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ORIGINAL PAPER

Feasibility and Efficacy of an Adapted Mindfulness-Based Intervention (MBI) in Areas of Socioeconomic Deprivation (SED)

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Abstract

Prolonged exposure to 'toxic stress' caused by financial hardship and social exclusion can result in reduced well-being, increased risk of illness and impaired cognitive function and can negatively impact the physiological processes underlying ageing. Evidence suggests that mindfulness-based interventions (MBIs) may reduce stress and improve well-being in clinical and non-clinical populations, and recent studies indicate they may also help address well-being-related effects of poverty. This study aimed to evaluate the feasibility of delivering an adapted MBI training to adults living with the psychosocial stress caused by poverty and its effectiveness in improving participants' well-being. In this mixed method, non-randomised waitlist-controlled feasibility pilot study, 40 adults ($n = 20$ in the training group) from regeneration areas in Scotland earning less than the Living Wage completed the adapted MBI. Delivery proved feasible, even though, as with previous studies on psychosocial interventions in socioeconomically deprived (SED) areas, the rate of participant attrition from recruitment ($n = 107$) to completion ($n = 40$) was high (58%). The results showed significant increases in well-being post training for the training group only ($p < 0.001$). No changes in mindfulness were found in either group. Further qualitative analyses suggested a possible shift in participants' conceptualisation of well-being from being difficult to manageable or workable. These results indicate that MBI training can be feasibly delivered within SED communities and potentially improve the well-being of course participants. The practicalities of developing accessible MBIs for those living in areas of multiple deprivation are discussed.

Keywords Mindfulness · MBI · Socioeconomic deprivation · Poverty · Well-being

Introduction

Mindfulness-based interventions (MBIs), namely mindfulness-based stress reduction (MBSR) and mindfulness-based cognitive therapy (MBCT), combine basic Buddhist philosophy and mindfulness practices with the modern psychological understanding of stress and cognitive processes (Chiesa and Malinowski 2011). They are structured in 8-week group programmes (Kabat-Zinn 1982), where participants learn to pay attention non-judgementally and develop metacognitive awareness of present moment experience (Kabat-Zinn 1990). A recent review highlighted the potential of meditation-based programmes in reducing, and partially reversing, some of the negative neurocognitive effects of severe stress (Fox et al. 2014). One of the most potent long-lasting stressors is the 'toxic stress' of poverty (Eisenberger 2012), which is known to alter brain structure and cognitive function (Davidson and McEwen 2012; Kim et al. 2013; Noble et al. 2012) and is associated with mental illness (Galea et al. 2011), substance abuse (Ahern et al. 2008) and higher risk of suicide (Dupéré et al. 2009).

Relative poverty, as defined in most Organisation for Economic Co-operation and Development (OECD) countries, means living on less than 60% of average household income after compulsory deductions (Chen and Ravallion 2010; Palmer 2015). A strong positive correlation between debt and poor physical and mental health has been found (Richardson et al. 2013). Socioeconomic success, in contrast, is associated with economic growth and upward social mobility. However, economic crises, stock market bubbles and student loan poverty are causing a decline in both growth and

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upward mobility. This has affected the earning power and opportunities for the socioeconomically disadvantaged (Mcknight 2015). This trend is further magnified by the fact that families with a higher socioeconomic status (SES) have a privileged access to education and connections. It leads to 'opportunity hoarding' (Reeves and Howard 2013) by those from more economically privileged backgrounds (Kenealy 2015) and fewer employment opportunities for talented individuals from low SES backgrounds. When entrenched, it results in the '2½ percent of every generation' stuck in a lifetime of disadvantage, harm and genetic change (Cabinet Office 2006), which may affect brain development and long-term health for several generations (Rechavi et al. 2014; Shonkoff and Garner 2012).

Initial evidence suggests MBIs may reduce stress and improve well-being in both clinical and non-clinical populations, even though the strength of the cumulative evidence seems to vary across reviews and meta-analyses. For example, Grossman et al.'s (2004) meta-analysis of clinical quantitative studies ($N = 20$ studies) found that MBIs significantly improved both mental and physical health-related outcomes. However, a more recent review and meta-analysis of 47 clinical and non-clinical studies suggested moderate reductions in anxiety, depression and pain, and low effects on reduction in stress- and mental health-related quality of life (Goyal et al. 2014). Several researchers have highlighted the complexity of the relationship between mindfulness and well-being (e.g., Chambers et al. 2009), including the possible contribution of other variables impacting on well-being (Carmody and Baer 2008). For example, Malpass et al. (2012) identified a shift in participants' self-identity and the way they related to their illness after mindfulness training. This shift maps onto a dimension of well-being known as well-being 'within illness', which refers to the awareness and ability to flexibly adapt to the continual changes in the experience of illness (Carel 2009; Doran 2014). Doran (2014) found that the acceptance which is cultivated through mindfulness training is key to improving well-being.

Nevertheless, some studies suggested that MBI training, and an improvement in mindfulness as such, can enhance well-being—for instance, Nyklíček and Kuijpers (2008) found reductions in stress and vital exhaustion, as well as improvements in positive affect and quality of life in a community sample of adults with distress. Importantly, improvements in mindfulness seemed to mediate the reductions in perceived stress and improvements in quality of life in this study. Furthermore, Eberth and Sedlmeier's (2012) meta-analysis ($N = 39$ studies) on the effects of MBIs on various psychological variables found MBIs to have a strong positive effect on subjective well-being (SWB). In contrast, however, Wenzel et al. (2015) found that the association between MBIs and SWB depended on variables such as neurosis and training/test group composition (i.e., whether the sample consisted of university students or employed participants).

Early reports of the health benefits of MBIs for SED individuals are anecdotal (Kabat-Zinn 2004), with little definitive evidence (only approx. 12 studies currently available). Perhaps the earliest of these was Roth and Creaser's (1997) evaluation of their income-based adapted MBSR programme for SED patients in an inner city health centre. The study did not include a control group and the dropout rate was high (60%). Roth and Robbins (2004) replicated and expanded the study and remedied shortcomings by adding a control group and 12-month follow-up. The completion rate was 66%, and they found improvements in aspects of quality of life, including psychological distress and well-being and social and emotional functioning, in addition to a trend towards improvements in mental health.

In a more recent study, Hick and Furlotte (2010) evaluated radical mindfulness training (RMT), based on MBSR, to improve well-being for the *severely* economically disadvantaged in a community-governed not-for-profit health centre. Their programme aimed to change participants' ($N = 8$) cognitive and affective judgments of self, others, institutions and societal structure. Despite this being a small and uncontrolled study, results were encouraging and course evaluations positive. Specifically, self-reports of improvements in self-compassion and satisfaction with life were found after the course. Qualitative themes suggested reperceiving, a shift in perspective on cognitions and self (see Shapiro et al. 2006), after the training, made participants' difficulties and attitudes towards others, institutions and societal structure less reactive. However, even with participant-led course adaptations, cash payments, funded travel and childcare, the dropout rate was high (64%), suggesting that this is an issue which needs further consideration in future courses and studies with this population.

Another set of studies explored the potential of MBIs in increasing the well-being of women in various SED environments. Abercrombie et al. (2007) found in their adapted, MBSR-based study with SED women who had abnormal pap smears, that after mindfulness training, the women were more likely to attend consultations due to reductions in anxiety. Vallejo and Amaro (2009) developed Mindfulness-Based Relapse Prevention for Women (MBRP-W), and in a study with African American and Latino women of low SES from mixed outpatient and residential substance abuse programmes, they found that the course had high levels of satisfaction and acceptability for those who attended ($N = 60$), but dropout rates were high (63%). Another study investigated an adapted MBSR course (ELDERSHINE) for older adults (all women, $N = 13$, ≥ 60 years) in a low-income residential programme. This study found that participants regularly implemented mindfulness to cope with medical procedures, anger and depression (Szanton et al. 2011). The ELDERSHINE programme was further piloted in a randomised controlled trial with lower-income older adults

with hypertension (Palta et al. 2012). Participants were randomised into the mindfulness programme ($n = 12$) or an active control consisting of a social support group ($n = 8$). Significant reductions in blood pressure were found in completers (> 80%).

Community care facilities for the homeless and a community hospital were the setting for Dutton et al.'s (2013) study with domestically abused (PTSD history) mixed-race women ($N = 106$, half in the MBI arm). Here, an adapted MBI was tested as an alternative to traditional mental health services. The programme was found both feasible and acceptable—there was a high completion rate (70%), perhaps due to reparations for travel and childcare. Informal practice was preferred over formal home practice. Participants reported an increase in non-reactivity, self-acceptance, empowerment and a sense of belonging; they particularly appreciated the support gained from being part of a group. However, no evaluations of changes in mental health service use were conducted.

Whilst small-scale, Bermudez et al.'s (2013) study investigated longer-term effects of MBI training with a similar sample. The longitudinal qualitative study over 15 months was conducted in a women's shelter ($N = 10$) and found that completers experienced an increase in confidence, serenity and self-compassion, which developed into a desire to help those in comparable situations after the mindfulness training. However, participants were dealing with trauma and found it difficult to practice mindfulness to begin with; accordingly, the attrition rate was high (81%). Group homogeneity, management of interpersonal conflict and a regulation of exposure to present moment experience were acknowledged as the key components for future similar courses with this population to increase retention of participants.

Other studies investigated the potential of MBIs in supporting the well-being of parents affected by SED. Eames et al. (2015) conducted an uncontrolled study which utilised an MBSR-based Mindfulness-Based Well-being for Parents (MBW-P) programme. It was held in a rural National Health Service setting in the UK and designed for 'at risk', 'hard to reach' mothers ($N = 9$ to 13 depending on the measures completed). The study aimed to assess parental well-being and parenting-related stress. It featured shorter 'in session' and 'home' practices, which incorporated mindful listening and communication, included social interaction and introduced short instructions in parental bonding, compassionate parenting and the maintenance of personal well-being. Results were encouraging, but need to be interpreted with caution given the small sample size, high attrition rate (48%) and a lack of control group or follow-up. However, a 56% reduction in stress and increased well-being for the most at risk suggested that SED parents may become easier to reach and engage with, and consequently, more likely to benefit from other parenting programmes after MBW-P.

Gucht et al. (2014) also chose institutional settings, in this case social welfare centres that serve low-income adults in the Netherlands. They combined MBSR and MBCT curricula with shorter exercises and contextual psychoeducational examples (like the stress felt due to living with less money than needed) and learning to deal with difficult conversations. Despite adaptations, attrition was high (only 40% completed all measures) and effect sizes on measures of stress, depression and anxiety were small post intervention and medium at follow-up. However, this study highlighted that MBIs may reduce (negative) self-directed overgeneralisation and consequently vulnerability to depression. The study, however, lacked a control group.

As a whole, and despite high attrition rates and lack of control groups, these studies suggest that suitably adapted MBIs are feasible and acceptable and can be beneficial for SED populations. They seem to positively affect clinic attendance rates (Abercrombie et al. 2007; Roth and Creaser 1997) and ameliorate factors of comorbidity for SED participants in outpatient and residential rehabilitation programmes (Vallejo and Amaro 2009). They also appear to improve the quality of life of SED elderly in residential care (Palta et al. 2012; Szanton et al. 2011) and show promising results in institutional settings (Eames et al. 2015; Gucht et al. 2014). These interventions may also bring about a reperceiving of the stress of poverty and authority (Hick and Furlotte 2010). However, the paucity of the studies indicates the need for more research and more robust investigations within this fledgling field.

This study aimed to investigate the feasibility and impact of an adapted MBI within a SED community. Feasibility was assessed through developing efficient recruitment protocols, examining acceptability of consent procedures, investigating and addressing barriers to attendance, assessing the viability of collecting reliable and valid data and evaluating the appropriateness/suitability of the intervention used. It was hypothesised that, in achieving these aims, there would be a moderate change in participants' well-being, mindful awareness and subjective perception of well-being.

Method

Participants

One hundred and seven adults from Dundee's most deprived areas were referred or self-referred to participate in an 8-week adapted MBI. Two with severe mental health diagnoses were excluded, one attended the course but declined research participation and 104 provided an informed consent to take part in the research. Seventy-two undertook orientation for one of two 8-week courses on a 'first come first served' basis, and 32 were assigned to a waitlist control group. Thirty seven dropped out post orientation (see Table 1), and 27 withdrew

Table 1 MBSR course attrition rates

	Cohort	Dropout post orientation	Dropout within 3 sessions	Completers
Total (*N*)	104			
MBSR group (*n*)	72	25	27	20
Control group (*n*)	32	12	0	20

within three sessions. Training group completers ($n = 20$) attended the minimum effective dosage of four sessions (Eames et al. 2015) set for this project.

There were 40 research group completers. Eight declined (three control and five MBSR training group), when asked to provide age demographics. Training group completers' ($n = 15$) ages ranged from 18 to 65 (50% male/female), average 58 years. Control group completers' ($n = 20$) ages ranged from 18 to 60 (25% male; 75% female), average 56 years. Seventy percent of the training and 45% of the control groups were single, with the remainder married (20%, 30%) or cohabiting (10%), 5% preferred not to say.

Data also revealed that participants experienced marginalisation (two participants with literacy issues both in the training and in the control group, two participants with learning disability in the training group and one in the control group, one carer in the training group). Twenty-nine completers ($n = 20$ training; $n = 9$ control) provided mental and physical health information (see Fig. 1a, b) in the pre-course assessment. Although 55% of the control group omitted giving demographic information, data received revealed a variety of mental health issues for both groups, e.g., anxiety, depression, stress and mood disorder, although the control group were less affected by each. Training group issues ranged from mobility, to cancer and obesity, with both reporting physical/nerve pain and high cholesterol. In addition, participants' reports on socioeconomic factors showed that all in the training group and the vast majority of those in the control group were receiving benefits (see Fig. 1c). They also reported being single parents, experiencing relationship breakdown and low income as socioeconomic factors.

Procedures

Posters, flyers and application forms were disseminated through community support professionals via the course venue,

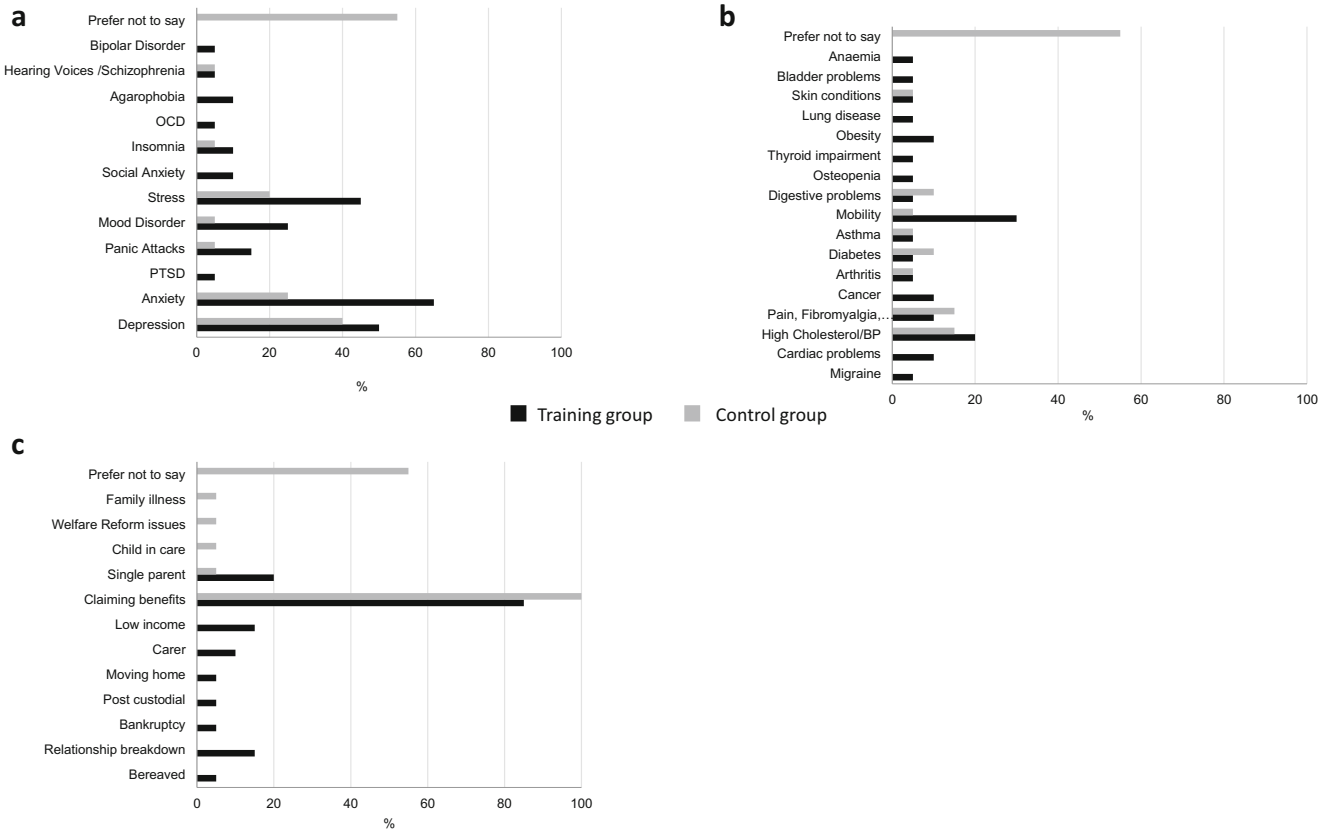

Fig. 1 Demographic information for the training group ($n = 20$) and control group ($n = 9$) completers including **a** mental health information, **b** physical health information and **c** socioeconomic factors

local community facilities, groups, charities and a local charity's website which supports those in hardship. Inclusion criteria comprised those living in regeneration areas in Dundee and receiving benefits or earning less than the Living Wage (Davis et al. 2014) with no significant life trauma in the previous 6 months. Applications were evaluated and primary assessments employed in accordance with MBCT Implementation Resources for public MBCT courses (Kuyken et al. 2012) and the University of Massachusetts, Center for Mindfulness, Mindfulness-Based Stress Reduction (MBSR) Standards of Practice 'Screening Criteria for Exclusion from the Stress Reduction Program' (Santorelli and Kabat-Zinn 2014).

Intervention

Eligible participants were invited by telephone, e-mail and text message to attend the sessions. During the group Pre-programme Orientation Session, participants were informed by the course teacher (the first author) that this 8-week eight-session adapted MBI was being taught to help reduce their stress, involved employing body/breath awareness whilst sitting, standing, lying and walking, both formally and informally, and consisted of eight more 2-hour weekly sessions. The Orientation included explanations of what mindfulness is, its origins, how it can help, a course outline and the completion of research questionnaires. Adaptations included interspersing the above with the short mindfulness practices from MBCT(Ca) (Bartley 2012), and to conclude the introductory session, an informal consultation was held. The consultation regarding initial experience and the physical/mental health information provided was employed to determine the appropriateness of further participation. Furthermore, the remaining 8-weekly group practice sessions were preceded by a 30-min pre-session socialisation involving tea, cakes and conversation. Although the practice sessions were based on Blacker et al.'s (2009) MBSR curriculum outline, shorter session times (2 hrs), shorter practices with plain language instruction and longer periods of dialogue were employed. An additional MBCT practice, the '3 step breathing space' containing the core practice elements used in MBIs (Williams et al. 2007) was also added (sessions 3 to 7), and a simplified visual presentation of the psychoeducational stress component provided (sessions 4 to 8) to aid the educationally challenged. Additionally, the all-day silent retreat was omitted.

To facilitate non-discriminatory participation, combat financial exclusion and reduce material inequalities (Curtis et al. 2002) during the course, all course materials and equipment was offered free. This included course manuals in digital and printed forms and audio for those with additional needs such as dyslexia, learning difficulties or literacy issues, large text for those with visual impairment, recordings in CD and mp3 formats for laptops, tablets and smartphones and ancillary equipment (blankets, yoga mats and cushions), which was provided by a local charity, Nilupul Foundation (www.nilupul.org).

To address the effects of marginalisation and exclusion (Kenway and Bushe 2015), two 'in-session' support assistants attended, and between sessions, participants were encouraged to seek support through 'course buddies' (Rockville 1994), e.g., a fellow course/family member, friend or colleague, to discuss experiences and encourage home practice participation and course completion. Furthermore, texts and e-mail reminders were sent, pre-session interaction (tea/conversation) encouraged and in-session, extended dialogue and inquiry into experiences fostered. To reduce psychosocial inequalities—e.g., having a low threat threshold and its resultant physical, mental or verbal 'reactive stress' to the perceived threat of interpersonal communication (Adli 2011)—dyads, triads and small groups were also utilised, to build confidence, increase social integrity and develop a willingness to address and discuss feelings (Egan et al. 2008).

Data Collection

The study followed a non-randomised waitlist-controlled design, with all assessments conducted before the start of the MBSR training and immediately after its completion. Data from the training group were collected at the pre-course orientation session and then on the last day of the course. Data from the control group were collected at the same time points. Qualitative assessments were complemented by a qualitative subjective self-assessment of the meaning of well-being at the two time points. Where needed, participants were supported through a question-by-question guided run through the measures.

Measures

Quantitative measures included the WHO-5 Well-being Index and the Mindfulness Attention and Awareness Scale (MAAS), in addition to two quantitative custom-made well-being assessments and a qualitative open-ended question (the last three measures were designed by the first author).

The WHO-5 is a widely used self-report measure (Taggart and Stewart-Brown 2015; Topp et al. 2015), developed for the purpose of assessing positive mental health (Bech et al. 2003). It has five items scored from 0 to 100. High scores signify better well-being, and low scores indicate mental health problems (Henkel et al. 2003). In a study on well-being with chronic illness sufferers, validities of *content* (0.77), *construct* ($r = -0.57$, $p < .01$) and *criterion relation* ($r = 0.49$, $p < 0.001$) were good or high and *internal consistency reliability* was high (Cronbach's $\alpha = 0.89$; Wu 2014).

The MAAS is a 15-item self-report scale assessing openness or receptive awareness of and attention to what is taking

place in the present. It showed strong psychometric properties when validated with college, community and cancer patients, and the scores are predictive of a variety of self-regulation and well-being constructs (Brown and Ryan 2003). The measure takes 10 min or less to complete (Brown and Ryan 2003) and has demonstrated high *internal reliability* (Cronbach's $\alpha = 0.89$) and good *gender reliability* (women $\alpha = 0.89$; men $\alpha = 0.87$) (MacKillop and Anderson 2007). Conner and White's (2014) study, which used this measure with parents of mixed socioeconomic background of children with autism spectrum disorder, showed an internal consistency of $\alpha = 0.90$.

The researcher-designed well-being assessments comprised two common single-item survey questions in the form of a 5-point Likert self-rating scale of general well-being and mental well-being (from very bad to very good), as described and validated in a national survey of British adults (Bowling 2011). The first question related to general well-being: 'Overall would you say your well-being was?' rated on a 5-point scale from very bad to very good. The second question related to mental well-being: 'Please rate your mental well-being, would you say your mental well-being was?' which was also rated on a 5-point scale from bad to very good.

Finally, the qualitative element of the evaluations aimed to explore more subjective associations of well-being provided by participants and their possible change from pre- to post-mindfulness training. It involved written responses to a single open-ended question designed by the first author in order to solicit participants' personal definition of well-being at two time points T1 and T2. The question asked, 'Please tell me, what the term well-being means to you?' and advised, 'You can mention as many things as you like, including mental or psychological and/or physical health issues, social relationships and activities and anything else you think of. There are no right or wrong answers'.

Data Analyses

Quantitative data were analysed using SPSS version 22 (IBM Corp. 2013). Descriptive statistics were computed and analysed and outliers removed. Prior to statistical analyses, independent *t*-tests determined any differences between groups at baseline. When no baseline differences were detected, a two-way repeated measures analysis of variance ANOVA with factors of group (training and control) and time (pre and post) was employed to assess differences in well-being and mindfulness. Significant time-by-group interactions were followed up with *t*-tests to assess the locus of the differences. Correlations in change scores (pre-scores subtracted from post-scores) investigated possible converging patterns of changes across the measures.

For qualitative data, written responses to an open-ended question were transcribed and analysed using thematic analysis (Braun and Clarke 2006) separately for responses pre and post training. Responses ranged from a series of *single words*, to *single and multiple phrases and single sentences*. These formed the primary themes or PTs. PTs were then grouped into meaningful *units of text* relevant to the research question. These groups were further specified to reveal refined primary themes (RPTs). Further distillation of RPTs revealed overarching themes (OATs), which were in turn summarised to produce pre- and post-meta-themes. Finally, tentative changes between these themes from pre- to post-training were explored. This process was iterative and related to the original responses and the research question at all stages. The thematic analysis was conducted by the first author and checked for accuracy in analysis progression and exemplification of themes in participant quotes by the third author.

Results

Quantitative Analyses

Initial interest in participation suggested that it may be feasible to deliver the adapted MBI to SED adults.

However, the dropout rate was relatively high—27 out of the initial 47 (58%) participants did not complete the study. Training group completers ($n = 20$) attended the minimum effective dosage of four sessions (Eames et al. 2015) set for this project. Seven of those attended up to 5 sessions and 13 completed between five to eight sessions. The attrition rates are summarised in Table 1. Reasons for dropout within three sessions were given by 21 participants; six gave no reason (see Table 2).

An initial 2 (group) × 2 (gender) chi square revealed no significant differences in gender across the two groups [$\chi^2 = (1) = 3.65$ $p = .087$, Cramer's V = 0.319]. Analysis was conducted for data from 36 participants (four participants were removed due to missing data). Data analysis was run with and without two moderate outliers at post-test (one outlier on the WHO-5 and one on the MAAS); no significant differences were found when outliers were removed and therefore the results reported are for the full data set (no outliers removed).

When comparing the gender differences between completers and dropouts in the training group, a chi square revealed a significant difference [χ^2 $(1) = 5.10$, $p = .044$, Cramer's V = 0.341], in the dropout group 84% of the group were females and 16% males and in the completers group there were 52.6% females and 47.4% males. The significant difference and pattern of findings were maintained when the three participants with missing data were removed from the analyses. However, a chi square for the control group revealed

Table 2 Reasons for dropout within three sessions

Reason for dropout	Fear of violence	Unable to get up in time	Not the right time	Anxiety	Family issues
(*n*)	1	1	3	1	4
Reason for dropout	Health issues	Other commitments	Carer responsibilities	Homeless	Benefits sanctions
(*n*)	2	4	3	1	1

no significant difference in gender between completers and dropouts [χ^2 (1) = 0.00, p = 1.00, Cramer's V = 0.00]; in both groups 75% were female and 25% male.

For the four self-report measures (WHO-5, Overall Well-being and Mental Well-being and MAAS), baseline group differences were assessed using independent samples *t*-tests with no significant baseline group differences found for any of the four measures (all $p > .05$). See Table 3 for a summary of the means and standard deviations for each measure.

Further feasibility aspects of the study were investigated by post hoc comparisons of differences in questionnaire scores between completers and those who dropped out of the study in the two groups. In the training group, these revealed no significant baseline differences for the WHO-5 [$t(42) = -0.655$, $p = .516$, $d = -0.20$], MAAS [$t(42) = -0.461$, $p = .647$, $d = -0.15$], or general well-being [$t(31.13) = 0.365$, $p = .717$, $d = 0.11$] or mental well-being [$t(32.86) = -1.38$, $p = .176$, $d = -0.43$]. For the WHO-5, there was one dropout participant who had a score of 0; after removing this participant from the data set, there were still no significant baseline differences between training group completers and dropouts for any of the measures. Similarly, no significant differences were found when three participants with missing data were removed from the analyses.

For the control group, a comparison between completers and dropouts revealed significant baseline differences for the MAAS [$t(30) = -3.58$, $p = .001$, $d = -1.31$], WHO-5 [$t(29.43) = -4.68$, $p < .001$, $d = -1.58$], general well-being [$t(30) = -3.83$, $p = .001$, $d = -1.45$] and mental well-being [$t(30) = -4.07$, $p < .001$, $d = -1.57$]; all scores were higher for dropout participants.

To measure changes in the four measures for the two groups across time, 2 (group: MBSR; control) × 2 (time: baseline, post-test) mixed ANOVAs were conducted. For the WHO-5, there was a significant main effect of time [$F(1, 34) = 20.61$, $p < .001$, $\eta^2 = 0.24$] and group [$F(1, 34) = 13.02$, $p = .001$, $\eta^2 = .28$] and a significant time × group interaction [$F(1, 34) = 31.13$, $p < .001$, $\eta^2 = .36$]. Follow-up *t*-tests revealed a significant increase in WHO-5 scores [$t(15) = -6.56$, $p < .001$, $d = -1.64$] from pre- to post-MBSR training in the training group only (control $p > .05$). The training group also showed significantly higher scores for the WHO-5 in between group comparisons at the post-test [$t(34) = -6.06$, $p < .001$, $d = -2.07$].

For the MAAS scores, no main effects or interactions were significant (all $p > .05$).

For the General Well-being scores, there was a significant main effect of time [$F(1, 34) = 16.28$, $p < .001$, $\eta^2 = 0.24$] and a significant time × group interaction [$F(1, 34) = 16.28$, $p < .001$, $\eta^2 = .24$]. There was no significant main effect of group [$F(1, 34) = 3.07$, $p = .089$, $\eta^2 = .08$]. Follow-up *t*-tests showed a significant increase in scores in the training group only [$t(15) = -4.679$, $p < .001$, $d = 1.17$] (control group $p > 0.05$). The training group also showed significantly higher scores in comparison to the control group at the post-test [$t(34) = -3.54$, $p = .001$, $d = -1.19$].

For the Mental Well-being scores, there was a significant main effect of time [$F(1, 34) = 8.55$, $p = .006$, $\eta^2 = 0.16$] and a significant time × group interaction [$F(1, 34) = 12.34$, $p = .001$, $\eta^2 = .22$]. There was no significant main effect of group [$F(1, 34) = 2.25$, $p = .14$, $\eta^2 = 0.06$]. Follow-up *t*-tests revealed a significant increase in scores in the

Table 3 A summary of the means and standard deviations for the total MAAS scores, WHO-5 scores, General Well-being and Mental Well-being scores at baseline and post-test for the MBSR and control groups

Group		Pre-test		Post-test	
		M	*SD*	*M*	*SD*
MBSR group ($n = 16$)	Total MAAS	3.36	0.49	3.50	0.48
	General Well-being	2.81	1.11	4.06	0.93
	Mental Well-being	2.69	1.25	3.78	0.98
	WHO-5	38.05	18.87	73.08	15.79
Control group ($n = 20$)	Total MAAS	3.11	0.82	3.17	0.84
	General Well-being	2.95	0.83	2.95	0.94
	Mental Well-being	2.85	0.81	2.75	0.97
	WHO-5	38.0	19.18	34.40	21.26

training group [$t(15) = -3.88$, $p = .001$, $d = -0.97$], but not in the control group ($p > 0.05$). Significant differences between the two groups with the training group scoring higher were also found at the post-test [$t(34) = -3.16$, $p = .003$, $d = -1.06$]. The longitudinal changes in the four measures are depicted in Fig. 2.

The change (pre-scores subtracted from post-scores) in WHO-5 scores across the training and control groups was found to positively correlate with the change in General Well-being scores [$r(36) = 0.67$, $p < .001$] and the change in Mental Well-being scores [$r(36) = 0.60$, $p < .001$]. The change in General Well-being scores was also found to positively correlate with the change in Mental Well-being scores [$r(36) = 0.78$, $p < .001$]. The change in MAAS scores was not found to correlate with any of the measures (all $p > .05$).

Qualitative Analyses

Qualitative data was collected from written responses to a single open-ended question 'What does well-being mean to you?' pre- (T1) and post- (T2) training and analysed using thematic analysis (Braun and Clarke 2006). All original written responses (word, phrases and sentences) or primary themes (PTs) were recorded verbatim and anonymised (coded) prior to analysis by the first author. To aid understanding and readability here, PTs are italicised followed by participant codes in parenthesis. Analysis of the PTs led to the formation of refined PTs (RPTs), which when distilled revealed sets of overarching themes (OATs). On summarising OATs, single meta-themes emerged at both time points. These progressions are presented below in Fig. 3a, b below.

Although thematic analysis is typically used in qualitative research to examine and capture the intricacies of a single data set's meaning (Braun and Clarke 2006), two data sets were produced here. Thus, an additional pairing of each data set's OATs was considered by the first author to explore if any well-being transitions/reperceptions may have occurred over time (see Fig. 4).

Observations of Well-being Transitions over Time

On examination of OATs, two themes seemed to permeate both data sets, 'having needs met' and 'managing difficulty'. 'Having needs met' seemed to transition from a need of the resources that could help with '*feeling well, physically as well as mentally*' (6) and '*feeling safe and secure*' (11) according to these PTs at T1, to a need to make use of new-found resources, for example, the need to maintain '*health and happiness and I'm working hard on all of these things*' (18), to the discovery that '*being able to trust in self and others means there's nothing to fear*' (24) at T2. 'Managing difficulty', for most,

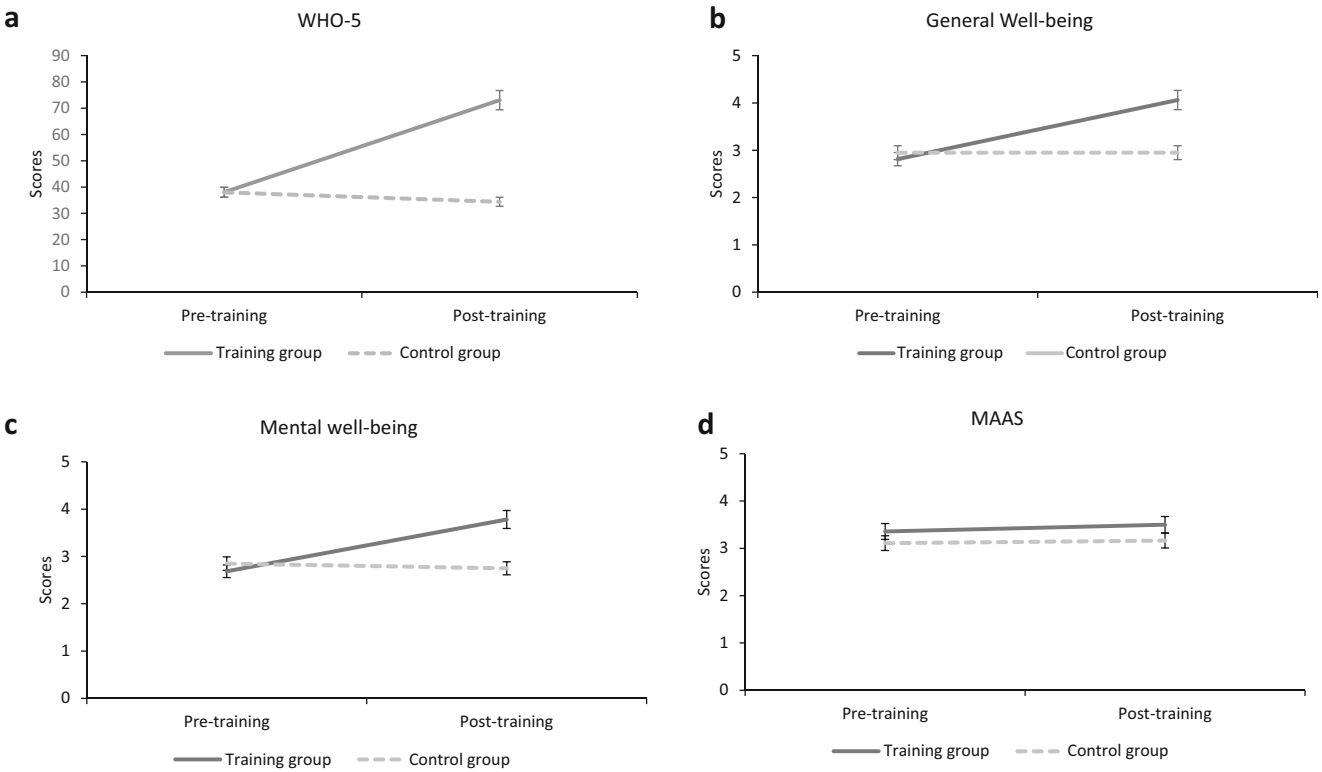

Fig. 2 Longitudinal changes for the training group ($n = 16$) and waitlist control group ($n = 20$) for **a)**the WHO-5 self-report, **b** General Well-being, **c** Mental Well-being and **d** MAAS

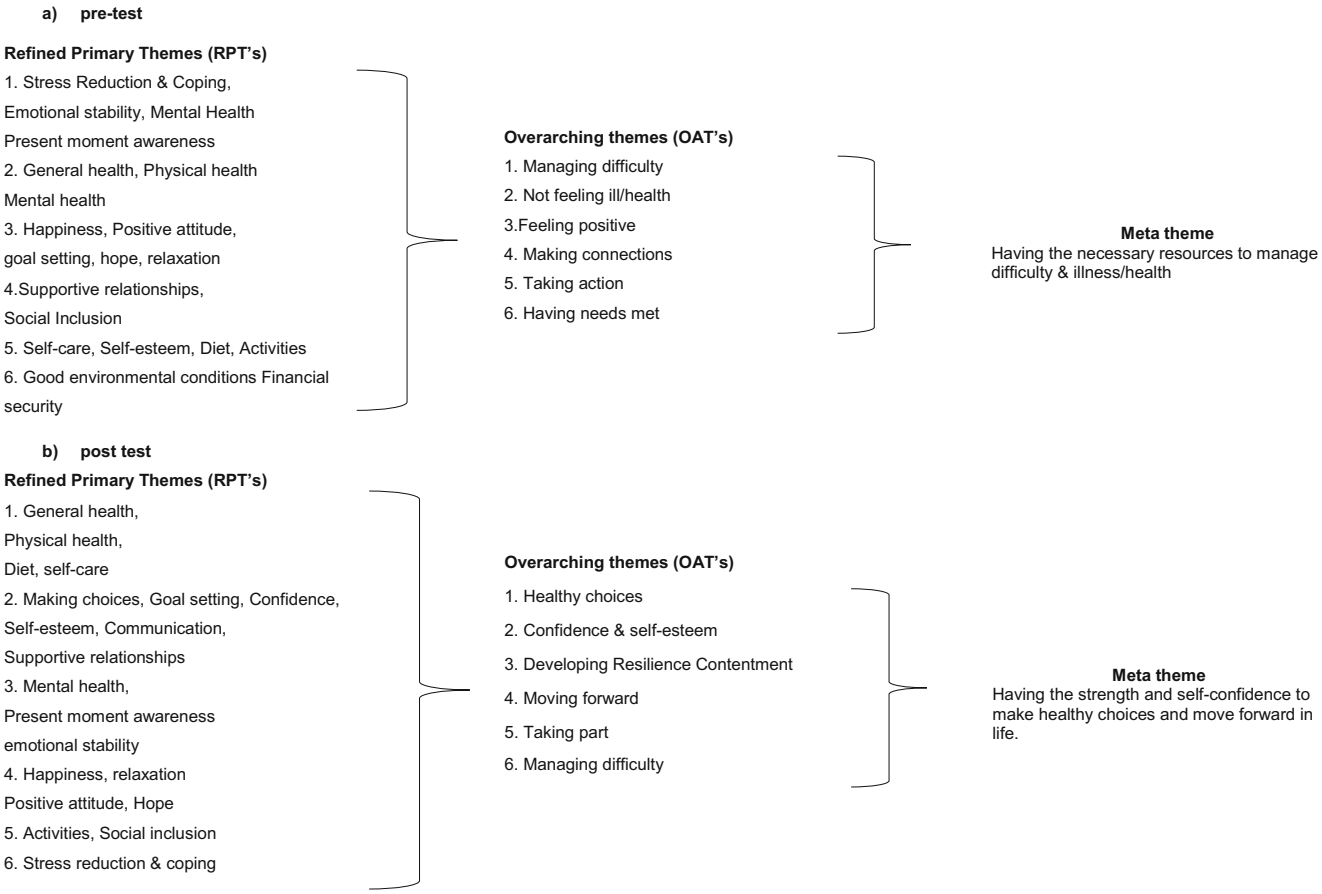

Fig. 3 The iterative analysis of pre- and post-test training group ($n = 20$) themes including **a** refined primary themes (RPTs), **b** overarching themes (OATs) and **c** meta-themes

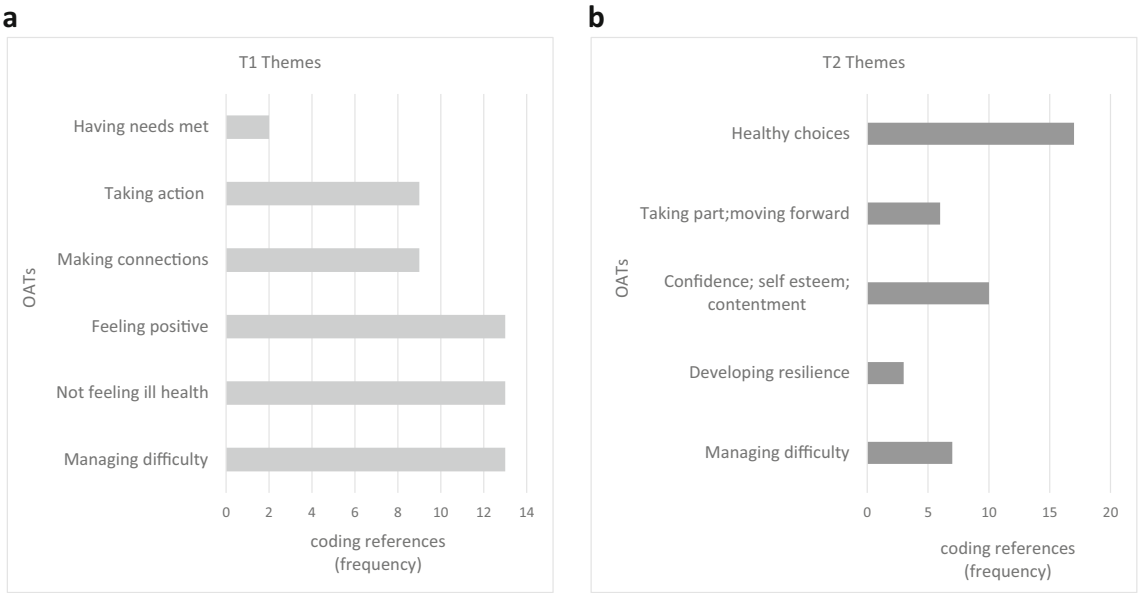

Fig. 4 A comparison of the categories and values attributed to the refined themes of the control group ($n = 20$) pre- and post-test, including **a** OATs and **b** frequency of coding references

according to T1 PTs, meant dealing with multiple difficulties, e.g., '*Being mentally stable*' (22), '*not feeling ill all the time and requiring medical intervention*' (32) and '*coping with mental health problems and not allowing chronic anxiety to control me*' (36). T2 PTs, however, indicated a transition into a more positive '*trusting that you always have options when life is tough*' (31) and an awareness of a need '*to avoid destructive practices*' (11).

Three additional themes also emerged. (I) At T1, there was a sense of feeling excluded, or more precisely, a need of '*being included*' (11), of '*feeling connected to other people*' (19) and of having '*good relationships*' (36) according to PTs. However, T2 PTs indicated that by T2, most, through '*feeling at ease with myself and through that, feeling at ease with others*' (6), discovered a newfound ability to be '*confident around people*' (69). For some, this transformed into a wider aspiration to '*succeed in the world and bring the benefits back to myself and my family*' (32). (ii) Second, a focus on general un-well-being and associated effects of poverty emerged in the PTs at T1, among them a wish to have '*no stress or depression*' (18) and of being '*pain free*' (11). By T2, however, PTs indicated a transition into feeling a sense of ease and flexibility through '*balance and mental and physical health*' (10) and a recognition that through applying the training '*a resilience to mental and physical health develops*' (24). (iii) Third, at T1, it was generally felt that there was a need to take action. This ranged from recognising a need to be free from a poverty-induced psychological entrenchment through '*becoming emotionally independent*' (32), to a need to be '*getting out in the community and doing things*' (19). By T2, however, these had transitioned into having both the ability and confidence to act, for example, by not allowing '*chronic anxiety to control me*' (36) or letting '*resentment and bitterness into your life*' (11) and maintaining well-being by '*being mindful and looking after myself, taking time to myself*' (57) as a result of having '*the confidence to do the things I want to do*' (61).

Finally, condensing the content of pre- and post-OATs seemed to point to a single meta-theme at each time point. At T1, this emerged as a need of 'having the necessary resources to manage difficulty, illness and health', and at T2 of 'having the strength and confidence to make healthy choices and move forward in life'. When paired, these meta-themes, as with OATs, seem to support an overarching principle of transition.

Discussion

This study aimed to evaluate the feasibility of delivering an adapted MBI for groups of SED adults in a regeneration area and to determine if this would significantly improve their well-being and mindfulness levels. The delivery of the adapted MBI was feasible, and the dropout rate (58%) was similar to previous studies with this population. The quantitative analyses revealed significant improvements in well-being in all three measures of this construct with large effect sizes. However, no significant changes in mindfulness were found. The qualitative component suggested subjective shifts in well-being and mindfulness for the training group. Accordingly, the findings of this study indicate that holding an MBI in an area of deprivation/regeneration for SED adults is feasible and may improve participants' well-being.

The robust improvements in well-being of participants in our study are consistent with findings in most previous studies with SED populations (e.g., Hick and Furlotte 2010; Roth and Creaser 1997). Although Carmody and Baer (2009) advise caution, as additional variables other than mindfulness as such may be at play in well-being improvements after MBIs, the significant effect sizes found suggests that participation in an MBI can improve well-being, even though the underlying mechanisms remain unclear. Indeed, we did not find any indicators of improvements in mindfulness as measured by the Mindfulness Attention and Awareness Scale (MAAS). This is contrary to findings with the same measure in healthy (Brown and Ryan 2003; Van Dam et al. 2010) and clinical samples (Carlson and Brown 2005; McCracken et al. 2007) and related theory (Black et al. 2012; Van Dam et al. 2010). This could possibly be due to factors such as problems with the construct validity of the MAAS (Brown and Creswell 2015; Van Dam et al. 2010); indeed, there is debate regarding the extent to which self-reports can sensitively and accurately detect changes in mindfulness after training (Grossman 2011).

The qualitative findings were based on thematic analysis of written answers to an open, well-being-related query at two time points. It seemed that the emergent themes at the pre-test were mostly focusing on negative aspects of physical and mental well-being and an inability to cope, whilst post-training themes were more positively worded with focus on changes to mindfulness skills, physical and mental well-being and confidence. This more positive outlook reflected in participants' responses was also linked to references about increased self-care in terms of better diet and exercise and reduced self-destructive behaviours. There also seemed to be indicators of increased social skills that better relationships. Pre- and post-OATs formed the basis for defining transitional pathways in the perceived change of well-being over time. Two OATs permeated this evolutionary process, 'having needs met' and 'managing difficulty'. 'Having needs met' seems to indicate a transitioning from a sense of hopelessness and feeling of, or being resource-less, to feeling more hopeful, positive and having better coping skills. The second transitioned from perceiving poverty as unworkable and unmanageable, to reperceiving it as workable and manageable. Three secondary pathways also emerged, transitioning from (i) exclusion to inclusion, (ii) from an overall sense of un-well-being to contentment and resilience and finally, (iii) from feeling a need to take action, to having the ability to take action.

To paraphrase in meta-themes, this meant transitioning from 'having a need for the necessary resources to manage difficulty and illness/health' to 'having the strength and self-confidence to make healthy choices and move forward in life'.

It is possible that through gradually decentering from their thoughts, emotions and body sensations as they arose, and learning to simply be with them, instead of being defined by them (Hick and Furlotte 2010) enabled the participants to overcome, at least to some extent, their perceived cognitive limitations (Mani et al. 2013). As a result, they appear to have experienced increased well-being and awareness. To fully investigate this possible mechanism of action, measures of decentering (Fresco et al. 2007) need to be included in future research with SED populations. However, initial research on mechanisms of mindfulness in clinical conditions, particularly in anxiety which is symptomatic of reduced well-being, points to the pivotal role of decentering in mediating the effects of MBIs (Hoge et al. 2015).

As already shown, previous studies with SED populations indicate that mindfulness training may lead to improvements in well-being and mindfulness. As no significant difference was found in the three well-being measures between the control and training groups at baseline and a significant increase was noted post training, this study, likewise, suggests that MBI training can enhance well-being. In addition, the findings for the researcher-designed *mental* and *general well-being* queries echo these findings and replicate the structure of Diener's 2008's two-part subjective well-being (SWB) construct. This implies validity of the well-being construct measures in this study. The results for the 15 item MAAS, however, unexpectedly implied that control programme dropouts had better levels of mindful awareness than control completers. Perhaps, further exploration of just how such measures can be adapted and/or scaled up in ways that are accessible and equitable may help address such anomalies (Sibinga et al. 2016). A better fit may have been the 6-item version, which has similar psychometric properties and could well have helped reduce respondent burden (Black et al. 2012; Van Dam et al. 2010). The qualitative analysis, however, implied that the acquisition of mindfulness skills may have supported participants in developing positive coping skills and may have helped them to move from 'day to day' reactive decision making, to longer-term responsive planning. This might enable better management of the toxic stress of living with chronic low income and possibly help those living in conditions of SED break the perpetuating cycle of suffering associated with it. Furthermore, employing this type of intervention could reduce the present cost of poverty to the nation (Bramley et al. 2016), as evidenced by reported reductions in the use of medications, even after long-term use/dependency, and of reduced clinic visits due to feeling healthier. Consequently, burdens on already overstretched health services could be reduced. Yet others were coping better with their mental problems, be it bipolar, depression, OCD, anxieties and phobias; hence, the burden on mental health and associated services could possibly be lessened. Others spoke of healed relationships, coping better with family, children and social workers, etc.; accordingly, the burden on social services, family and education services could also be reduced. These results indicate that community-based MBIs are not only feasible and possibly effective, but could become a useful and beneficial part of government well-being policies that may eventually permeate the mainstream (Mindfulness All-party Parliamentary Group 2015). Of course, these policies need to, at the same time, address the core economic problems underlying poverty and together with effective psycho-social interventions enable social mobility. MBIs can be a part of a systemic approach to addressing poverty.

Limitations and Future Directions

The attrition rate in the current study was high despite financial reparations, efficient recruitment protocols and adaptations to the MBI training. We have collected reasons for participant dropout rates, and most of them seemed to be out of their control (see Table 2), with family, carer issues and scheduling conflicts being the most frequent. Perhaps a greater flexibility in the timing of training (several options) and further qualitative research into the support needs of SED participants could provide additional insights into how to reduce barriers to their participation.

Furthermore, only a small set of self-report measures were used in the current study with a primary focus on assessing well-being of participants. This was partially due to a concern about participant overload impacting negatively on the dropout rates. As a result, the findings do not allow for investigation of underlying mechanisms of change. Nor do they address the implementation challenges regarding established measures like the MAAS for this population, for which additional research elements may need to be employed to improve any future interventions overall effectiveness and produce more meaningful results (Sibinga et al. 2016). Even so, converging significant findings with large effect sizes from three different measures of well-being support the validity of the overarching results.

Future studies could include additional short assessments, such as those evaluating the construct of decentering, which seemed to be prominent in qualitative feedback from participants. Inclusion of neurocognitive and psychophysiological measures could also provide new insights into the bio-behavioural changes resulting from MBI training in this population; however, such assessments are more time-consuming and may further increase dropout rates. In addition, this study did not assess ethnicity, which should be included in future studies in order to provide a more complete picture of the impact MBIs can have on SED populations in general.

Finally, the study did not include follow-up assessments, so it is not clear to what extent the initial findings will be sustained long-term or what the longer-term impact of the MBI on participants' lives is. Nonetheless, this study, as it stands, adds to the extant literature, provides a platform for future research/development and evidences that community-based MBIs are viable.

The current study shows that delivery of adapted MBI courses to SED adults is feasible and can enhance their well-being. Even though the study had a small sample, the robust improvements on three different measures of well-being are encouraging. These findings are further supported by a shift towards positive comments from participants regarding their well-being from pre-test to post-test. However, the study also reported relatively high levels of participant dropout and no significant change in a measure of mindfulness was found. Further, larger-scale studies with more diverse participant samples, a range of measures and follow-up assessments are needed. Overall, the findings of this study suggest that MBIs could play an important role in increasing the well-being of adults living under conditions of SED.

Author Contributions KJ designed and executed the study, conducted initial quantitative data analyses, conducted the qualitative analyses, and wrote the manuscript. RJK conducted and wrote the final quantitative data analyses and edited the manuscript. DD collaborated on the design and writing of the study, guided the data analyses, and edited the manuscript.

Compliance with Ethical Standards

Ethics Statement The Ethics Committee in the School of Psychology at Bangor University granted ethical and governance approval for the study, and informed consent was obtained from all participants prior to their inclusion in the study. Permission was granted to hold the study in a Dundee City Council integrated health and welfare facility, with full disabled access, facilities, security and logistical support by a Communities Officer.

Conflict of Interest The authors declare that they have no conflict of interest.

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