general diet improvements.

For physical activity, the present intervention did not have any effect. Physical activity levels and sedentary time did not change though 2 participants reported perceptions of improved physical activity and other participants expressed intentions to make changes. As per the TPB, these intentions may lead to later behaviour change and increases in physical activity. The lack of change in physical activity may be attributed to the fact the intervention did not focus on making positive changes in this regard or explicitly disseminate practical advice or incorporate exercises (other than some light Hatha yoga). As follow-up measures could not be conducted, it was not possible to investigate if these intentions resulted in greater physical activity. This thesis is not alone in finding such results. For instance, Baker, Francis, Soares, Weightman and Foster (2011) conducted a review of community wide (non-Mindfulness) interventions for promotion of physical activity and concluded that the reviewed interventions had mixed effectiveness for physical activity, more specifically, the more methodologically robust studies did not improve measures of physical activity. This highlights the complex nature of eliciting physical activity change especially when it is taken into consideration that this study did not include physical activity

components or contextualise Mindfulness teachings towards physical activity. As literature cited in chapter 1 has established, not all determinants of physical activity are within an individual's control, as macrosocial factors can influence physical activity (Kumanyika et al., 2012; Schwarz, 2011). Considering Dunkley et al.'s (2014) meta-analysis finding that greater treatment adherence led to greater reduction of T2D risk factors, it is possible that the low attendance rate in the present study may have contributed to a lack of effectiveness for some outcomes.

Participants also found the programme to be feasible, finding the sessions well-timed, and the content feasible to implement into their lives. Results indicate that a future full-scale trial is warranted. As stress reduction was the most commonly self-reported programme effect and perceived by participants to have facilitated some dietary and coping benefits for some participants, stress (measured by the DASS21 scale) would be recommended as the primary outcome measure. Creswell and Lindsay (2014) and Whitebird et al. (2009) (as discussed in Chapter 2) suggested Mindfulness may facilitate better coping and improve health behaviour by reducing stress and attenuating physiological stress responses (such as through excessive activation of the neuroendocrine and neuro immunological pathways). Results suggest this contention may be plausible. However, as it was not explicitly operationalised and tested, and due to a small sample, this cannot be confirmed within the current thesis.

Participants in the post-intervention focus group echoed the opinions of participants in the modelling phase focus groups (Chapter 3). More specifically both sets of participants felt South Asian adults who were of the older generation, likely to be first generation

migrants, and less accultured to British or Western life, were less likely to engage in an unfamiliar practice such as Mindfulness. This was perceived to be especially true if they were to learn Mindfulness originates from Buddhism, a religion likely to not be the one they adhere to and thus may be perceived as incompatible to their belief system. Both sets of participants felt the use of community or faith leaders, co-participation with family members or friends would help entice them to partake in an MBI. Kumanyika et al. (2012) had noted that such measures were important for access to, and trust from, some minority groups (Chapter 1). In terms of the TPB, it may be that witnessing other South Asians attend may alter their 'subjective norm' regarding what is permissible and non-conflicting with their religion and/or culture.

## Limitations and directions for future research

This thesis advocates the use of Mindfulness as a diabetes prevention strategy in young adult South Asian women. It has found that Mindfulness is culturally acceptable and feasible to implement within this sample. Additionally, findings suggest Mindfulness' stress-reductive capabilities may facilitate better coping, improved diet with intentions formed among some participants to improve physical activity. Stress-reduction may also reduce activation of neuroendocrine and neuroimmunological pathways that are associated with increased T2D risk, ultimately reducing T2D risk. Nonetheless, this research is not without limitations. Furthermore, it is important to acknowledge and address limitations to facilitate more rigorous future research in this area of study.

The systematic review examining the effectiveness of MBIs on physiological and psychological complications in adults with diabetes (Chapter 2) consisted of studies of

variable quality. The average score on the Joanna Briggs Institute (JBI) critical appraisal checklist was 6.3 (out of 11 maximum indicating highest quality). Therefore, more robust studies need to be conducted and published, particularly randomised controlled trials (RCT). A meta-analysis could not be conducted due to the variance and lack of consistency of outcome measures. Therefore, a narrative approach was utilised. Additionally, most papers did not measure Mindfulness as an outcome measure to gauge possible changes in Mindful trait or ability. Hence, a standardised core outcome set is suggested to be established for future studies in the topic area of Mindfulness for diabetes. Two suggested primary outcome measures for a future large-scale trial are stress and Mindfulness. Finally, some physical health effects were not sustained at follow-up in those studies where a follow-up assessment was conducted. As the studies included in the systematic review did not record whether participants continued Mindful practice, it remains unclear whether effects not sustained at follow-up were due to participants not continuing their practice, or a potential diminishing Mindfulness effect over time. Future research should include a measure of Mindful practice and should also include a follow-up assessment to examine whether Mindful practice is continued at follow-up.

One limitation of the modelling phase focus groups (Chapter 3) was that by having a male focus group facilitator, this could have inhibited female participants from disclosing information that be have been considered sensitive or personal. An example of a discussion point that may have been affected was if/whether South Asian women might feel uncomfortable attending mixed gender classes. Future studies exploring this issue may benefit from having a same gender facilitator leading focus groups. Additional limitations include the fact that the group dynamic of focus groups may inhibit expressions of opinion

that are perceived 'different' from co-participants' or 'undesired' by the researcher (Smithson, 2000). This could be addressed in future research by using individual interviews in addition to focus groups, though not necessarily with the same participants. Another limitation of the modelling phase was that the sample was generally highly educated and therefore their responses may not be generalisable to members of their community who are less educated. Future research can target the recruitment and participation of South Asians of lower socio-economic status, less educated and acculturated backgrounds to investigate whether their reactions to a proposed MBI would reflect that of the present sample.

A limitation of the feasibility intervention (Chapter 4) was its relatively low attendance rate (53.8%). While participants expressed they enjoyed the programme, it remains possible they were reluctant to disclose a lack of motivation or willingness to attend all sessions. Another critique was of the sample being comprised of predominantly higher educated women. The CEB framework suggests that people with less education, of lower socioeconomic status and less acculturation are more susceptible to health inequalities. Weaver, Lemonde, Payman and Goodman (2014) found that economically 'high-resource' individuals were more motivated and able to maintain healthy diets. As such, this sample is not representative of all UK-residing South Asian young women, especially those who are more socially disadvantaged. Additionally, the small sample size precludes determining efficacy of the intervention and limits the generalisability of the findings. However, this was intentional, as the aim of the PhD research was not to conduct a full-scale RCT with a large sample but examine the feasibility of Mindfulness in a relatively small sample of South Asian young women.

Spijkerman and Bohlmeijer's (2016) systematic review and meta-analysis on online Mindfulness-based interventions in improving mental health suggested online MBIs can potentially improve mental health outcomes (especially stress). Thus, it was considered that online delivery could be acceptable and feasible in this population. However, participants in both the modelling phase focus groups (Chapter 3) and the feasibility intervention post-intervention focus group (Chapter 4) expressed concerns with an intervention delivered exclusively online. However, both sets of participants felt face-to-face delivery might benefit from being supported or supplemented by some online content. Thus, a 'blended' intervention that integrates face-to-face and online learning is worth exploring in future research, particularly as this has been shown to be an effective pedagogical approach in non-Mindfulness applications (Glogowska, Young, Lockyer, & Moule, 2011; Shaw, Long, Chopra & Kerfoot, 2011; van der Vaart et al., 2014). Wentzel, van der Vaart, Bohlmeijer, and van Gemert-Pijnen, (2016) recommended that blended approaches ensure both modalities are used appropriately depending on participant needs, preferences and capabilities. Thus, future research could investigate a blended approach where the Mindfulness classes are supplemented to a greater degree by some form of online learning.

A limitation of the data reported in Chapter 5 was that qualitative data were not available for all experimental participants, as participants missed either the post-intervention focus group or the post-intervention dietary interview. This would mean that some unique individual insights may have been missed. Therefore, although the available data provided interesting insights into how perceived and objective programme effects compared, it did not account for the full intervention group. Future replications could integrate questions about perceived programme effects at the end of the post-intervention

dietary interviews. In the instances that this happened spontaneously, it catered for interesting data. The present study was limited to predominantly focus group data, which can have the limitation of participants not expressing certain views that they feel uncomfortable to in front of co-participants. Notably, analyses on the entire sample (Chapter 4) found beneficial Mindfulness effects in anxiety and depression whereas analyses in Chapter 5 on a smaller subset of participants did not, which is not surprising due to the low statistical power of a smaller subset. An oft cited impediment to participants enhancing their diet was the fact that their mothers were responsible for the whole family's meals, reducing their control (Chapter 5). It may be worth exploring the implementation of a family intervention due to the family-oriented eating practices within South Asian culture. In doing this, programmes would be intervening at the individual and family levels, so a future research study could investigate whether this will garner more success in eliciting healthy behaviour changes.

It is recommended that a future full-scale study should conduct follow-up assessments of outcome measures 1-year post-intervention (as in Hartmann et al., 2012), in addition to immediate post-intervention measures, to investigate if Mindful practice is continued and whether effects are sustained over the longer-term. Future research could also explore the feasibility of delivering a similar programme to other ethnic minority groups, particularly those at higher risk of developing diabetes, as the recruitment process revealed some interest from individuals who are from middle Eastern, South-East Asian and East Asian backgrounds.

## Implications for policy and practice

Mindfulness is used in clinical settings within the UK National Health Service (NHS), predominantly for psychological illness (Kuyken et al., 2015). However, before it can be readily applied to diabetes prevention and treatment, more research (in the form of full-scale trials) is required to validate its effectiveness in ameliorating psychological and physiological health outcomes. The findings from the systematic review (Chapter 2) and feasibility study (Chapter 4) support Mindfulness' psychological benefits, and thus suggest it may be advantageous to continue the current clinical use of Mindfulness for psychological distress. After full-scale trials are conducted, it may be possible to utilise Mindfulness in other applications such as coronary heart disease, obesity, and hypertension.

Both the modelling phase focus groups (Chapter 3) and the feasibility study post-intervention focus group (Chapter 4) highlighted various macrosocial factors that impinged on participants' perceived ability to improve their physical activity or diet-related behaviours. Examples included time constraints, food unavailability, cost, limited shelf-life of foods, cooking ability and sociocultural influences. While individual-focused interventions such as MBIs may improve individuals' propensity to better cope with stress and subsequently could potentially facilitate making healthy changes to diet and physical activity, they cannot change distal factors that may impede personal change.

Hence it is also imperative for policy makers to adapt environments to be more conducive to increasing physical activity and making it easier and more affordable to make healthy dietary choices. If environments are primed to facilitate healthier lifestyles, then individuals are more able to use Mindful skills to focus and maintain their attention towards

health-conscious choices. For promoting increased physical activity, this would include increasing the availability and accessibility of leisure centres; increasing funding for resources for leisure centres; the retention and maintenance of urban park spaces; and the pedestrianisation of city and town centres. For promoting healthier eating behaviours and dietary choices, this could include providing food stamps or subsidies to those of lower socio-economic status, and utilising advertising and media (including internet media) to positively change the information environment for better diet (Bowen, Barrington & Beresford, 2015). McGill et al.'s (2015) systematic review found that ecological interventions that focused on food pricing were most effective in minimising socio-economic inequalities. Hawkes et al.'s (2015) review of food policies for obesity prevention and noted that food policies should prioritise creating environments that facilitate people to discover healthy food preferences and also help groups that suffer inequalities to overcome barriers for each groups' unique healthy eating preferences. Once people can afford or are aware of healthy alternatives, they can use Mindfulness to help maintain healthy food and activity choices rather than habitual unhealthy decisions. Mindfulness can be more successful in fostering a healthy lifestyle as long as macrosocial factors support the availability of healthier options.

Considering Kumanyika et al.'s (2012) CEB framework, entities at the 'Ethnic minority community' level can also contribute to remedying the issue of low physical activity levels in South Asians (evident at baseline in Chapter 4). For instance, Chelsea football club have run their 'Asian football' scheme designed to increase Asian participation in football in West London (Chelsea Football Club, n.d.). Unfortunately, Chelsea remain the only professional British club to run such a scheme targeted at South Asians. Kumanyika et al. (2012) suggested a variety of upstream changes to help address macrosocial barriers to healthy

diet. For example, policy makers can facilitate the accessibility and affordability of healthy foods in deprived areas. Fiscal measures can also be implemented against high energy foods, making them less affordable, while simultaneously reducing the cost of healthier foods such as fruits, vegetables, and whole grain products. At the 'Ethnic minority community' level, Kumanyika et al. suggested culturally appropriate information and skills training for healthy diets. Mead, Gittelsohn, Roache, Corriveau and Sharma (2013) implemented a multi-level community-based intervention among the indigenous population in the Canadian Arctic. It involved an environment modification component that entailed increasing healthy food availability in community stores, cooking demonstrations, dissemination of information through various media mediums, and interactive informative taste tests throughout the community or at point-of-purchase. Compared to control communities, experimental participants had higher healthy food intentions and higher food-related self-efficacy. Therefore, ecological approaches to improving diet can be beneficial in ethnic minority populations. Specifically, by making the environment conducive to maximising Mindfulness' effects, with more healthy food available and affordable, individuals can utilise Mindfulness skills to focus their mental faculties towards the healthier alternatives. Work sites and public spaces could also reduce the availability of unhealthy foods in vending machines or food-catering stations as Wansink (2016) suggests. Hannon, Bowen, Christensen and Kuniyuki (2008) noted places of worship had a high capability to successfully disseminate health promotive messages for diet. Based on findings in this thesis, this could be facilitated through places that are trusted such as community centres or places of worship.

## Conclusions

To conclude, the studies within this thesis lend support to the existing body of literature for the capabilities of Mindfulness in alleviating psychological outcomes, particularly stress. Mindfulness also appears to have a small effect on improving general diet and may elicit intentions to improve physical activity. More research is necessary to confirm Mindfulness' effectiveness in these regards, nonetheless Mindfulness bears promise as an additional disease management tool for people with diabetes, or as a diabetes prevention tool in those at high risk. The findings from this thesis leaves scope for future research to further investigate Mindfulness' utility in diabetes prevention through the use of robust methodologies. This thesis, through contextualising results with an ecological model, highlights the fact that while individual-focused interventions such as MBIs have their uses in addressing intra- and interpersonal factors impeding healthier lifestyles, they cannot change macrosocial factors. Thus, this thesis serves as a reminder that health promotive policies and strategies within the community must be implemented to help prevent the rising prevalence of diabetes in the South Asian population in the UK.

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# Appendices

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- Appendix B: Modelling phase focus group schedule
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- Appendix E: Diet-focused interview schedule
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# Appendix A: Data extraction form

**Authors:**

**Year:**

**Journal:**

**Study Method:**

Study design (RCT,
quasi-experimental or prospective cohort):

Type of mindfulness-based intervention
(e.g. MBCT, MBSR, Mindful eating or other):

Sample ethnicity:

Setting:

**Groups (N):**

Group A: (N= )

Group B: (N= )

Group C: (N= )

**Findings and conclusions:**

Change in measured Diabetes outcome (e.g. glycaemic control, albuminuria level):

Change in secondary physical or psychological outcomes (if measured):

# Appendix B: Modelling Phase focus group schedule

Focus group moderator will introduce himself and his assistant and provides information on general housekeeping issues. He will then present participants with an overview of a typical 8-week Mindfulness programme before posing any questions.

Following this overview, the following questions will be posed to participants:

1. What are your initial thoughts about the programme?
   Additional probe: Do you think it would it be helpful to people of a South Asian background in changing their eating and physical activity behaviours to help reduce risk for diabetes?

2. The concept of Mindfulness has been adapted from Buddhist practices. As such, does this affect your opinion of its applicability to you or other young South Asian adults?
   Additional probe: Do you think the fact that it is derived from Buddhist practices will make people think it cannot be applied to non-Buddhists?

3. What might need to be done to revise or tailor a Mindfulness programme to ensure it is culturally appropriate for you or other young South Asian adults?
   Additional probes: Would you change its name?

   Would you change the duration (number of weeks) or frequency (number of days) of the programme?

   How long should each session be?

4. Usually a trained Clinical Psychologist or Mindfulness practitioner delivers the programme. For a South Asian audience, who should deliver it?
   a. Should it be delivered in conjunction with a community leader?
   b. Should it be delivered in conjunction with a religious/faith leader?

5. What are the most important changes to make when considering this programme for South Asians?
   a. Should it be adapted for different sub groups?
   b. Should classes be offered separately to men and women, or would mixed gender groups be acceptable?

6. Usually this type of programme is delivered face-to-face. Would an electronic online delivery model be acceptable or even preferable?
   a. For example, having a weekly online video to practice to?
   b. Do you think it would work as a mobile app?

7. Would this be something that you would be willing to try out if offered to you?
   a. [Explain RCT process], would you mind being randomised? Would they want a delayed intervention?
   b. How would they feel being assessed on either physical activity (accelerometer/self-report), dietary, stress/anxiety depression and Mindfulness measures?
   *c.* Would they prefer to fill in these measures in person on paper or online?

# Appendix C: Mindfulness overview document

- Mindfulness is a psychological treatment adapted from Buddhist practice

- It is a way of paying attention– being deeply attuned to yourself, your environment and those around you from moment to moment to manage thoughts
    - We are always explaining the world to ourselves, and we react emotionally to these explanations rather than to the facts

    - These ideas soon get set in concrete as reference points for the future – regardless of how far they are from representing the truth of the here and now

    - The realisation that thoughts are not facts is vitally important to us

    - Intellectualising and analysing doesn't work when low mood has been triggered. Remembering that thoughts are 'just thoughts' is a wiser strategy

    - An effective response is to see thoughts clearly, with awareness. We then remain free to choose which thoughts are appropriate, wise, healthy; which to listen to, believe and possibly act on; and which to simply recognise as unhealthy and let pass

- In paying attention this way, individuals give themselves 'mental space' enabling them to react to situations more positively and appropriately

- Mindfulness has had successful applications in many mental health areas (e.g. depression, stress & anxiety)

- Increasingly extended to physical health applications (e.g. cancer, chronic pain)

- It's believed that the psychological state of, or stresses that come with, illnesses can become a barrier to self-management (incl. physical activity, healthy diet, medication adherence)

**<u>Mindfulness programme structure</u>**

- 8 Weekly sessions
- Each session lasts 90-120 mins
- Each session is self-contained aiming to teach Mindfulness, how to be aware and non-judgemental
- Sessions tend to use various teaching techniques to cater to different learning styles

An example of a Mindfulness programme:

| Week | Session overview |
|---|---|
| 1 | **Introduction**<br>• What is mindfulness?<br>• The Raisin/Orange Exercise: drawing us away from automatic pilot<br>• Breathing space exercise<br>• Compassion exercise: What do I appreciate?<br>• Resources (audio, online)<br>• Home practice: 1) Eating mindfully 2) Breathing space |
| 2 | **Mindfulness in daily life**<br>• Awareness of a routine activity e.g. remove shoe: drawing away from automatic pilot<br>• Mindfulness and spirituality (see book: 'Into the Silent Land')<br>• Home Practice: 1) Daily practice of a Body scan and a short breathing space. 2) Compassion exercise: Keep a daily record of an activity you enjoy |
| 3 | **The Breath**<br>• Mindfulness of the breath<br>• Home practice: 1) daily mindfulness of the breath, everyday activity 2) Compassion exercise: Keep a daily record of an unpleasant activity |
| 4 | **Body Scan**<br>• Compassionate Body Scan<br>• Home practice: to use the body as a mindfulness anchor in irksome situations |
| 5 | **Mindful Movement**<br>• Mindful walking and/or movement<br>• Home practice: 1) Mindful walking/movement 2) Compassion exercise: breathing space practice when feeling troubled |
| 6 | **Thoughts are not facts**<br>• Seeing thoughts as creations of the mind<br>• Working wisely with unhappiness and depression<br>• How can we relate to our thoughts differently?<br>• Home practice: Mindfulness of hearing and thinking<br>• Home practice: 1) Noticing thoughts, labelling them and deciding how to relate to them. 2) Short daily breathing space |
| 7 | **Compassion**<br>• Introduction to compassion<br>• Compassionate breathing space<br>• Home practice: "Just like me" – using compassion for others as a mindfulness activity |
| 8 | **Endings**<br>• Thinking about endings<br>• Inviting difficulty practice<br>• Maintaining progress (working in pairs)<br>• Reflection on course e.g. what will I take away? What could we do differently?<br>• Final breathing space – living in the moment |

## Appendix D: UK diabetes and diet questionnaire

| Think about your diet over the **last MONTH**. Please tick or circle the answer that best applies to you. | Never or very rarely | Once a week or less often | 2- 4 times a week | 5 - 6 times a week | 1 – 2 times a day | 3 or more times a day | **Score** |
|---|---|---|---|---|---|---|---|
| 1. How often did you eat a portion of vegetables?<br>-Include fresh, tinned and frozen vegetables.<br>A portion is 80g (see the back sheet for what this looks like). | | | | | | | |
| 2. How often did you eat a portion of fruit?<br>- Include fresh, frozen, tinned and dried fruit. Do not count fruit juices.<br>A portion is 80g (see the back sheet for what this looks like). | | | | | | | |
| 3. How often did you eat a cake, a sweet pastry like a Danish pastry, a donut or a sweet biscuit? | | | | | | | |
| 4. How often did you eat some sweets or a bar of chocolate? | | | | | | | |
| 5. How often did you drink sugary drinks?<br>- Include non-diet fizzy drinks, squashes, mixers, energy drinks, fruit juices or coffee, tea or other hot drinks with sugar or flavoured syrups. | | | | | | | |
| 6. How often did you use full-fat spread (butter or a full fat margarine) on your bread, potatoes or vegetables? | | | | | | | |

| Think about your diet over the **last MONTH**. Please tick or circle the answer that best applies to you. | Never or very rarely | Less than once a week | Once a week | 2 – 5 times a week | Nearly every day or daily | Twice or more per day | **Score** |
|---|---|---|---|---|---|---|---|
| 7. How often did you eat full-fat cheese?<br>-Include cheese in sandwiches, on biscuits, in sauces and when used as a topping.<br>-Full fat cheeses include hard cheeses like cheddar, blue cheeses and soft cheeses like brie or cream cheese or full-fat goat cheeses. | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 8. How often did you eat processed meat?<br>-Include processed meat in sandwiches, ready meals and if eaten as a snack.<br>-Processed meat includes foods like bacon, ham, spam, sausages, salami or chorizo. | | | | | | | |
| 9. How often did you eat savoury foods like crisps, corn chips, corn puffs, salted nuts or Bombay mix? | | | | | | | |
| 10. How often did you eat a savoury pastry?<br>-Think about food like pies, pasties, samosas, sausage rolls or vol-au-vents. | | | | | | | |
| 11. How often did you eat 'fast foods' from a take-away or in a restaurant?<br>-Think about foods like burgers, fish and chips, fried chicken, donor kebabs, pizza, fried rice or curries with cream or ghee. | | | | | | | |
| 12. How often did you eat pudding or dessert, apart from fruit, with your meals? | | | | | | | |
| 13. How often did you drink alcohol? | | | | | | | |
| 14. How often did you eat oily fish?<br>-Think about fresh or tinned salmon, trout, sardine, mackerel, pilchards, herring or red mullet, or fresh tuna. | Never | Less than once a week | Once a week | Twice or more per week | | | |
| Think about your diet over the **last MONTH**. Please tick or circle the answer that best applies to you. | Never or very rarely | Less than once a week | Once a week | 2 – 4 times a week | 5 - 6 times a week | Daily | **Score** |
| 15. How often did you have 3 or more regular meals in a day?<br>-Include light meals like a sandwich or a soup and roll.<br>-Don't include snack times when you ate only a biscuit or cake or a piece of fruit or vegetable sticks or a packet of crisps or piece of cheese. | | | | | | | |
| 16. How often did you eat breakfast (more than just a drink or one or two sweet biscuits) within about 2 hours of waking? | | | | | | | |
| 17. How often did you 'snack' or 'pick' | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| on high-fat or high-sugar foods between meals?<br>-Think about food like biscuits, chocolate, cakes, crisps, nuts and cheese. | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 18. How often did you eat a portion of bread?<br>-Include bread in sandwiches and wraps.<br>-A portion of bread is 1 slice of bread, a bread roll, half a baguette, a bagel, a tortilla wrap, a small naan, a chapatti or a paratha. | Never or very rarely | Once a week or less than once a week | 2- 6 times a week | 1 – 2 times a day | 3 – 4 times a day | More than 4 times a day | |
| 19. If you ate bread how often did you choose higher fibre breads?<br>-Breads that are high in fibre include wholemeal, granary, multi-grain or rye breads.<br>-If you follow a gluten free diet include high fibre gluten free breads. | All of the time | Most of the time | About half the time | Less than half the time | Never | I did not eat bread | **Score** |
| 20. How often did you eat a bowl of breakfast cereal, porridge or muesli? | Never or very rarely | Less than once a week | Once a week | 2 – 5 times a week | Nearly every day or daily | Twice or more per day | |
| 21. If you ate breakfast cereal how often did you choose higher fibre cereals?<br>-Cereals that are high in fibre include porridge, muesli, Weetabix, Shredded Wheat, multi-grain cereals and wheat or oat bran cereals. | All of the time | Most of the time | About half the time | Less than half the time | Never | I did not eat cereals | **Score** |
| 22. What type of milk did you usually use, if any? | Full fat (cow, goat or sheep) | Semi-skimmed (cow, goat or sheep) | Skimmed (cow, goat or sheep) | Sometimes full fat, sometimes skimmed or semi skimmed | Soya, oat, rice or other non-dairy milk. | None | **Score** |
| 23. Are you concerned about your weight? | I am not concerned about my weight | I am a little concerned about my weight | I am moderately concerned about my weight | I am very concerned about my weight | | | |

24. On a scale of 1-10 (with 10 being most important), how important is it to you to change your diet? Answer below.

    _____

25. On a scale of 1-10 (with 10 being most confident), how confident are you that you could change your diet? Answer below.

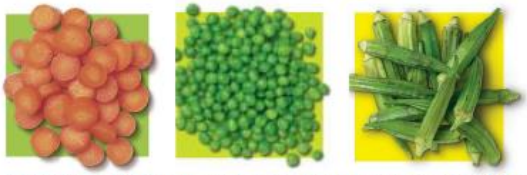
    _____

**Question 1: How often did you eat a portion of vegetables?**

A portion of fresh, raw, tinned and frozen vegetables is 80g

These are some examples of what counts as a portion:

2 florets of broccoli or cauliflower or 4 tablespoons green, leafy vegetables



3 heaped tablespoons of cooked vegetables like carrots, peas, okra or courgettes

A dessert or cereal bowl of salad

7 cherry tomatoes

**Question 2: How often did you eat a portion of fruit?**

A portion of fresh, tinned, frozen or cooked fruit is 80g

These are some examples of what counts as a portion:

1 medium fruit like a banana, apple, orange, pear, peach or nectarine

2 small fruit like plums or satsumas

10 chunks of tinned pineapple

A handful of grapes or berries

A 5cm slice of a large fruit like a melon or pineapple

A tablespoon of dried fruit

**Portion Size Guide**

# Appendix E: Diet-focused interview schedule

## Dietary assessment interview schedule (for both experimental and control group)

Pre- and post-intervention

1. Just to start, do you have dietary requirements such as being vegetarian or vegan or requiring Halal food?

2. Do you plan your meals ahead?
   a) If so how far ahead do you plan meals?
   b) If not, how do you go about thinking of what to eat?

3. How would you describe your ability to control food portions?

4. Are you able to maintain a healthy diet?
   a) If so, how? Could you list any strategies?
   b) If not, what are the barriers?

5. Does anything cause you to eat unhealthily or stop eating healthily?
   a) For example stress or the influence of others?
   b) If the influence of others, do you find it hard to turn down food when offered due to the need for politeness?

6. Do you find yourself snacking?
   a) If so, how often?
   b) What do you usually snack on?
   c) Do you find it difficult to stop snacking once you have started?

7. When eating, do you find yourself able to pause and enjoy the food in terms of flavour and texture?

   <u>Post-intervention questions only</u>

8. Following the programme, have you changed your diet or any aspect of it?
   a) do you find yourself eating more/less of certain foods and drink?

9. Why did you make these changes?

# Appendix F: Acceptability & feasibility focus group schedule

1. What were your thoughts about the programme?
   PROBES:

   a. Do you think there is a demand for this kind of programme from South Asians?
   b. In what ways, if any, do you think this programme would be helpful to other people of a South Asian Background?
   c. What did you like best about the programme?
   d. What did you like the least?

2. Which, if any, of the Mindful practices would you be willing to keep practicing in your life now that you have completed the programme?
   PROBES:

   a. Why would you practice the techniques you've identified? What were the results of this practice?
   b. Why would you not practice other techniques?

3. Did the training result in any changes to your life or lifestyle (physical activity & diet)?
   PROBES:

   a. How able do you feel to implement healthy lifestyle choices now compared to before the training?
   b. How, if at all, did it affect your management of moments of stress, anxiety or depression?
   c. Were any of the techniques particularly effective (or perhaps otherwise)?

4. What were your thoughts about the practitioner and delivery style?
   PROBES:

   a. The programme was delivered to you by a trained Mindfulness practitioner. Did you find a person of this background appropriate?
   b. How effectively do you feel she taught the concepts? Did she make it easy to understand so that they can have results?
   c. Should it have been delivered in conjunction with a community leader or a religious/faith leader?
   d. Is there anything else about the person delivering the programme that you'd like to tell us? Did her training yield any results, if so describe them please?

5. What, if any changes, would be important for us to make when delivering this programme to South Asians?
   PROBES:

   a. Should it be adapted for different sub-groups (such as Pakistanis, Bangladeshis, Indians etc) going forward?
   b. Should classes be gender-segregated or mixed? What about ages of participants being mixed, or should classes be targeted to narrow age groups (e.g., 20-30 yrs, 50-60 yrs, etc)
   c. Can you suggest anything that may make you learn the techniques better? i.e.

change of format, or anything else?

6. What changes would you make to this programme?
   PROBES:

   a. Is there anything that would help you learn the techniques better and see more results?
   b. Would you change the length of the programme?
   c. What were your thoughts on the duration of sessions?
   d. What did you think about the timing of sessions?
   e. What did you think about the venue?

7. This programme was delivered face-to-face, what did you think about this mode of delivery?
   PROBES:

   a. Do you feel an electronic form of delivery would be acceptable and effective? For example, a weekly online video to practice to?
   b. What are your thoughts about it being delivered using a mobile app?
   c. How, if at all, would alternate modes affect the effectiveness of the programme in terms of learning, applying and seeing results?

8. Is there anything else you would like us to know about the programme?

## References

England, C. Y., Thompson, J. L., Jago, R., Cooper, A. R., & Andrews, R. C. (2017). Development of a brief, reliable and valid diet assessment tool for impaired glucose tolerance and diabetes: the UK diabetes and diet questionnaire. *Public health nutrition, 20*(2), 191-199.