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Mindfulness-based prevention for eating disorders: A school-based cluster randomised controlled study

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RUNNING HEAD: MINDFULNESS-BASED EATING DISORDER PREVENTION

Abstract

Objective: Successful prevention of eating disorders represents an important goal due to damaging long-term impacts on health and well-being, modest treatment outcomes, and low treatment seeking among individuals at risk. Mindfulness-based approaches have received early support in the treatment of eating disorders, but have not been evaluated as a prevention strategy. This study aimed to assess the feasibility, acceptability and efficacy of a novel mindfulness-based intervention for reducing the risk of eating disorders among adolescent females, under both optimal (trained facilitator) and task-shifted (non-expert facilitator) conditions. **Method**: A school-based cluster randomised controlled trial was conducted in which 19 classes of adolescent girls (N = 347) were allocated to a 3-session mindfulness-based intervention, dissonance-based intervention, or classes as usual control. A subset of classes (N = 156) receiving expert facilitation were analysed separately as a proxy for delivery under optimal conditions. **Results**: Task-shifted facilitation showed no significant intervention effects across outcomes. Under optimal facilitation, students receiving mindfulness demonstrated significant reductions in weight and shape concern, dietary restraint, thin-ideal internalisation, eating disorder symptoms and psychosocial impairment relative to control by 6-month follow-up. Students receiving dissonance showed significant reductions in sociocultural pressures. There were no statistically significant differences between the two interventions. Moderate intervention acceptability was reported by both students and teaching staff. **Discussion**: Findings show promise for the application of mindfulness in the prevention of eating disorders; however, further work is required to increase both impact and acceptability, and to enable successful outcomes when delivered by less expert providers.

Keywords: eating disorders, prevention, mindfulness, cognitive dissonance

Mindfulness-based prevention for eating disorders: A school-based cluster randomised controlled study

Eating disorders, both diagnostic and sub-threshold, are associated with a range of damaging consequences for physical and mental health (1; 2.). Body dissatisfaction and concerns about weight and shape have been identified as robust risk factors (3.), and are associated with impairments even in the absence of clinical eating disorders (4; 5.). The greatest risk period for these concerns is in adolescence, with body image being consistently rated in the top three concerns of young Australians (6.), and eating disorder onset peaking between the ages of 16 and 20 (7; 8.). As such, programmes aimed at improving body image in mid-late adolescence provide an important avenue for the prevention of eating and weight related difficulties. Furthermore, given that previous research has noted the high numbers of individuals not seeking or accessing help (1; 9.), in addition to the difficulty in reaching those at risk with individual targeted prevention programmes (10; 11.), school-based universal prevention provides a useful opportunity to gain access across all levels of risk and capture those who may otherwise not receive necessary intervention. Previous school-based work has demonstrated some success in reducing body concerns at the conclusion of program implementation and over meaningful follow-up periods, with evidence showing media literacy and cognitive dissonance approaches to be useful in this context (14; 54.). However further evaluation of different approaches in this setting are required.

Dissonance-based interventions (DBI) are now viewed as the “gold standard” prevention approach for older adolescents and young adult females, and target thin-ideal internalisation, a distal risk factor in theoretical models of eating pathology such as the Dual Pathway model (15.) and the Tripartite Influence Model (16.). These empirically supported models posit that pressures to be thin and internalisation of the thin-ideal lead to body

dissatisfaction, and ultimately to disordered eating behaviours, with the Dual Pathway model implicating negative affect and dieting as instrumental factors leading from body dissatisfaction to eating pathology. In addition to targeting thin-ideal internalisation, there is also a need to target additional risk factors (13.), particularly those more proximal to disordered eating behaviour, such as negative affect and dieting. Mindfulness-based interventions (MBI) represent a potentially useful strategy in this respect, as they aim to both increase the capacity to refrain from automatic responses when confronted with the thin-ideal and related sociocultural pressures, and reduce the intensity and impact of any experiences with a negative affective component if and when they do occur. School-based delivery of MBIs have gained preliminary support in improving general well-being, stress and depression in adolescents (17; 18.); and in reducing body dissatisfaction and bulimia symptoms in fifth-grade girls with the inclusion of yoga in a multi-component eating disorder prevention program (19.). However, these studies were non-randomised and limited to short-term follow-up. Thus this study aimed to overcome these methodological limitations and evaluate an MBI designed to reduce risk for eating disorders, in comparison to an established DBI and control condition, in female adolescents.

In addition, previous reviews have shown programmes are more effective when facilitated by dedicated expert interventionists (12; 20.), and effect sizes for MBI are positively moderated by greater mindfulness training of the therapist (21.). Nevertheless, successful task-shifting to non-expert providers has been identified as an important goal for disseminating mental health interventions at scale (22.). Indeed, implementation of dissonance-based interventions using peer facilitators has already demonstrated success towards this goal (23; 24.). Thus, the current study aimed to compare results under an adequately trained facilitator with the requisite knowledge and familiarity with the interventions, to facilitators with limited training and knowledge, in order to simultaneously

assess the efficacy under optimal conditions and determine feasibility of task-shifting to less expert providers.

METHOD

Trial design and procedure

This study used a school-based cluster randomised controlled design. All single-sex girls' high schools in Adelaide, South Australia, were invited via email and follow-up telephone contact to take part in the study (see **Figure 1** for participant flow). Schools were informed that senior grades (10, 11 and 12) were eligible to participate, and it was then left to the discretion of the school to decide which year levels they would like to take part. Four schools were willing and able to participate, with one school offering grade 10, two schools offering grade 11, and one school offering grade 11 and 12 (19 classes in total). Randomisation was conducted using a computer-generated randomizing sequence, whereby classes were allocated to one of the three experimental conditions within each year level, within each school. Given the nature of the trial, it was not possible to blind students or facilitators to their condition. Approval for the study was obtained from the Flinders University Social and Behavioural Research Ethics Committee, the Catholic Education Office, and the individual school principals.

Parents gave opt-in informed consent for their daughter, and students also gave informed assent to their involvement. Intervention classes received their allocated programme at a rate of one lesson each week for three weeks, while the control classes received lessons taught by their usual class teacher. Self-report measures assessed outcomes at baseline, post-intervention, 1- and 6-month follow-up via electronic or paper questionnaire. Student and teachers' acceptability of the programmes were also assessed at post-intervention. The first author (MA) and three other available postgraduate Psychology students delivered the

interventions, with all but one facilitator delivering both interventions. MA provided an individual 2-hr training session for each of the other facilitators. MA's experience and familiarity with the interventions included four years of prior research in the area of applying cognitive dissonance and mindfulness-based strategies for body image and eating disorder prevention, development of the mindfulness program itself under the supervision of the second author, and previously delivering both interventions to young adults with elevated body image concerns in a face-to-face small group setting (25.).

Due to a greater level of familiarity and expertise, classes facilitated by MA were viewed as representing an optimal level of training and knowledge for delivering the interventions. This provided an opportunity to assess task-shifting capacity from more to less expert providers, by analysing MA's classes in comparison to the minimally trained facilitators. This optimal facilitation subset included three classes of mindfulness and two classes of dissonance participants, representing students from all year levels and schools.

Participants

A total of 347 female students aged 14 to 18 (M = 15.70, SD = 0.77) were present for baseline and therefore eligible for inclusion in the study (82.2% of a potential pool of 422 students). Participants were predominantly Caucasian (84%), with the remainder identifying as Asian (8%), African (1%), or Other (4%). The subset of classes facilitated by the first author (MA), analysed as a proxy for optimal facilitator training conditions, included 156 students (n = 59 mindfulness, n = 40 dissonance, n = 57 randomly selected control) and was reflective of the larger sample with respect to demographic characteristics.

According to guidelines for repeated measures designs (26.), assuming a small between-group effect size (d = 0.3) based on previous school-based universal prevention trials (27; 28.), a medium correlation between repeated measures, and allowing for 10% attrition due to student absences, an acceptable power of .8 with an alpha of .05 would be

achieved with at least 91 participants in each condition (273 in total). Thus, we were underpowered to detect statistical significance for small effect sizes in the facilitator subset of this study.

Interventions

The DBI was constructed based on '*The Body Project*' protocol outlined in Stice and colleagues (29.) and the initial facilitator guide (30.). The sessions involved engaging participants in voluntarily challenging the thin-ideal, through facilitated discussions, role-plays, and written tasks. Adaptations for delivery in a universal school-based setting included a graphical presentation of the facts related to pursuing the thin-ideal, showing videos to illustrate key concepts, and conducting exercises (such as role-plays and some discussions) in pairs and groups. The MBI applied key aspects of mindfulness and acceptance-based practice specifically to body image, with some exercises adapted from Mindfulness-Based Cognitive Therapy (MBCT) for depression (31.). The sessions introduced present-moment awareness through the raisin exercise and using breath as an anchor; viewing thoughts and feelings about the body as simply mental events and not necessarily right, wrong, or true; and practising non-judgement and acceptance with respect to body-related thoughts and feelings. The majority of interactive and experiential exercises were focussed on body-related stimuli, whether provided (e.g., idealised magazine images), imagined (e.g., visualising mirror reflection) or generated (e.g., role-plays to body-specific thoughts). Both interventions involved three weekly lessons, minimised didactic presentation, encouraged class interaction, and contained optional homework exercises. A description of session content is contained in **Table 1**.

Measures

At baseline, participants completed demographic questions, and Body Mass Index (BMI) was calculated from self-reported height and weight (kg/m^2).

Outcome measures.

Weight and shape concern. Concern over weight and shape was assessed using 12 relevant items from the Eating Disorder Examination – Questionnaire (EDE-Q; 32.), a self-report version of the interview-based EDE (33.). Each item assessed the frequency of eating disorder psychopathology over the previous 28 days on a 7-point scale (*no days* to *every day*). A mean item was calculated, with higher scores reflecting greater concerns. A number of studies have now reported on the reliability of the EDE-Q, with a recent review indicating good psychometric properties and consistency with the interview based EDE (34.). Although there is limited validation research regarding use with adolescents, the EDE-Q weight and shape scales have demonstrated reliability for females in both younger and older adolescent samples (28; 35; 36.). Internal reliability in the current study was .95

Negative affect. The 17 items from the Sadness, Guilt, and Fear/Anxiety subscales of the Positive and Negative Affect Schedule-Expanded (PANAS-X; 37.) were used to assess negative affect (29.). Participants report feelings during the past week using a five-point scale (*very slightly or not at all* to *extremely)*. The mean item score was used where higher scores reflected greater negative affect. Internal consistency and temporal validity of the PANAS-X have been demonstrated (23; 37.) as well as predictive validity for the onset of bulimia symptoms (29.). Internal reliability in the current study was .95.

Dietary restraint. The Dutch Eating Behaviour Questionnaire – Restraint (DEBQ-R; 38.) consists of 10 items whereby participants use a 5-point scale (*never* to *always)* to assess the frequency of dieting behaviours. A higher mean score reflects greater dietary restraint. Internal consistency and 2-week test-retest reliability has been demonstrated (39.), as well as convergent validity with self-reported caloric intake, and predictive validity for bulimic symptom onset (38.). Internal reliability in the current study was .94.

Thin-ideal internalisation and sociocultural pressures. Two subscales of the Sociocultural Attitudes Towards Appearance Scale (SATAQ-3; 40.) were used: *Internalisation – General*, 9 items (e.g., "I compare my body to the bodies of TV and movie stars") and *Pressures*, 7 items (e.g., "I've felt pressure from TV or magazines to lose weight"). Responses were rated on a 5-point scale (*definitely disagree* to *definitely agree)*, where higher scores indicated a higher level of internalisation. Acceptable reliability and validity with female adolescent samples have been demonstrated (27; 41.). Internal reliability in the current study was .91 and .92 for thin-ideal internalisation and sociocultural pressures, respectively.

Eating disorder symptoms. Nine diagnostic items from the EDE-Q (32.) assessed the frequency of eating disorder symptoms present over the previous 28 days, and included the behavioural diagnostic features of objective binge episodes, fasting, weight control practices (e.g. purging, laxative use, driven exercise); and cognitive diagnostic features of over-evaluation of weight and shape, and fear of weight gain. Items were standardised and summed together to form a symptom composite. A mean was calculated with higher scores representing greater symptoms of disordered eating. Use of a similar composite of diagnostic items has demonstrated internal consistency and 1-month test-retest reliability among adolescent females (29; 42.). Acceptable internal reliability was obtained in the current study (α = .78).

Psychosocial impairment. The Clinical Impairment Assessment (CIA; 43.) is a 16-item self-report measure of impairment related to eating disorder pathology. Items are rated on a four-point Likert scale (*not at all* to *a lot*), reflecting the extent to which eating habits, exercising, or feelings about eating, shape or weight have had an impact on aspects of personal, social and cognitive psychosocial functioning in the past 28 days. The CIA has demonstrated adequate reliability and validity within a clinical sample of patients with eating

disorders (43.) and has also been validated with a non-clinical university population where it showed excellent internal consistency (α = .94) and 1-week test-retest reliability (r = .94; 44.). Although limited research has been conducted to date using this measure with adolescents, an adapted format showed excellent psychometric properties in a sample of adolescent Fijian schoolgirls (36.). Internal reliability in the current study was .95.

Intervention validity. The Child and Adolescent Mindfulness Measure (CAMM; 45.) was used to assess whether participants receiving the MBI experienced an increase in mindful acceptance and awareness. It consists of 10 items and assesses mindfulness specifically for school-aged youth. A 5-point rating scale (*never true* to *always true*) is used to indicate how often each statement is true of them (e.g., 'I tell myself that I shouldn't feel the way I'm feeling.') All items were reverse scored and a total mean score calculated with higher scores reflecting higher mindfulness. The CAMM has previously been reported as having adequate internal consistency among adolescents (45; 46.), with α = .89 in the current study, and associations in the expected directions with self-regulation, quality of life, stress, rumination, and catastrophising.

Programme Acceptability.

Students. Programme acceptability was assessed at post-intervention by having students rate the programme they received using separate 5-point scales (*not at all* to *very much*) with regard to subjective feelings of improvement in body image, enjoyment, amount of attention paid, extent of homework completed, facilitator confidence, understanding of concepts, ease of use, effectiveness, and likelihood of continued use. Students also gave free report responses regarding programme aspects they liked and disliked. At all follow-up assessments, intervention participants were asked to indicate how much time they had spent using the techniques on a 5-point scale (*not at all* to *a lot*) and any reasons for not using the techniques.

Teachers. School teachers were also asked to complete a qualitative evaluation of the programme. This included questions regarding aspects of the programme they felt were most positive, relevant to students, and those already covered in the school curriculum. They were also asked what aspects could be improved and how confident they would be in teaching the programme themselves after appropriate training.

Statistical Analysis

All analyses were conducted using SPSS, version 19 (47.). Normality distributions and outliers for each outcome variable across time and condition were examined prior to commencing analysis. Square root (dietary restraint), log (negative affect, eating disorder symptoms), and inverse transformations (psychosocial impairment) were applied to account for positive skewness. A reverse square root transformation was applied to mindfulness to account for negative skewness.

Baseline differences between the three experimental conditions were assessed using univariate analysis of variance (ANOVA) for each outcome variable. Differences between the two interventions for each aspect of programme acceptability, and time spent using the techniques, were assessed using independent sample t-tests.

Intervention effects for each outcome variable were assessed using linear mixed models, which are robust with respect to missing follow-up data, unbalanced groups, and varying time points common in repeated measures designs (48.), and are the recommended technique for analysing repeated-measures designs (49.). Baseline observations were used as covariates to eliminate the influence of any baseline variability, resulting in a 3 (condition: mindfulness, dissonance, control) X 3 (time: post-intervention, 1-month, 6-month) X 2 (risk status: low, high) fixed effects model for each outcome variable, with random effects accounting for individual and school-level variation. In this context, both main effects of condition as well as interactions between condition and time are indicators of intervention

effects. Risk status was not included in models for analysis of the facilitator subset, due to insufficient cell sizes severely compromising statistical power to detect statistical differences with respect to risk. Post-hoc analyses were conducted to assess the differential impact of condition on outcome variables at each post-intervention follow-up, with pairwise comparisons indicating specific group differences. A Bonferroni adjustment was applied to account for multiple comparisons. Effect sizes for between-group pairwise comparisons were calculated using Cohen's *d*, where the difference in means between conditions was divided by the pooled standard deviation.

RESULTS

Baseline data

Two cases were identified as multivariate outliers and excluded. Remaining participants (N = 345) were aged 14 to 18 (M = 15.74, SD = 0.82), with a mean self-report BMI of 20.76 (SD = 2.91, range = 14.95–38.06) and a mean baseline level of weight and shape concern of 2.69 (SD = 1.71, range = 0-6), where 29.9% were classified as high risk (≥ 4; 50.). There were no differences between the whole sample and the facilitator subset on any of these demographics ($p > .4$), indicating that the subset was reflective of the larger sample. In addition, there were no significant differences between experimental conditions at baseline on BMI or any of the outcome measures (all $p > .2$).

Intervention validity

Results of a linear mixed model analysis with respect to mindfulness among the whole sample indicated no significant effects of condition (F = 1.00, p = .368), or between conditions over time (F = .932, p = .445). Within the facilitator subset, results showed no significant overall interaction between time and condition [$F(4,191.33)$ = 1.11, p = .351] over post-intervention time points. However, there was a significant main effect of condition

[*F(2,138.56)* = 4.11, *p* = .018], with Bonferroni-adjusted pairwise comparisons showing mindfulness participants to have significantly higher mindfulness across all post-intervention time-points relative to control participants (*p* = .023, *d* = 0.50, 95% CI [0.13, 0.87]). The difference between dissonance participants and control was not significant (*p* = .109, *d* = 0.43, 95% CI [0.02, 0.84]). This indicates a small advantage for the mindfulness-based intervention in improving mindfulness and acceptance as would theoretically be expected.

Intervention effects under task-shifted conditions (whole sample)

Means and associated standard errors, adjusted for baseline assessment, are displayed in **Table 2**. Linear mixed model analyses were conducted with respect to each outcome. As can be seen in **Table 4**, the only significant interaction was between condition and risk status for negative affect, indicating that intervention impact collapsed across all post-intervention time points differed between low and high risk participants. Specifically, there was a marginally significant simple effect of condition among low risk participants [*F(2, 308.72)* = 2.90, *p* = .056], with pairwise comparisons showing those receiving the DBI to be slightly lower on negative affect than control participants (*p* = .050; *d* = 0.31 [0.05, 0.57]). There was no significant effect of condition among high risk participants [*F(2, 313.56)* = 1.01, *p* = .365]. Given the minimal impact of risk status overall, and to provide a comparison to the facilitator subset, risk groups were collapsed for assessing between group pairwise comparisons. **Table 5** displays effect sizes and associated confidence intervals for pairwise comparisons at each time point, showing no significant differences at any time point.

Intervention efficacy with the optimally trained facilitator

Intervention efficacy with respect to outcomes. Means and associated standard errors, adjusted for baseline scores, for each outcome by condition and time are displayed in **Table 3**. Results of linear mixed models are displayed in **Table 4**. Overall interactions between time and condition**,** reflecting a differential change in slope between conditions,

were significant for weight and shape concerns, eating disorder symptoms, and marginally significant for dietary restraint. Post-hoc tests indicated a significant effect of condition evident at the 6-month follow-up for weight and shape concerns [$F(2,263.11) = 6.20$, $p = .002$], dietary restraint [$F(2,264.90) = 6.58$, $p = .002$], sociocultural pressures [$F(2,279.16) = 5.00$, $p = .007$], eating disorder symptoms [$F(2,248.43) = 5.41$, $p = .005$], and psychosocial impairment [$F(2,258.86) = 4.17$, $p = .006$]. In all cases except sociocultural pressures, Bonferroni-adjusted pairwise comparisons revealed significant improvements for mindfulness participants with respect to control at 6-month follow-up. For sociocultural pressures, participants in both interventions were significantly improved relative to the control group at 6-months. **Table 5** displays effect sizes and associated confidence intervals for all pairwise comparisons.

In addition to the interactions over time, significant main effects of condition (indicating intervention effects collapsed across all post-intervention time-points) were revealed for weight and shape concerns, dietary restraint, sociocultural pressures, and psychosocial impairment. Pairwise comparisons showed that mindfulness participants showed greater reductions than control for weight and shape concerns ($p = .046$, $d = 0.45$, 95% CI [0.08, 0.82]), dietary restraint ($p = .044$, $d = 0.46$, 95% CI [0.09, 0.83]), and psychosocial impairment ($p = .007$, $d = 0.57$, 95% CI [0.20, 0.94]) and that dissonance participants showed reduced sociocultural pressures relative to control ($p = .018$, $d = 0.57$, 95% CI [0.16, 0.98]). Main effects of time were found for both weight and shape concerns and negative affect, where participants across conditions reported significantly lower concerns than post-intervention at both 1-month ($p = .009$, $d = 0.38$, 95% CI [0.01, 0.74]) and 6-month ($p = .030$, $d = 0.41$, 95% CI [0.00, 0.81]) follow-up. Participants were also significantly lower than post-intervention for negative affect at the 1-month assessment ($p = .010$, $d = 0.39$, 95% CI [0.02, 0.75]).

Programme Acceptability

Students. Means and standard deviations for programme acceptability ratings taken at post-intervention are presented in **Table 6**. For the facilitator subset, there were no significant differences between interventions for perceived improvement in body image, level of enjoyment, ease of use, effectiveness, amount of attention paid or completion of homework tasks. However, mindfulness participants reported significantly lower understanding of concepts, facilitator confidence, and likelihood of continued use, than dissonance participants. A similar pattern of effects was found for the whole sample analysis, with a trend for lower ratings.

Of the 217 intervention students assessed at post-intervention, 81.6% and 79.3% of students freely reported at least one aspect they liked or disliked, respectively, with the remainder choosing not to give a response. Free report responses of liked aspects included comments regarding the interactive elements (18.9%), informative nature or facts learned (14.7%), visual presentations and booklets (11.5%), liking specific techniques (13.4%), the presenter (9.7%), the overall goal of improving body image (9.7%), changed perspective or increased self-reflection (7.4%), finding the programme interesting (5.1%), or the supportive environment (5.1%). Significant differences between conditions to emerge with respect to these qualitative themes were that dissonance participants were more likely to rate learning new facts as a positive element ($\chi^2 = 20.57$, $p < .001$), and mindfulness participants more likely to rate a change in perspective ($\chi^2 = 4.33$, $p = .037$). Themes that emerged among free report responses of disliked elements included the homework or feeling that the programme took too much time and interfered with study (22.1%), was uninteresting (14.7%), was not personally relevant or should be aimed at a younger audience (14.3%), disliked the techniques or did not find them effective (13.8%), disagreed with the message or concepts (8.8%), wanted more activities or to be more “fun” (11.5%), struggled to understand the

concepts (5.1%), made them feel worse or uncomfortable (5.5%), surveys were too long (4.1%). There were no significant differences between conditions on disliked elements.

Teaching staff. Three of the four teachers returned their programme evaluation form. Positive aspects that were identified included the peer reflection around body image, novelty of the mindfulness concepts, and encouraging acceptance of the self, with particular reference to the high levels of perfectionism and self-criticism in senior grades. Similarly, two of the three staff reflected that although the content of both programmes were relevant, the dissonance intervention concepts were more familiar by this age and therefore the acceptance and self-compassion concepts were considered more useful. Suggestions for improvement included pitching the interventions at a younger age, using a shorter survey, and refinements for making the MBI more interactive and engaging. Staff reflected moderate to high confidence in their ability to implement these interventions with appropriate training.

DISCUSSION

The aim of the current study was to assess the efficacy and acceptability of a mindfulness-based intervention, in comparison to a dissonance-based intervention and control, for reducing the risk of eating disorders in older female adolescents. We were also interested in assessing whether the interventions require implementation by a facilitator with expertise in the intervention approach in order to produce benefits, as an assessment of task-shifting capacity. The results provide preliminary support for the utility of mindfulness in a prevention context; however also indicate some important considerations for future implementations.

Main findings

Overall, intervention effects based on classes across all facilitators showed no significant impact of either the dissonance or mindfulness-based intervention. Diminished

intervention effects when less expert providers deliver interventions is consistent with previous research (e.g., 42.); however, these findings emphasise that delivery of these interventions in the current format, to a universal risk sample, and with this level of facilitator training, is not advised.

In order to assess the impact of facilitator expertise, intervention effects under optimal training conditions (classes led by the first author) were also evaluated. With respect to mindfulness, post-hoc follow-up of significant interactions showed intervention effects for reductions in weight and shape concerns, dietary restraint, sociocultural pressures, eating disorder symptoms, and psychosocial impairment, with significant reductions relative to control at 6-month follow-up associated with medium effect sizes (d = 0.47 – 0.67). Significant main effects of condition for weight and shape concerns, dietary restraint, and psychosocial impairment also demonstrated the superiority of mindfulness relative to control across post-intervention assessments combined (d = 0.45 – 0.57). This positive impact on weight and shape concerns is an important finding given its significant role in the development of disordered eating (3.), and therefore pivotal point in the prevention of such disorders. In contrast to previous significant reductions in depression found for a mindfulness intervention with adolescents also conducted in a universal sample (17.), we found limited impact on negative affect. This may indicate that mindfulness does not work as expected with regard to this variable in the context of a body image intervention, or that the intervention needs to be adapted to enhance the specific impact on negative mood. Additional research will be required to address these questions in the future.

Generally, the above findings compare favourably with previous prevention trials reported in reviews of eating disorder prevention and body image programmes, where small effect sizes are often the norm (12; 51.). Additionally, effect sizes observed at 6-month follow-up are consistent with corresponding improvements produced by the DBI reported in

Stice et al.'s original trial (29.). This is particularly encouraging given that the present study included participants across all levels of body image concern, in contrast to Stice et al.'s study, which was conducted with a volunteer sample of high risk participants who likely demonstrated a greater scope for improvement. The occurrence of significant follow-up effects is also an encouraging finding consistent with successful school-based interventions that report an increase in effect sizes over follow-up rather than deterioration (28.). It also suggests that mindfulness takes time to confer benefit. This supports findings from recent evaluations of school-based mindfulness programmes for improving well-being which have highlighted the importance of practicing mindfulness in order to receive benefit (17; 18.). This underscores the need for future evaluations of mindfulness to aid understanding early on, emphasise the importance of practice, and include longer follow-ups to track the full potential of mindfulness to produce benefit.

With respect to dissonance under optimal training, the significant interaction for sociocultural pressures showed dissonance participants to be significantly lower than control at 6-month follow-up ($d = 0.59$). This is in line with previous evidence of dissonance acting on risk factors occurring early in the development of disordered eating. However, there were no significant differences with control observed across the remaining risk factors, symptoms, and related impairment, despite small to medium effect sizes ($d < 0.43$). Combined with the previous support for DBIs, it is likely that the small sample for analysis resulted in the inability to detect significance of these smaller effects. It is also important to note that there were no statistically significant differences between dissonance and mindfulness; however, effect sizes were in the small to medium range favouring mindfulness. DBIs are not typically delivered in the context of universal settings, although there is one exception that showed reductions in body dissatisfaction and thin-ideal internalisation, with small effect sizes. This mode of delivery with this age group may have impacted adversely on the efficacy of the

package. It is also conceivable that there was an allegiance effect favouring mindfulness, but given that the acceptability ratings tend towards favouring the dissonance intervention, it seems unlikely that this was the case. Regardless, these results require replication in a larger sample to more clearly be able to differentiate the benefits of mindfulness and dissonance.

Viewing all of the findings together, it is clear that the current approach to task-shifting was not viable and a refined facilitator training and selection process is necessary to ensure worthwhile impact. Although moving intervention delivery to non-experts is recognised as an important avenue for enabling widespread dissemination (e.g., 52; 53.), a trade-off between the cost of training and selection of facilitators with intervention benefit is a necessary consideration to be balanced for future implementations.

Programme Acceptability

Despite some encouraging findings with respect to intervention efficacy under optimal facilitation, the moderate acceptability of the programmes from both students and teachers indicates that future implementations will need to make amendments with regard to delivery format and target population. A strong theme that emerged through qualitative comments was that the senior students felt they already knew enough about body image and therefore had predetermined that the content was irrelevant, and therefore felt the programmes intruded on their study time. This is likely to be particular to older adolescents in senior grades, and thus the interventions may be received more favourably among younger students. Indeed, universal programmes with early adolescents have evidenced greater acceptability (28; 54.). Teaching staff echoed that younger students might be more amenable to these kinds of interventions, although they reported mindfulness and self-compassion to be valuable concepts for senior students that could be translated to coping within high achieving academic environments. Accordingly, future research may benefit from trialling the programmes in a younger age group, with a consideration of their capacity to appropriate

metacognitive concepts inherent within mindfulness, or alternatively, packaging the body-specific content within a more general programme on well-being and coping with stress. Finally, a strong preference for increased visual and interactive elements suggests that increased attention to enhancing these aspects may result in greater engagement and subsequent intervention benefit.

It is perhaps interesting to note that effects for mindfulness and not for dissonance were obtained, relative to control, despite mindfulness participants reporting lower understanding, likelihood of continued use and confidence in the facilitator, compared to dissonance participants. This is likely related to the fact that assessment of acceptability was taken at post-intervention, when the concepts were still new and the extent of practice limited. The effects of mindfulness emerged over follow-up, providing further support that mindfulness may take time to grasp and engage, and thus to confer benefit. Future research may profit from including qualitative assessment at a later follow-up in order to capture this change.

Limitations

These findings should be interpreted in the context of some significant limitations. First, randomising by class within year level introduced the capacity for cross contamination between conditions. This potential was not assessed and could be remedied in future by using the school or year level as the unit for randomisation. Second, although the majority of control classes received supervised study lessons, at least one of the control classes received a guest speaker on the subject of meditation, which introduced a further source of contamination for the control group. Third, the small sample size demonstrates limited power to detect statistical significance of small effects commonly found in universal trials, which is a contributing factor to the small number of significant results, particularly for the dissonance intervention that had fewer participants. Fourth, all data was collected via self-report

measures which allows for potential biases in responding. Fifth, the fidelity of program administration was not assessed and future research should include this evaluation. Sixth, cognitive dissonance is not usually delivered in a universal context and therefore requires replication with additional consideration of how the intervention is adapted. Finally, the 6-month follow-up is short compared to some prevention trials. Future research should therefore aim to extend follow-up to better determine maintenance of effects.

Conclusion

This study provides important preliminary data regarding the feasibility of a mindfulness-based intervention for reducing body image disturbance and risk for eating disorders. It suggests that mindfulness can be effective with respect to important eating disorder risk factors, symptoms, and associated impairment, although these effects are not immediately apparent and appear to depend on a certain level of facilitator knowledge and experience. These are important findings that provide support for the continued application and evaluation of mindfulness in the context of eating disorders prevention. Nevertheless, considerable work is required to enhance programme content and delivery with respect to enhancing the impact on negative affect, improving overall acceptability among participants, trialling in younger students, and better enabling successful facilitation by less expert providers, in order to maximise benefit.

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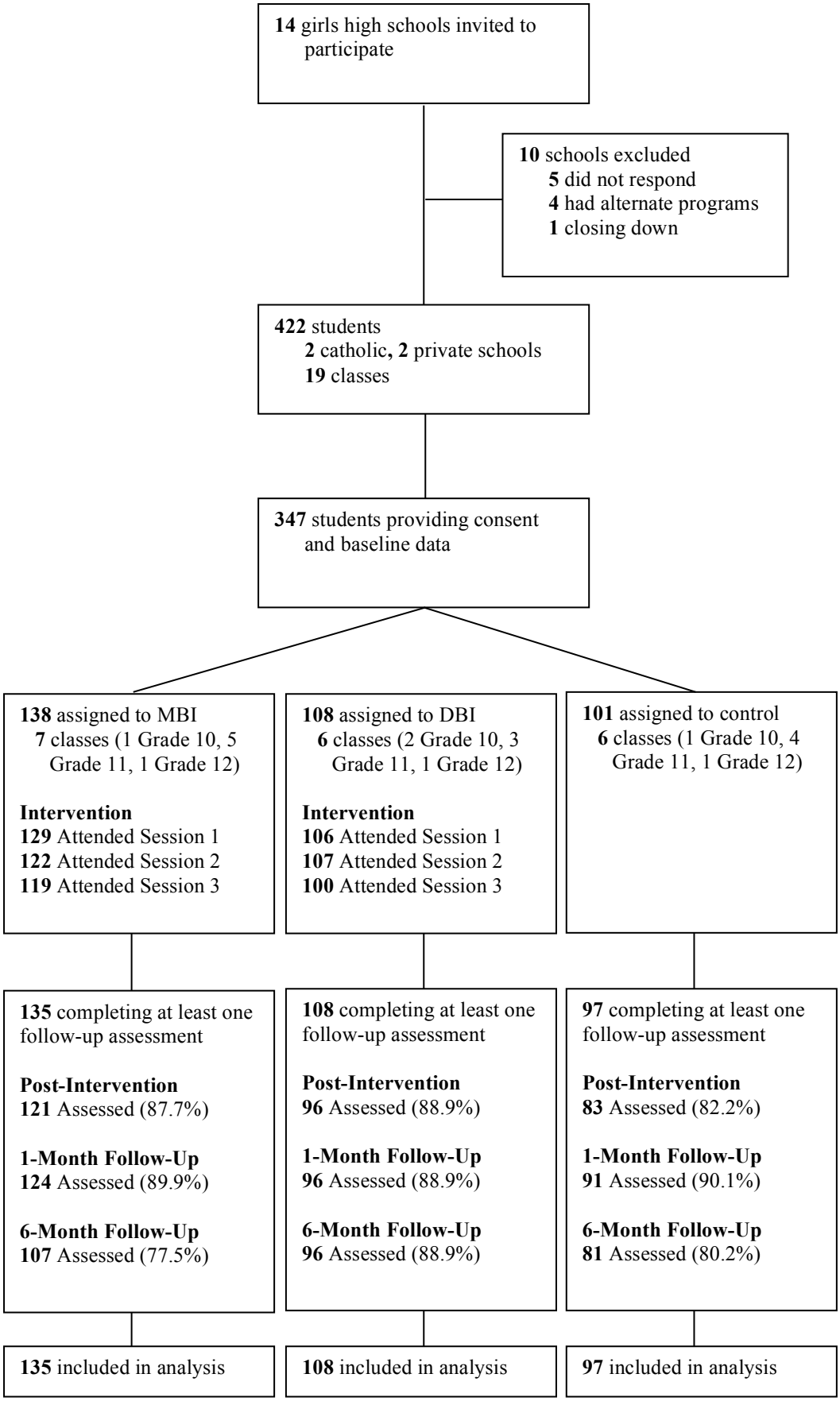

Figure 1. Participant flow

Table 1

Intervention Features

Lesson	**Components**
Mindfulness-Based Intervention	
Lesson 1 Introducing Mindfulness	1. Common coping strategies: Suppression and magnification exercises 2. Video: "Today is a Gift" (Kung Fu Panda) 3. Visual slideshow about what mindfulness is *not* 4. Guided exercise (Raisin) for present awareness *Homework*: 1. Management strategies worksheet 2. Awareness and acceptance of routine task
Lesson 2 A New Way of Relating to Experience	1. Barriers to mindfulness (hand out Hint Cards) 2. De-centring thought exercise 3. Guided exercise: Sitting with magazine images 4. Role-play mindfulness attitude in groups 5. STOP Method for countering auto-pilot *Homework*: 1. STOP practise 2. Awareness of pleasant body experience
Lesson 3 Self-compassion and Letting Go	1. Discuss "Guest House" poem in pairs 2. Brainstorm compassionate acceptance statements 3. Guided exercise: Visualised mirror reflection 4. Discuss future pressures and develop a Personal Action Plan *Homework*: 1. STOP practise
Dissonance-Based Intervention	
Lesson 1 Defining the Thin-Ideal	1. Brainstorm thin-ideal 2. Video: Dove Evolutions (air-brushing) 3. Examine visual Factsheet 4. Small group discussions: Costs of thin-ideal 5. Video: Little girl doing verbal affirmation in mirror *Homework*: 1. Self-affirmation mirror task
Lesson 2 Resisting Pressures to be Thin	1. Mirror review 2. Write email to younger girl about costs of pursuing thin-ideal 3. Role-plays: Verbal challenges to thin-ideal *Homework*: 1. Top-10 List (Body Activism)
Lesson 3 Body Activism	1. Role-plays: Quick comebacks to thin-ideal 2. Discuss behavioural challenge 3. Discuss body activism 4. Future pressures and Response plan *Homework*: 1. Behavioural challenge 2. Body activism challenge

Table 2

Adjusted Means (and Standard Errors) of Outcomes for the Whole Sample by Condition, Time, and Risk Status, Controlling for Baseline

	Baseline Covariate	**Low Risk (*n* = 242)**			**High Risk (*n* = 103)**		
		Post	1-month	6-month	Post	1-month	6-month
Variable	*M*	*M (SE)*	*M (SE)*	*M (SE)*	*M (SE)*	*M (SE)*	*M (SE)*
Primary outcomes							
Weight & Shape Concerns	2.63						
CAU		2.46 (0.15)	2.20 (0.14)	2.38 (0.15)	2.89 (0.22)	2.53 (0.22)	2.60 (0.23)
MBI		2.39 (0.12)	1.98 (0.12)	2.22 (0.13)	2.88 (0.20)	2.74 (0.20)	2.57 (0.20)
DBI		2.23 (0.14)	1.99 (0.14)	2.23 (0.14)	2.73 (0.21)	2.18 (0.21)	2.52 (0.21)
Negative Affect[±]	0.30						
CAU		0.34 (0.02)	0.29 (0.02)	0.31 (0.02)	0.30 (0.03)	0.30 (0.03)	0.31 (0.03)
MBI		0.30 (0.02)	0.26 (0.02)	0.31 (0.02)	0.31 (0.03)	0.33 (0.03)	0.33 (0.03)
DBI		0.28 (0.02)	0.26 (0.02)	0.26 (0.02)	0.36 (0.03)	0.32 (0.03)	0.36 (0.03)
Secondary outcomes							
Dietary restraint[±]	1.53						
CAU		1.48 (0.03)	1.45 (0.03)	1.48 (0.03)	1.52 (0.05)	1.47 (0.05)	1.46 (0.06)
MBI		1.40 (0.03)	1.39 (0.03)	1.39 (0.03)	1.57 (0.05)	1.52 (0.05)	1.44 (0.05)
DBI		1.40 (0.03)	1.36 (0.03)	1.39 (0.03)	1.51 (0.05)	1.44 (0.05)	1.47 (0.05)
Thin-ideal internalisation	3.28						
CAU		3.15 (0.09)	3.08 (0.09)	3.25 (0.09)	3.19 (0.14)	2.97 (0.14)	3.18 (0.15)
MBI		3.06 (0.08)	3.04 (0.07)	3.20 (0.08)	3.24 (0.12)	3.14 (0.12)	3.04 (0.13)
DBI		3.13 (0.09)	3.12 (0.09)	3.25 (0.09)	3.27 (0.12)	3.15 (0.13)	3.02 (0.13)
Sociocultural pressures	3.07						
CAU		2.98 (0.10)	2.87 (0.10)	3.20 (0.10)	2.95 (0.16)	2.78 (0.16)	3.01 (0.17)
MBI		2.81 (0.09)	2.83 (0.08)	2.96 (0.09)	2.95 (0.14)	2.82 (0.14)	2.71 (0.14)
DBI		2.84 (0.10)	2.85 (0.10)	2.93 (0.10)	2.92 (0.14)	2.77 (0.14)	2.73 (0.15)
ED symptoms	0.22						
CAU		0.22 (0.01)	0.19 (0.01)	0.20 (0.01)	0.24 (0.02)	0.22 (0.02)	0.22 (0.02)
MBI		0.20 (0.01)	0.18 (0.01)	0.19 (0.01)	0.25 (0.02)	0.24 (0.02)	0.21 (0.02)
DBI		0.18 (0.01)	0.17 (0.01)	0.18 (0.01)	0.22 (0.02)	0.20 (0.02)	0.22 (0.02)
Psychosocial Impairment	0.29						
CAU		0.31 (0.02)	0.29 (0.02)	0.31 (0.02)	0.33 (0.04)	0.29 (0.03)	0.31 (0.04)
MBI		0.26 (0.02)	0.25 (0.02)	0.26 (0.02)	0.31 (0.03)	0.35 (0.03)	0.28 (0.03)
DBI		0.26 (0.02)	0.23 (0.02)	0.26 (0.02)	0.34 (0.03)	0.28 (0.03)	0.37 (0.03)

Note. MBI = Mindfulness-based intervention, DBI = Dissonance-based intervention, CAU = Assessment-only control; [±] Transformed variables

Table 3

Adjusted Means (and Standard Errors) of Outcomes for the Optimal Facilitator Subset, by Condition and Time

Variable	Baseline Covariate *M*	Post-Intervention *M (SE)*	1-month Follow-up *M (SE)*	6-month Follow-up *M (SE)*
Primary outcomes				
Weight & Shape Concerns	2.61			
CAU		2.76 (0.17)	2.53 (0.16)	2.63 (0.17)
MBI		2.58 (0.16)	2.16 (0.15)	1.82 (0.16)
DBI		2.26 (0.18)	2.06 (0.19)	2.29 (0.19)
Negative Affect±	0.30			
CAU		0.35 (0.02)	0.31 (0.02)	0.32 (0.02)
MBI		0.29 (0.02)	0.26 (0.02)	0.31 (0.02)
DBI		0.31 (0.03)	0.25 (0.02)	0.26 (0.03)
Secondary outcomes				
Dietary Restraint±	1.51			
CAU		1.51 (0.04)	1.45 (0.04)	1.50 (0.04)
MBI		1.45 (0.04)	1.38 (0.04)	1.30 (0.04)
DBI		1.43 (0.05)	1.42 (0.05)	1.42 (0.05)
Thin-ideal Internalisation	3.23			
CAU		3.13 (0.11)	3.09 (0.10)	3.34 (0.10)
MBI		3.17 (0.10)	3.14 (0.09)	3.15 (0.10)
DBI		2.89 (0.12)	2.93 (0.12)	3.09 (0.12)
Sociocultural Pressures	3.02			
CAU		3.01 (0.12)	2.97 (0.12)	3.25 (0.12)
MBI		2.94 (0.11)	2.86 (0.11)	2.82 (0.12)
DBI		2.62 (0.14)	2.69 (0.14)	2.72 (0.14)
ED Symptoms±	0.21			
CAU		0.23 (0.02)	0.21 (0.02)	0.22 (0.02)
MBI		0.21 (0.02)	0.18 (0.01)	0.15 (0.02)
DBI		0.18 (0.02)	0.18 (0.02)	0.19 (0.02)
Psychosocial Impairment±	0.28			
CAU		0.33 (0.03)	0.31 (0.03)	0.34 (0.03)
MBI		0.26 (0.03)	0.23 (0.02)	0.22 (0.03)
DBI		0.27 (0.03)	0.26 (0.03)	0.29 (0.03)

Note. MBI = Mindfulness-based intervention, DBI = Dissonance-based intervention, CAU = Assessment-only control; ± Transformed variables

Table 4

Main and Interaction Effects for the Whole Sample, and for the Optimal Facilitator Subset

	Whole Sample (n = 345)			Optimal Facilitator Subset (n = 156)		
Variable	***F***	***df***	***p***	***F***	***df***	***p***
Weight & Shape Concerns						
Time	12.43	2, 544.52	.000	5.11	2, 159.24	.007
Condition	1.11	2, 334.73	.330	3.63	2, 134.87	.029
Time x Condition	0.65	4, 544.42	.628	2.85	4, 161.40	.026
Risk x Condition	0.43	2, 334.90	.653	-	-	-
Risk x Time x Condition	1.10	6, 544.32	.364	-	-	-
Negative Affect[±]						
Time	2.67	2, 429.54	.070	4.41	2, 174.12	.014
Condition	0.01	2, 312.15	.988	2.25	2, 129.48	.110
Time x Condition	0.34	4, 432.17	.850	1.36	4, 174.87	.251
Risk x Condition	3.17	2, 312.03	.043	-	-	-
Risk x Time x Condition	1.10	6, 430.20	.359	-	-	-
Dietary restraint[±]						
Time	3.96	2, 403.85	.020	2.64	2, 166.14	.075
Condition	1.26	2, 320.76	.285	3.07	2, 134.29	.050
Time x Condition	0.76	4, 404.05	.553	2.37	4, 189.94	.054
Risk x Condition	1.39	2, 321.05	.251	-	-	-
Risk x Time x Condition	0.96	6, 403.81	.452	-	-	-
Thin-ideal internalisation						
Time	2.30	2, 422.76	.101	2.80	2, 168.56	.063
Condition	0.10	2, 317.23	.909	1.68	2, 135.07	.189
Time x Condition	0.70	4, 423.56	.591	0.92	4, 173.20	.455
Risk x Condition	0.14	2, 317.18	.870	-	-	-
Risk x Time x Condition	1.70	6, 423.28	.119	-	-	-
Sociocultural pressures						
Time	2.17	2, 417.61	.115	0.77	2, 172.27	.466
Condition	0.99	2, 306.00	.375	3.95	2, 129.37	.022
Time x Condition	1.28	4, 418.34	.278	1.25	4, 182.08	.291
Risk x Condition	0.06	2, 305.74	.944	-	-	-
Risk x Time x Condition	1.10	6, 418.41	.364	-	-	-
Eating disorder symptoms[±]						
Time	4.06	2, 373.77	.018	2.67	2, 148.40	.073
Condition	0.94	2, 320.58	.391	2.85	2, 134.15	.062
Time x Condition	0.65	4, 374.45	.626	2.47	4, 152.60	.047
Risk x Condition	0.38	2, 320.98	.687	-	-	-
Risk x Time x Condition	0.54	6, 374.21	.776	-	-	-
Psychosocial Impairment[±]						
Time	1.89	2, 445.07	.152	0.81	2, 178.38	.445
Condition	0.44	2, 320.86	.647	4.82	2, 130.44	.010
Time x Condition	2.14	4, 451.79	.075	0.72	4, 180.29	.577
Risk x Condition	1.60	2, 321.21	.204	-	-	-
Risk x Time x Condition	1.03	6, 446.57	.403	-	-	-

[±] Transformed variables

Table 5

Effect Sizes (Cohen's d) for Between-Groups Pairwise Comparisons for the Whole Sample and the Optimal Facilitator Subset

	Whole Sample (*n* = 345)			**Optimal Facilitator Subset (*n* = 156)**		
	Post	1-Month	6-month	Post	1-Month	6-month
Variable	*d [95% CI]*	*d [95% CI]*	*d [95% CI]*	*d [95% CI]*	*d [95% CI]*	*d [95% CI]*
Primary outcomes						
Weight & Shape Concerns						
MBI vs. CAU	0.04 [-0.32, 0.41]	0.00 [-0.36, 0.37]	0.10 [-0.27, 0.46]	0.14 [-0.22, 0.51]	0.31 [-0.06, 0.67]	0.65 [0.27, 1.02]**
DBI vs. CAU	0.22 [-0.19, 0.62]	0.31 [-0.09, 0.72]	0.12 [-0.28, 0.53]	0.41 [0.00, 0.81]	0.39 [-0.02, 0.80]	0.27 [-0.14, 0.68]
DBI vs. MBI	0.18 [-0.22, 0.59]	0.33 [-0.08, 0.73]	0.03 [-0.37, 0.43]	0.27 [-0.13, 0.67]	0.09 [-0.32, 0.49]	-0.39 [-0.80, 0.01]
Negative Affect						
MBI vs. CAU	0.11 [-0.25, 0.48]	-0.01 [-0.38, 0.35]	-0.05 [-0.42, 0.31]	0.39 [0.02, 0.75]	0.33 [-0.04, 0.69]	0.05 [-0.31, 0.42]
DBI vs. CAU	-0.01 [-0.41, 0.40]	0.05 [-0.36, 0.45]	0.03 [-0.38, 0.43]	0.24 [-0.17, 0.64]	0.39 [-0.02, 0.80]	0.33 [-0.07, 0.74]
DBI vs. MBI	-0.13 [-0.53, 0.27]	0.07 [-0.34, 0.47]	0.09 [-0.31, 0.49]	-0.15 [-0.55, 0.25]	0.07 [-0.33, 0.48]	0.28 [-0.12, 0.68]
Secondary outcomes						
Dietary restraint						
MBI vs. CAU	0.07 [-0.30, 0.43]	0.05 [-0.32, 0.41]	0.26 [-0.11, 0.62]	0.19 [-0.18, 0.55]	0.26 [-0.11, 0.62]	0.67 [0.29, 1.04]**
DBI vs. CAU	0.23 [-0.18, 0.63]	0.30 [-0.11, 0.71]	0.21 [-0.20, 0.61]	0.26 [-0.15, 0.66]	0.11 [-0.30, 0.51]	0.25 [-0.16, 0.65]
DBI vs. MBI	0.17 [-0.23, 0.57]	0.27 [-0.14, 0.67]	-0.07 [-0.47, 0.34]	0.07 [-0.33, 0.47]	-0.14 [-0.55, 0.26]	-0.43 [-0.83, -0.02]
Thin-ideal internalisation						
MBI vs. CAU	0.03 [-0.34, 0.39]	-0.11 [-0.47, 0.25]	0.15 [-0.22, 0.51]	-0.06 [-0.42, 0.31]	-0.06 [-0.42, 0.31]	0.25 [-0.12, 0.61]
DBI vs. CAU	-0.06 [-0.46, 0.35]	-0.19 [-0.60, 0.21]	0.13 [-0.27, 0.53]	0.31 [-0.10, 0.71]	0.22 [-0.19, 0.62]	0.32 [-0.08, 0.73]
DBI vs. MBI	-0.10 [-0.50, 0.31]	-0.09 [-0.49, 0.32]	-0.02 [-0.42, 0.38]	0.38 [-0.02, 0.79]	0.29 [-0.12, 0.69]	0.08 [-0.33, 0.48]
Sociocultural pressures						
MBI vs. CAU	0.12 [-0.24, 0.49]	0.00 [-0.37, 0.36]	0.39 [0.02, 0.76]	0.09 [-0.28, 0.45]	0.13 [-0.24, 0.49]	0.47 [0.09, 0.83]*
DBI vs. CAU	0.13 [-0.27, 0.54]	0.02 [-0.39, 0.42]	0.41 [0.00, 0.82]	0.44 [0.030, 0.84]	0.33 [-0.08, 0.73]	0.59 [0.17, 1.00]*
DBI vs. MBI	0.00 [-0.40, 0.40]	0.02 [-0.38, 0.43]	0.01 [-0.39, 0.41]	0.36 [-0.04, 0.77]	0.21 [-0.19, 0.61]	0.11 [-0.29, 0.51]
ED symptoms						
MBI vs. CAU	0.07 [-0.30, 0.43]	-0.03 [-0.40, 0.33]	0.11 [-0.26, 0.47]	0.13 [-0.24, 0.49]	0.27 [-0.09, 0.64]	0.61 [0.24, 0.98]**
DBI vs. CAU	0.32 [-0.09, 0.72]	0.20 [-0.20, 0.61]	0.10 [-0.31, 0.50]	0.35 [-0.06, 0.76]	0.29 [-0.11, 0.70]	0.30 [-0.11, 0.70]
DBI vs. MBI	0.26 [-0.14, 0.66]	0.24 [-0.16, 0.65]	-0.02 [-0.42, 0.38]	0.23 [-0.18, 0.63]	0.02 [-0.38, 0.42]	-0.32 [-0.73, 0.08]
Psychosocial Impairment						
MBI vs. CAU	0.21 [-0.16, 0.57]	-0.08 [-0.44, 0.29]	0.23 [-0.14, 0.59]	0.35 [-0.02, 0.71]	0.43 [0.06, 0.80]	0.59 [0.22, 0.96]**
DBI vs. CAU	0.16 [-0.24, 0.57]	0.22 [-0.18, 0.63]	-0.03 [-0.43, 0.38]	0.31 [-0.10, 0.72]	0.24 [-0.17, 0.64]	0.24 [-0.17, 0.65]
DBI vs. MBI	-0.06 [-0.46, 0.34]	0.32 [-0.09, 0.72]	-0.29 [-0.69, 0.12]	-0.04 [-0.44, 0.36]	-0.19 [-0.59, 0.21]	-0.37 [-0.77, 0.04]

Note. ** $p < .01$, * $p < .05$, Bonferroni adjustments; CI = Confidence Interval; MBI = Mindfulness-based intervention, DBI = Dissonance-based intervention, CAU = Classes as usual.

Table 6

Post-Intervention Assessment of Programme Acceptability for the Whole Sample and the Optimal Facilitator Subset

	Whole Sample				Optimal Facilitator Subset			
Variable	**Mindfulness (*n* = 59)** *M (SD)*	**Dissonance (*n* = 40)** *M (SD)*	*t(p)*	*d*	**Mindfulness (*n* = 121)** *M (SD)*	**Dissonance (*n* = 96)** *M (SD)*	*t(p)*	*d*
Improvement in body feelings	3.15 (0.73)	3.14 (0.65)	0.10 (.924)	0.01	3.14 (0.76)	3.11 (0.58)	0.19 (0.848)	0.04
Enjoyment	2.39 (0.95)	2.50 (1.02)	-0.79 (.433)	0.11	2.49 (0.77)	2.76 (0.96)	-1.44 (0.154)	0.31
Attention paid	3.03 (0.97)	3.39 (0.88)	-2.86 (.005)	0.39	3.14 (0.96)	3.47 (0.74)	-1.72 (0.089)	0.38
Homework completion	1.68 (0.92)	2.23 (1.19)	-3.78 (<.001)	0.52	1.71 (0.82)	1.92 (1.01)	-1.04 (0.302)	0.23
Facilitator confidence	3.89 (1.08)	4.20 (0.87)	-2.25 (.026)	0.31	4.12 (0.81)	4.54 (0.65)	-2.58 (0.012)	0.56
Understanding	3.58 (1.03)	4.10 (0.97)	-3.83 (<.001)	0.52	3.71 (0.97)	4.46 (0.65)	-4.07 (<.001)	0.88
Ease of use	3.14 (1.08)	3.32 (1.01)	-1.29 (.200)	0.17	3.27 (1.02)	3.41 (0.87)	-0.67 (0.502)	0.15
Effectiveness	2.39 (1.08)	2.60 (1.07)	-1.42 (.156)	0.19	2.37 (1.04)	2.70 (0.97)	-1.53 (0.130)	0.32
Likelihood of continued use	1.94 (1.07)	2.29 (1.10)	-2.36 (.019)	0.32	1.94 (1.01)	2.41 (0.83)	-2.29 (0.025)	0.50

Note. d = Cohen's d, $M_2 - M_1/SD_{pooled}$

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