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Examining the efficacy of video-based micro-interventions for improving risk and protective

factors for disordered eating among young adult women

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Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon

reasonable request.

Abstract

Brief self-guided activities designed for focused and immediate benefits, termed micro-interventions, have the potential to aid reach and engagement in mental health interventions; however further validation is needed. This study evaluated effects of two micro-interventions for responding to appearance-ideal media on risk and protective factors for disordered eating. Undergraduate women (N=202, M_{age}=19.90, SD=2.75) were allocated quasi-randomly to one of three 15-min video-based micro-interventions (mindfulness, cognitive dissonance, educational control) in the lab and assessed on state outcomes at baseline and immediate post-test. One week later, trait factors were assessed and participants underwent an appearance-ideal media exposure task. Results showed both mindfulness and dissonance groups reported significant immediate benefits to state appearance-ideal internalisation, perceived sociocultural pressures and related distress, and mood, compared to educational control (Glass's Δ effect sizes = .40-.94), but not state weight or appearance satisfaction. At 1-week follow-up, mindfulness and dissonance groups demonstrated improved trait appearance-ideal internalisation (Δ = .40 and .42), weight and shape concerns (Δ = .27 [*ns*] and .44), and body appreciation (Δ = .39 and .46) compared to the educational control. There were no effects on trait perceived pressures, negative affect, or body image psychological flexibility, and no differential changes in state outcomes from pre- to post-media exposure. Micro-interventions using mindfulness and dissonance techniques show promise for improving some risk and potential protective factors for disordered eating in the immediate and short-term. Further research is required to substantiate their place within the spectrum of eating disorder prevention, early intervention and treatment techniques.

Keywords: feeding and eating disorders, body image, mindfulness, cognitive dissonance, prevention, early intervention, risk factors, protective factors, micro-intervention, media exposure

Eating disorders are serious psychiatric disorders characterised by significant physical and mental health difficulties, chronicity, low help-seeking, moderate recovery, and significant economic burden (Ali et al., 2017; Arcelus et al., 2011; Hart et al., 2011; Keel & Brown, 2010; Linardon et al., 2017; Samnaliev et al., 2015). Prevention and early intervention is vital. Efforts have focused on reducing risk factors for eating disorders and disordered eating (i.e., maladaptive cognitions and behaviours irrespective of clinical diagnosis), including perceived sociocultural appearance pressures (e.g., from peers, family and media), internalisation of societal appearance ideals, body dissatisfaction and weight and shape concerns, and negative affect (Jacobi & Fittig, 2010; Pennesi & Wade, 2016; Stice, 2001). Multi-session face-to-face and online interventions using cognitive dissonance induction, media literacy, cognitive-behavioural therapy, and mindfulness have shown effectiveness (for reviews, see Le et al., 2017 and Watson et al., 2016). Despite growing evidence, creating scalable intervention strategies and catering for a broader spectrum of user preferences remains pressing (Holmes et al., 2018).

Micro-interventions for Reducing Risk of Disordered Eating

Lack of time, scheduling difficulties, and stigma limit uptake into face-to-face interventions aimed at reducing risk of disordered eating among young women (Atkinson & Wade, 2013). While incorporating interventions into existing infrastructures (e.g., schools) or providing online modules via the internet overcomes some obstacles, many interventions still require intensive multiple hour-long sessions, contributing to disengagement and limiting reach (Atkinson et al., 2020; Eysenbach, 2005; Melville et al., 2010). An alternative approach is the use of micro-interventions, a term which has recently emerged and been used to describe brief self-guided therapeutic activities designed for immediate and targeted benefit, in either single or repeated administration (Elefant et al., 2017; Fuller-Tyszkiewicz et al., 2019). They typically are designed to be easily accessible (e.g., brief videos and audios, animations, writing tasks) via digital technologies (e.g., websites and online platforms, smartphone apps), offering potential to be widely disseminated at low cost (e.g., via social media, charities, service providers) to enable broad reach (Matheson et al., 2020). Importantly, framing micro-interventions as quick and effective tools with a focused objective (i.e., targeting particular threats or aspects of well-being) may encourage individuals with less need or motivation for intensive

intervention to engage and receive benefit. This has relevance for stand-alone approaches suitable for

prevention and early intervention contexts, as well as potentially serving as adjuncts to target specific

concerns within more intensive multi-faceted interventions (Fuller-Tyszkiewicz et al., 2019).

Nevertheless, research is needed to validate the need and efficacy of such approaches.

Within the context of eating disorders prevention and early intervention, evaluating micro-

interventions that have been informed by existing evidence-based interventions targeting validated

risk factors for disordered eating is key. Cognitive dissonance is currently one of the most effective

approaches (Le et al., 2017), in which participants engage in counter-attitudinal verbal, behavioural

and written exercises to challenge internalised sociocultural appearance ideals over a period of 2-6

hours of modular interactive sessions (Stice et al., 2008). Guided by cognitive dissonance theory

(Festinger, 1957) and the dual pathway model of bulimic pathology (Stice, 2001), dissonance-based

interventions primarily target appearance-ideal internalisation and have demonstrated efficacy in

reducing multiple risk factors and onset of eating disorders in adolescent girls and young women up to

three years later (Dakanalis et al., 2019; Stice et al., 2019). More recently, mindfulness-based eating

disorder prevention has received preliminary support (Beccia et al., 2018). Such interventions

cultivate mindfulness (i.e., non-judgmental awareness and acceptance in the present; Bishop et al.,

2004) as an alternative to unhelpful coping strategies, and are thought to disrupt influence of distal

(e.g., counteracting sociocultural pressures) and proximal (i.e., reducing impact of negative body

image experiences) risk for disordered eating (Atkinson, 2015). Multi-session 1-hour long

interventions have demonstrated reductions in risk factors for disordered eating, including

internalisation and weight and shape concerns, in adolescent girls and young women (Atkinson &

Wade, 2015, 2016).

Preliminary evidence suggests utilising dissonance and mindfulness techniques in a micro-

intervention format targeting risk factors for disordered eating, within a specific context, may be

beneficial. Experimental work with undergraduate women showed single 5-minute tasks based on

metacognitive acceptance (a component of mindfulness) and dissonance-induction reduced state

weight dissatisfaction compared to assessment-only control (Wade et al., 2009), following exposure to

idealised media images. The acceptance condition additionally evidenced reduced state appearance

dissatisfaction, and, in a follow-up study with 10-min video-based delivery, state negative affect (Atkinson & Wade, 2012). A recent study found women who engaged with a multi-session mindfulness-based micro-intervention for improving body satisfaction specifically (i.e., 11 brief online videos accessed over three weeks) demonstrated immediate improvements in state body satisfaction, and short-term (3-week follow-up) benefits on trait-based body satisfaction, compared to wait-list controls (Fuller-Tyszkiewicz et al., 2019). Although these are promising findings, additional research is needed, including comparison to active control conditions to account for non-specific effects, assessing potential to mitigate against relevant stressors (e.g., later media exposure), and testing additional outcomes. With respect to the latter, evaluating capacity to enhance protective factors for disordered eating could further substantiate micro-intervention effects and avoid duplication that may arise in targeting protective factors separately via new interventions (Atkinson & Wade, 2019; Halliwell & Diedrichs, 2019).

Protective factors

Protective factors for disordered eating include family and social support, media literacy, and positive body image (e.g., media literacy skills, rejection of narrow appearance ideals, positive body image; Levine & Smolak, 2016). In particular, positive body image has a unique relationship with disordered eating and broader health and well-being distinct from negative body image (Piran & Tylka, 2019). It is a multi-faceted construct involving body appreciation and acceptance, awareness and attention to bodily needs, and self-protective filtering of external pressures (e.g., rejecting sociocultural appearance ideals promoted in the media; Tylka & Wood-Barcalow, 2015b). Although largely overlooked in prevention research to date, assessing positive body image could enhance comprehensive understanding of prevention efforts.

Two aspects of positive body image may have particular relevance to mindfulness and cognitive dissonance-based micro-interventions: *body appreciation* and *body image psychological flexibility*. *Body appreciation* refers to accepting, holding favourable opinions towards, and respecting one's body, in spite of perceived flaws (Avalos et al., 2005). It is negatively correlated with disordered eating (Avalos et al., 2005; Tylka & Wood-Barcalow, 2015a), and positively correlated with intuitive eating and health promoting behaviours (Andrew et al., 2016a; Oh et al., 2012).

Experimental work shows body appreciation protects women from the negative impact of appearance ideal media exposure and its concomitant impact on disordered eating risk factors, including body dissatisfaction (Andrew et al., 2015). While longitudinal evidence for body appreciation as a protective factor is limited, one study showed body appreciation was predictive of adaptive eating behaviours among adolescent girls after 12-months (Andrew et al., 2016b).

Dissonance-based microintervention strategies may be expected to increase body appreciation as this technique encourages recognition and acceptance of diversity in body shapes and sizes to reduce pursuit of narrow appearance ideals promoted in the media; verbalising and reinforcing body acceptance messages encompassing both appearance and function; and engagement in critique to develop and strengthen a protective information processing style regarding the body (Halliwell & Diedrichs, 2019). Indeed, semi-mandatory participation in 1-4 hrs of face-to-face dissonance-based intervention in educational settings resulted in increased body appreciation compared to assessment-only control among young girls and young adult women (Halliwell & Diedrichs, 2019). Mindfulness-based micro-intervention strategies may also be expected to improve body appreciation as it inherently involves cultivating acceptance and openness to all experiences without judgement, which may facilitate reduced self-criticism and greater acceptance and appreciation of the body (Atkinson & Wade, 2019). In support, multi-session mindfulness-based self-compassion interventions have shown increases in body appreciation at post-intervention compared to assessment only and waitlist controls (Albertson et al., 2014; Toole & Craighead, 2016).

Body image psychological flexibility is a psychological construct denoting an adaptive regulation strategy for body-related threats (e.g., negative thoughts and feelings about the body, external pressures and criticisms), encompassing the welcoming and acknowledgement of experiences rather than avoidance or suppression, and exercising choice in pursuing valued actions (e.g., self-care) in place of maladaptive automatic reactions (Hill et al., 2013; Sandoz et al., 2013). While longitudinal evidence as a protective factor for disordered eating is again lacking, cross-sectional data has shown body image inflexibility to be associated with disordered eating, even after controlling for body dissatisfaction (Ferreira et al., 2011; Hill et al., 2013; Pellizzer et al., 2017; Sandoz et al., 2013). Studies have also found body image psychological flexibility to moderate and mediate the relationship

between appearance evaluation, and disordered eating and appearance modification (for review, see Rogers et al., 2018). Mindfulness-based strategies may be particularly suited to improve body image flexibility given their explicit targeting of experiential avoidance through present-moment awareness, acceptance, openness to experience, and non-reactivity (e.g., Baer et al., 2003) and reduction of automatic secondary emotional and behavioural responses to body image threats (Atkinson, 2015).

The Current Study

The objective of this study was to evaluate two 15-minute video-based delivery of micro-interventions relative to an active educational control (documentary excerpt), among young women. Microinterventions were based on leading and emerging eating disorder prevention approaches (cognitive dissonance and mindfulness respectively), and focused on response to appearance-ideal media imagery specifically. Our aims were threefold:

1. To assess immediate effects of the micro-interventions via *state* assessment of risk factors for disordered eating (weight and appearance satisfaction and related distress, appearance-ideal internalisation, perceived pressures and related distress, affect), compared to an active educational control. We predicted that both micro-interventions would result in immediate improvements relative to educational control across all state outcomes.

2. To assess short-term effects of the micro-interventions via *trait* assessment of risk factors (appearance-ideal internalisation, perceived sociocultural pressures, weight and shape concerns, and negative affect), *and* potential protective factors (body appreciation, body image psychological flexibility) after 1-week. We hypothesised both micro-interventions would result in improvements across risk factors and body appreciation compared to an educational control; however, we expected only mindfulness to improve body image psychological flexibility relative to control. We also considered effects on appearance-ideal internalisation, and additional outcome of trait mindfulness, as tests of intervention validity for dissonance and mindfulness, respectively.

3. To assess resilience to negative effects of later exposure to appearance ideal media imagery. Given that brief metacognitive acceptance and dissonance tasks have shown effectiveness in ameliorating state body dissatisfaction when provided training following media exposure

(Wade et al., 2009), and multi-session dissonance interventions have been shown to protect against the impact of later exposure to idealised media imagery among adolescent girls (Halliwell & Diedrichs, 2013), we expected that both micro-interventions would better protect against the negative impacts of viewing of idealised media imagery than an educational control.

Method

Design

This study used an experimental design across two laboratory sessions spaced 1-week apart (see Figure 1). Within the first lab session, a 3 (group: mindfulness, cognitive dissonance, educational control) by 2 (time: baseline, immediate post-test) factorial design assessed immediate effects of micro-interventions on state outcomes. Within the second lab session, a 3 (group: mindfulness, cognitive dissonance, educational control) by 2 (time: pre-media exposure, post-media exposure) factorial design assessed effects of media exposure on state outcomes. Across both sessions, a 3 (group: mindfulness, cognitive dissonance, educational control) by 2 (time: baseline, 1-week follow-up) factorial design assessed effects of micro-interventions on trait risk (weight and shape concerns, negative affect, appearance-ideal internalisation, perceived sociocultural pressures) and protective (body appreciation, body image psychological flexibility) factors for disordered eating.

Participants

Undergraduate women studying psychology (N=202) were recruited from a British university to earn course credit. Participants were aged 18 to 48 ($M = 19.99$, $SD = 2.75$), with self-reported BMI between 15.06 and 42.59 ($M = 22.26$, $SD = 4.08$). Participants identified primarily as White (87.6%). Mean baseline weight and shape concerns was 4.16 ($SD = 1.56$), with over half (55.4%) endorsing a score indicative of clinical concerns (≥ 4). Inclusion criteria were identifying as women and aged 18 or over. Ethics approval was granted by the University's Faculty Research Ethics Committee, and informed written consent was obtained from each participant.

An *a priori* power analysis was conducted using G*Power (version 3.1.3; Faul et al., 2009). For analysis related to our first aim of assessing immediate effects on state outcomes and our second aim to assess trait outcomes after one week, a sample size of 128 was indicated to detect statistical

significance of medium effect sizes, at an acceptable power of .80 and an alpha of .05. To analyse

effects on resilience to idealised media exposure, a sample size of 158 was required to detect

significance of medium effect sizes on between-group differences. Selection of medium effects size as

a guide was based on similar experimental paradigms (e.g., Wade et al., 2009), however we over-

recruited given our use of an active control condition and potential for drop-out across two sessions.

Procedure

   Recruitment and allocation. Participants volunteered for a study involving two in-person

group laboratory sessions via the university's psychology participant pool website, which were

scheduled at the same timeslot one week apart. A variety of timeslots were offered, each with a

maximum of 20 participants according to computer availability. Whole timeslots were randomly

allocated to a condition to avoid cross-contamination in an open computer laboratory, representing

quasi-random allocation. Participants were blind to conditions; the research assistant who supervised

data collection was not blinded to condition to set up appropriate materials; however, a scripted

protocol was followed, and all assessments were self-reported anonymously via computer.

   Baseline and intervention delivery. At the first session, participants were told the study's

purpose was to examine different ways of responding to media images and their impact, and that they

would be receiving brief training in a technique via video and asked to return for a follow-up

questionnaire after one week. Participants provided informed consent and completed a *baseline*

questionnaire via secure online survey platform Qualtrics, comprising self-report trait and state

measures. The research assistant introduced the intervention phase, indicating participants would

watch a 15-minute video. For experimental conditions, the research assistant opened the appropriate

video via the media player on the computer (labelled video "A" and "B" to mask conditions),

provided a paper worksheet for participants, and instructed participants to press play after donning

headphones. For the educational control condition, participants watched the DVD excerpt together

(without discussion) via the large display TV screen. Following the video in all conditions,

participants completed a second rating of state outcomes via Qualtrics (*immediate post-test*).

Participants were encouraged to use and reflect on their strategy over the following week; intervention

participants were provided with a "take-home" worksheet to summarise the strategy and facilitate

practice.

One-week follow-up and media exposure task. Participants attended the same computer laboratory at the same time the following week. They first completed a follow-up questionnaire comprising trait measures (*1-week follow-up*) and state VAS (*pre-media exposure*). Participants then underwent a media exposure task, ostensibly for an unrelated study. Participants were informed that there was a need to "match" the timings of assessments from session 1 to session 2 to maintain consistency, and so were required to wait for 15 minutes (the same length as the video in week 1) before completing a final set of ratings. While they waited, they were offered an opportunity to "participate in a task for another researcher in the psychology department [who needed] to pilot test a set of advertisements for a study on the effectiveness of fashion advertising among women." Participants were provided a separate information sheet and consent form and offered the chance to win one of three £30 Amazon vouchers. All participants agreed to take part. Participants viewed the set of advertising images sequentially on their individual computer screens and completed a set of advertising effectiveness questions for each image, to support the cover story and to ensure attention. After completing the exposure task, participants were thanked and informed they could now complete the final set of VAS state outcomes (*post-media exposure*). Finally, participants were informed of the true study aims, including alternative conditions, and the cover story related to the media exposure task was exposed. Participants were debriefed and given an information sheet including resources and support services.

Materials

Micro-interventions. Intervention content for the three conditions, outlined in Table 1, was presented in a 15-minute video format. Mindfulness and dissonance-based content were adapted from existing evidence-based interventions by the first author and reviewed by the second author, who both have extensive experience and training in these intervention techniques.

Media exposure stimuli. A set of 15 clothing advertisements depicting female models were selected from a pool of 30 images taken from fashion magazines and the internet. Decisions on final inclusion were made by the first author and a research assistant representing the target demographic, based on including a model showing at least ¾ of the body, conforming to appearance ideals (thin,

toned, flawless skin, young), and good image quality. Advertising images were displayed sequentially on the computer screen using Qualtrics. In order to support the cover story, each image was accompanied by a set of five statements (e.g., 'If I saw this advertisement in a magazine it would catch my eye', 'If this brand cost the same as clothing brands I normally buy, I would consider purchasing it when shopping') developed by Halliwell and Dittmar (2004), with items rated from 1 (strongly disagree) to 5 (strongly agree). Similar sets of images successfully induced negative impacts such as increased body dissatisfaction and negative mood in previous experimental studies (Atkinson & Wade, 2012; Wade et al., 2009).

Measures

Participants self-reported their date of birth, ethnicity, height, and weight. Body Mass Index (BMI) was calculated (weight/height^2). This was followed by questions regarding frequency of media use (filler items), and measures of outcomes (see Table 2).

Statistical Analyses

All analysis was conducted using Stata, version 14. Data were screened for normality, outliers, and missing data. Missing data was estimated using multiple imputation to reduce potential bias. All demographic, condition and dependent variables were included in an imputation model, separately for state and trait outcomes, with 100 data sets imputed for each using chained equations (MICE) as implemented in Stata (see Data Screening section of Supplementary Materials for further detail).

To assess immediate and short-term (1-week follow-up) intervention effects (Aims 1 and 2), we conducted a series of multilevel mixed-effects models, despite the non-hierarchical structure, as this analysis technique is supported when using multiply imputed data. Models contained fixed effects for Condition (Educational Control=0, Mindfulness=1, Dissonance=2), as well as continuous grand-mean centred covariates controlling for baseline score and BMI. As a 3-level categorical predictor, Condition was represented in the model by two dummy coded parameters, each reflecting the difference between one of the experimental conditions and the educational control as the reference group. Following model estimation, a multi degree of freedom Wald test was performed to assess the joint significance of the two Condition coefficients taken together, therefore representing an omnibus

effect of Condition. Planned pairwise comparisons assessed between-group differences, with the threshold for significance adjusted according to the Benjamini-Hochberg procedure to control the false discovery rate of simultaneous multiple tests (Hochberg & Benjamini, 1995). Effect sizes were calculated using a variation of Cohen's d - Glass's Δ - where the difference in means is divided by the standard deviation of the control group, appropriate for our experimental design (Cumming, 2012). To test effects of later media exposure (Aim 3), we conducted a series of two-level (i.e., repeated measures within individual) multilevel mixed models with random intercept included at the individual level, and fixed effects for Condition (as described above), Time (pre-media exposure=0, post-media exposure=1), Condition x Time interactions, and covariates (baseline score and BMI). Post-estimation Wald tests again assessed joint effects of Condition coefficients, and their interaction with Time. Non-significant interactions were removed from final models. Planned pairwise between-group comparisons were conducted and standardised effect sizes calculated as above.

Results

Descriptive Data

A total of 48 timeslots were volunteered for, ranging from 1-19 participants in each with an average of 4.22 participants per session ($SD = 4.02$). Table 3 displays descriptive statistics for demographic characteristics and all outcomes at baseline, immediate post-test (state outcomes) and 1-week follow-up (trait outcomes).

Intervention Effects on State Outcomes at Immediate Post-test (Aim 1)

Results of the mixed models assessing effects of Condition on state outcomes at immediate post-test, controlling for baseline, are displayed in Table 4. Significant joint tests of Condition coefficients, representing an omnibus effect of Condition, were observed for state appearance distress, appearance-ideal internalisation, pressures, pressures distress, and positive mood. Pairwise comparisons showed that participants engaging in the mindfulness micro-intervention reported lower appearance distress compared to educational control (medium effect size) and that participants in both micro-intervention conditions reported lower state appearance-ideal internalisation, pressures and pressures distress, and more positive mood, than educational control (medium to large effect sizes). There was no evidence of effects on state weight satisfaction, weight distress, or appearance

satisfaction.

Intervention Effects on Trait Outcomes at One-Week Follow-Up (Aim 2)

Results of the mixed models assessing effects of Condition on trait outcomes at 1-week follow-up, controlling for baseline, are also displayed in Table 4.

Risk factors. Significant joint tests of Condition coefficients, representing an omnibus effect of Condition, were observed for weight and shape concerns and appearance-ideal internalisation. Participants in the dissonance condition demonstrated significantly greater reduction in both outcomes compared to the educational control group, while mindfulness participants showed significantly lower appearance-ideal internalisation only (all small effect sizes). There was no evidence of effects on perceived pressures or negative affect.

Protective factors. A significant joint test of Condition coefficients was observed for body appreciation. Specifically, participants in both mindfulness and dissonance conditions reported greater trait body appreciation at 1-week follow-up than the educational control group (small effect sizes). There was no evidence of effects of either micro-intervention on body image psychological flexibility.

Intervention validity. Both conditions reduced appearance-ideal internalisation (primary target of dissonance-based interventions) compared to educational control, as noted above. There was no significant joint effect of Condition on trait mindfulness. The mindfulness-based micro-intervention did not result in increased mindfulness relative to dissonance or educational control.

Intervention Effects on Resilience to Media Exposure at One-Week Follow-Up (Aim 3)

No joint tests of Condition coefficients x Time interaction terms were significant across state outcomes (p's = .074 – .881), indicating the effects of media exposure did not differ between conditions over time. Significant joint tests of Condition coefficients, reflecting an omnibus effect of Condition averaged over pre- and post-media exposure, were observed for weight satisfaction, appearance-ideal internalisation, perceived pressures and pressures distress. When considered alongside the lack of change over Time, this reflects a sustained difference between experimental and educational control conditions from pre- to post-media exposure. Pairwise comparisons showed that participants in both mindfulness and dissonance-based micro-interventions reported better scores than educational control overall (Glass's Δ = 0.38 - .66). Full results are available in Table S1 and S2 of

the Supplementary Materials.

Discussion

This study evaluated two micro-interventions based on cognitive dissonance and mindfulness approaches, respectively, with particular focus on managing response to appearance-ideal media, and with respect to reducing risk factors and enhancing protective factors for disordered eating. Our specific aims were to assess intervention effects, including immediate benefits as is a purported goal of micro-interventions (Elefant et al., 2017; Fuller-Tyszkiewicz et al., 2019); short-term impact (1-week follow-up) on commonly assessed trait risk factors *and* potential protective factors for disordered eating; and, finally, resilience to exposure to appearance-idealised media imagery 1-week later.

Intervention benefits on risk and protective factor outcomes

In partial support of our hypothesis, both micro-interventions produced significant immediate impacts on state sociocultural (appearance-ideal internalisation and perceived pressures) and affect related risk factors, compared to an educational control. However, in contrast to hypotheses, no effects were observed for state body image factors, including weight satisfaction, weight distress, and appearance satisfaction (although mindfulness participants did demonstrate reduced appearance distress). At 1-week follow-up, improvements were observed on trait internalisation (both interventions), as well as body image factors of weight and shape concerns (dissonance only) and body appreciation (both interventions). However, no intervention effects were observed for perceived pressures or negative affect, or for body image psychological flexibility.

It is perhaps unsurprising that stronger immediate effects were found for sociocultural factors, given that the interventions were framed as strategies for responding to media ideals and pressures rather than as strategies for improving body image. This is encouraging given that these represent key early risk factors in the development of disordered eating (e.g., Stice, 2001), and provides some support for micro-interventions targeting specific contexts (i.e., media pressures) and having immediate benefits. It appears that impact on body image concerns may take longer to produce benefits in this context, perhaps requiring repeated engagement in the micro-intervention techniques, or an alternative intervention technique or focus. Future research could focus on assessing continued

use of techniques and relationship to outcomes.

Demonstrating positive effects of micro-interventions on body appreciation at 1-week follow-up, however, is encouraging given that it is inversely associated with disordered eating (Tylka & Wood-Barcalow, 2015a; Webb et al., 2015), predicts adaptive eating behaviours in adolescent girls (Andrew et al., 2016b), and recently has differentiated full versus partial eating disorder recovery (Koller et al., 2020). This provides preliminary support that these micro-intervention techniques may enhance positive and protective factors as well as risk reduction. Although no impact on body image psychological flexibility was observed, change has been evidenced as a result of more intensive intervention (Rogers et al., 2018) and therefore development of psychological flexibility may require more time and practice than afforded by the current approach. More explicitly involving additional relevant aspects, such as pursuing valued action in the context of distress, could also increase benefits.

It is interesting to note that the pattern and magnitude of effects were largely similar for both dissonance and mindfulness, across state and trait outcomes. While this may indicate similar effectiveness of the strategies, the lack of impact on trait mindfulness as an intervention change process also highlights that non-specific factors associated with intentionally engaging in any active intervention strategy may have been responsible for effects. Further work is needed to better elucidate mechanisms to help target and refine intervention approaches in future (Holmes et al., 2018). It would additionally be useful to explore whether user acceptability differs for each strategy, as this would likely inform dissemination and implementation.

Protecting against the adverse impact of exposure to appearance-ideal media. In contrast to our hypothesis, we found no evidence that either micro-intervention promoted greater resilience to appearance-ideal media exposure than watching a documentary excerpt. This may indicate that the media exposure exercise was not powerful enough to induce negative body image-related impacts commonly reported (Grabe et al., 2008), although a similar length and nature of exposure has produced such effects with comparable samples (Atkinson & Wade, 2012; Wade et al., 2009). An alternative explanation is that watching and reflecting on a documentary regarding effects of media on body image and eating disorders was just as effective at protecting against negative effects of idealised media, at least in the short-term. This provides further support that passively watching

educational videos can act as an effective micro-intervention for negating the effects of ubiquitous idealised media imagery (Halliwell et al., 2011). It is worth noting that significant differences between micro-interventions and the educational control were maintained from pre- to post-exposure for multiple state outcomes, which indicates that micro-intervention gains were at least maintained in the face of a body-image related threat (i.e., appearance-ideal media exposure). Nevertheless, further research is required to substantiate whether these micro-interventions are justified in protecting against relevant threats and stressors when they arise.

Limitations and Future Directions

This study provided a robust test of dissonance and mindfulness-based micro-intervention strategies by including an active control. However, limitations should be noted. First, we did not include a measure of eating disorder pathology and therefore could not identify those engaging in disordered eating behaviours or meeting full criteria for an eating disorder. Combined with the relatively high endorsement of weight and shape concerns in our sample, we cannot be certain about whether these findings represent a prevention, early intervention or treatment context, only that they show some benefit to relevant risk and protective factors for disordered eating in a sample recruited from the general population. Second, the adoption of a quasi-random allocation procedure due to logistical constraints resulted in a wide range of group sizes for the laboratory testing sessions. Future similar research should retain group-testing information and aim to statistically account for clusters within analysis. Third, it is possible that participants suspected the true purpose of the media exposure task, despite framing as a task for an unrelated study, which may have contributed to the lack of effects. Future research may like to consider cover stories that go further to disguise research aims, or use more observational and behavioural measures less subject to bias. In addition, the inclusion of an appearance-neutral condition as part of the media exposure task would increase capacity to make more definitive conclusions regarding the impact of media exposure.

Overall, both micro-interventions received some support as brief tasks that can be implemented to provide some immediate and short-term benefits with a particular objective. However, there was little support that this extrapolated to protection or relief to a *subsequent* specific relevant trigger (i.e., appearance ideal media exposure). It would be useful to further investigate

intervention efficacy across a range of appearance- and eating related pressures and contexts (e.g.,

different forms of media exposure, body talk, mirror exposure, weight prejudice), and across a range

of times throughout the day (e.g., using Ecological Momentary Assessment), to be able to offer

increased specificity in guidance for micro-intervention users. This could provide a useful basis for

machine learning and app-based models of care that can match and provide discrete tasks for discrete

purposes, such as just-in-time adaptive interventions (Nahum-Shani et al., 2018). Finally, it would be

useful to assess moderating characteristics to better target those who will benefit most.

Conclusion

In conclusion, our findings show that brief micro-interventions based on cognitive dissonance

and mindfulness provide immediate and short-term benefits to some risk factors for disordered eating,

and short-term improvement in body appreciation as a potential protective factor. While impacting

such factors is relevant to eating disorder prevention efforts, future research is required to validate

effectiveness specifically for prevention, early intervention or treatment-adjunct contexts. It will also

be worthwhile to conduct a more robust test of resilience to idealised media imagery and other

appearance and eating-related threats; investigate moderators; and assess benefits for more diverse

users (e.g., across age, gender, sexuality, ethnicity). Nevertheless, this study provides encouraging

support for the further development and evaluation of micro-intervention strategies to address

disordered eating.

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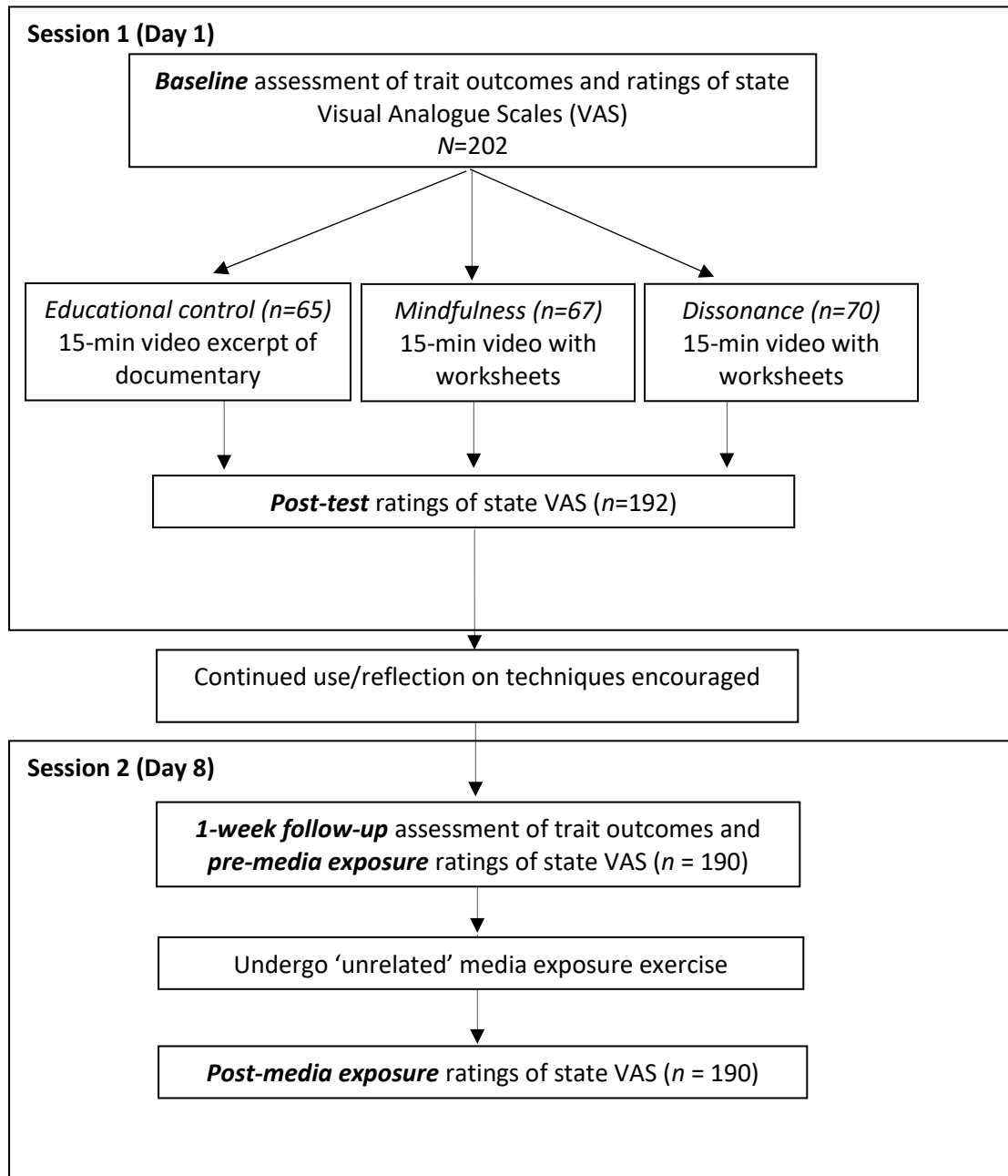
Figure 1. Study design and participant flow.

Table 1

Intervention content for experimental and control conditions

Mindfulness-based intervention (adapted from *The Mindfulness Mode*; Atkinson & Wade, 2015, 2016)
1. Introduced to the role of the media in promoting an unrealistic, thin body ideal and the importance of learning strategies to respond effectively.
2. The presenter (first author) then introduced key mindfulness concepts, including present-moment awareness and non-judgemental acceptance.
3. Participants guided through three experiential exercises related to decentring ("I am having the thought X"), continual observation and letting go (using a cinema metaphor), and the STOP method (Stop, Take a few breaths, Observe, Proceed).
4. A paper worksheet was provided that outlined a number of "helpful hints" to guide the experiential practice of observation, awareness and acceptance e.g., "okay I am feeling bad, that is my experience", "these thoughts are in my mind, that is how it is right now", and "like other feelings, bad ones come and go."
5. Participants were asked to keep practicing the mindfulness techniques "as much as possible whenever you notice media images or their impact on your thoughts and feelings" over the following week, and to create and write down additional "helpful hint" statements that might help to guide personal practice.
6. A take-home worksheet was provided that included a summary of the mindfulness concepts, instructions for practice, and a space to record use and reflections on their practice.
Cognitive dissonance-based intervention (adapted from The Body Project; Stice & Presnell, 2007)
1. Introduced to the role of the media in promoting an unrealistic, thin body ideal and the importance of learning strategies to respond effectively.
2. The presenter (first author) led a guided exploration of the "thin-ideal" and its impact, including a more detailed definition of the thin-ideal, costs of pursing the thin-ideal, and ways to challenge the thin-ideal.
3. Participants were invited to mentally respond to Socratic style questions at different points to increase active engagement and maximise potential for dissonance induction.
4. A paper worksheet was provided so they could complete directed exercises i.e., writing down as many costs of pursing the thin-ideal as they were able to, and creating written verbal challenges to the thin-ideal for three different scenarios.
5. Participants were asked to engage in the strategy over the following week, including writing a short letter to an adolescent girl about "about the costs associated with pursuing the thin ideal and the different things she can do, say, avoid, or learn that will help her develop or maintain a positive body image", to try and remind themselves of the costs of pursing the thin ideal whenever they saw it presented in the media, and to engage in as many verbal challenges to the thin ideal as they could to themselves or others.
6. A take-home worksheet was provided for participants to write their letter and record their verbal challenges.
Educational control
1. Participants in the control condition watched the first 15-minutes of documentary "Killing Us Softly 4: Advertising's Image of Women" (Jhally & Kilbourne, 2010).
2. This strategy was framed as "developing awareness about how women are represented in the media and advertising, and the message this promotes."
3. The excerpt focused on how the thin-ideal is promoted in the media, and advertising in particular, and the effects on women's self-image.
4. Participants were simply encouraged to reflect on the messages from the documentary excerpt over the following week.
5. No take-home worksheet was provided, to mimic real-world documentary viewing and provide a minimal active control.

Table 2

Description of all measures assessing state- and trait-based outcomes

Variable	Measure name, example items, response options	Reliability (α)
State-based		
Risk factors	Visual Analogue Scales (VAS; Heinberg & Thompson, 1995), 8 separate scales measuring *weight satisfaction, weight distress, appearance satisfaction, appearance distress, appearance-ideal internalisation, perceived pressures, pressures distress, and positive mood*. Asssessed feelings "right now", rated on a electronic slider from 0 (*not at all*) to 100 (*very much*). Full wording of all items is provided in Supplementary Materials.	-
Trait-based		
Appearance-ideal internalisation	Sociocultural Attitudes Towards Appearance Scale (SATAQ-3; Thompson et al., 2004): Internalisation – General, 9 items (e.g., "I compare my body to the bodies of TV and movie stars"), scored from 1 (*definitely disagree*) to 5 (*definitely agree*), higher mean score reflects greater internalisation of appearance ideals	.94
Perceived sociocultural pressures	Sociocultural Attitudes Towards Appearance Scale (SATAQ-3; Thompson et al., 2004): Pressures, 7 items (e.g., "I've felt pressure from TV or magazines to lose weight"), scored from 1 (*definitely disagree*) to 5 (*definitely agree*), higher mean score reflects greater perceived pressures	.91
Weight and shape concern	Eating Disorder Examination – Questionnaire (Fairburn & Beglin, 1994): Weight and Shape concern subscales, 12 items (e.g., have you had a strong desire to lose weight?), scored from 0 (*not at all*) and 6 (*markedly*), higher scores reflect greater concern	.94
Negative affect	Positive and Negative Affect Schedule-Expanded (PANAS-X; Watson & Clark, 1994), 25 negative affect items (e.g., disgusted), assessed extent of feelings "during the past week", scored from 1 (*very slightly*) to 5 (*extremely*), higher scores reflect greater negative affect	.95
Body appreciation	Body Appreciation Scale-2 (BAS-2; Tylka & Wood-Barcalow, 2015a), 10 items (e.g., "I respect my body"), scored from 1 (*never*) to 5 (*always*), higher mean score reflects greater appreciation	.94
Body image psychological flexibility	Body Image-Acceptance and Action Questionnaire (Sandoz et al., 2013), 12 items (e.g., "I shut down when I feel bad about my body shape or weight"), scored from 1 (*never true*) to 7 (*always true*), higher mean score reflects lower flexibility	.94
Mindfulness	Five Facet Mindfulness Questionnaire-Short Form (Bohlmeijer et al., 2011), 24 items (e.g., "I watch my feelings without getting carried away by them"), scored from 1 (*never or very rarely true*) to 5 (*very often or always true*), higher mean score reflects greater overall mindfulness	.81

Table 3

Means (and Standard Errors) for Demographic and Dependent Variables

	EC (*n* = 65)		MI (*n* = 67)		CD (*n* = 70)	
	M (SE)		*M (SE)*		*M (SE)*	
Variable	**Baseline**	**Post-test**	**Baseline**	**Post-test**	**Baseline**	**Post-test**
Age	19.72 (0.14)	-	20.4 (0.53)	-	19.83 (0.19)	-
BMI	23.25 (0.66)	-	21.93 (0.35)	-	21.82 (0.43)	-
State outcomes						57.30 (3.42)
Weight satisfaction	45.65 (3.57)	52.86 (3.28)	40.97 (3.23)	51.28 (3.26)	47.87 (3.80)	57.30 (3.42)
Weight distress	36.18 (3.83)	25.57 (2.79)	39.42 (3.63)	20.99 (2.76)	33.54 (3.57)	22.79 (3.08)
Appearance satisfaction	51.49 (3.01)	54.69 (3.12)	49.18 (2.96)	59.21 (2.94)	53.76 (3.08)	60.34 (2.88)
Appearance distress	31.57 (3.37)	28.68 (2.99)	35.04 (3.09)	19.85 (2.73)	30.80 (3.37)	23.06 (2.77)
Appearance-ideal internalisation	50.34 (3.69)	39.52 (3.30)	54.10 (3.56)	34.88 (3.11)	52.90 (3.94)	33.60 (3.25)
Pressures	41.83 (3.85)	36.83 (3.39)	45.57 (3.58)	24.11 (2.61)	43.00 (4.04)	26.23 (3.06)
Pressures distress	28.85 (3.20)	27.66 (2.81)	32.61 (3.06)	18.62 (2.57)	28.79 (3.40)	18.81 (2.71)
Positive mood	65.72 (2.67)	56.71 (2.64)	59.97 (2.37)	69.30 (2.44)	63.70 (2.56)	67.09 (2.36)
	Baseline	**1-Week FU**	**Baseline**	**1-Week FU**	**Baseline**	**1-Week FU**
Trait outcomes						
Weight/shape concerns	4.32 (0.19)	3.66 (0.18)	4.19 (0.18)	3.35 (0.17)	3.99 (0.20)	3.07 (0.17)
Appearance-ideal internalisation	3.21 (0.12)	3.05 (0.12)	3.38 (0.11)	2.95 (0.11)	3.23 (0.12)	2.81 (0.12)
Pressures	3.37 (0.11)	3.21 (0.12)	3.38 (0.12)	3.05 (0.12)	3.22 (0.12)	2.97 (0.13)
Negative Affect	2.08 (0.11)	1.92 (0.09)	2.14 (0.08)	1.91 (0.09)	2.07 (0.09)	1.92 (0.09)
Body Image Psychological Flexibility	3.19 (0.11)	3.32 (0.11)	3.33 (0.10)	3.61 (0.10)	3.30 (0.11)	3.61 (0.11)
Body Appreciation	4.72 (0.17)	4.88 (0.17)	4.86 (0.15)	5.11 (0.15)	5.02 (0.17)	5.25 (0.16)
Mindfulness	3.69 (0.06)	3.72 (0.07)	3.67 (0.07)	3.79 (0.07)	3.59 (0.06)	3.68 (0.07)

Note. Values represent combined estimates from 100 imputed datasets; EC = educational control, MI = mindfulness-based intervention, CD = cognitive dissonance-based intervention, *M* = Mean, *SE* = Standard Error, BMI = body mass index.

Table 4

Results of Mixed Models: Intervention Effects on Dependent Variables at Immediate Post-Test and 1-week Follow-Up, Controlling for Baseline and BMI, with Between-Group Comparisons and Effect Sizes (Glass's Δ)

	Adjusted Margins			Joint Test of Condition		Between-Group Comparisons					
						MI vs EC		CD vs EC		CD vs MI	
	EC (N=65)	MI (N=67)	CD (N=70)								
Variable	M_{adj} (SE)	M_{adj} (SE)	M_{adj} (SE)	F(2)	p	Δ	p	Δ	p	Δ	p
State outcomes (immediate post-test)											
Weight satisfaction	52.55 (2.31)	53.76 (2.43)	55.21 (2.21)	0.33	.719	0.07	.720	0.14	.408	0.08	.660
Weight distress	25.78 (2.35)	19.53 (2.47)	23.99 (2.25)	1.83	.161	-0.33	.068	-0.09	.585	0.24	.181
Appearance satisfaction	54.80 (2.18)	60.71 (2.32)	58.81 (2.09)	1.82	.162	0.34	.065	0.23	.185	-0.11	.541
Appearance distress	28.40 (2.37)	19.00 (2.53)	24.13 (2.27)	3.77	.023*	**-0.49**	**.007**	-0.22	.195	0.27	.130
Appearance-ideal internalisation	40.99 (2.22)	33.81 (2.34)	33.26 (2.12)	3.61	.027*	**-0.40**	**.027**	**-0.43**	**.012**	-0.03	.862
Pressures	37.80 (2.42)	23.04 (2.52)	26.35 (2.32)	9.84	<.001*	**-0.76**	**<.001**	**-0.59**	**.001**	0.17	.333
Pressures distress	28.25 (2.10)	17.32 (2.20)	19.51 (2.01)	7.26	.001*	**-0.64**	**<.001**	**-0.52**	**.003**	0.13	.463
Positive mood	55.65 (2.01)	70.86 (2.19)	66.58 (1.92)	14.07	<.001*	**0.94**	**<.001**	**0.67**	**<.001**	-0.27	.141
Trait outcomes (1-week follow-up)											
Weight & Shape Concerns	3.54 (0.1)	3.33 (0.09)	3.20 (0.09)	3.30	.037*	-0.27	.114	**-0.44**	**.012**	-0.17	.322
Appearance-ideal internalisation	3.10 (0.07)	2.86 (0.07)	2.85 (0.07)	3.75	.024*	**-0.40**	**.021**	**-0.42**	**.014**	-0.02	.891
Pressures	3.18 (0.09)	3.01 (0.08)	3.05 (0.08)	1.00	.368	-0.23	.174	-0.18	.297	0.06	.742
Negative Affect	1.93 (0.08)	1.88 (0.07)	1.94 (0.07)	0.17	.840	-0.08	.641	0.01	.945	0.09	.583
Body Appreciation	3.40 (0.05)	3.56 (0.05)	3.59 (0.05)	4.09	.017*	**0.39**	**.023**	**0.46**	**.008**	0.07	.696
Body Image Psychological Flexibility	5.01 (0.08)	5.11 (0.07)	5.12 (0.07)	0.72	.487	0.17	.321	0.19	.278	0.02	.921
Mindfulness	3.67 (0.04)	3.77 (0.04)	3.74 (0.04)	1.50	.223	0.30	.084	0.19	.280	-0.11	.513

*p < .05

Note. EC = educational control, MI = mindfulness-based intervention, CD = cognitive dissonance-based intervention; M_{adj} = estimated mean adjusted for covariates; SE = standard error; Δ = Glass's Delta between-groups effect size ($M_2 – M_1 /SD_{control}$), where 0.2 is considered small, 0.5 is medium, and ≥ .8 is

large. Bolded items indicate significance of pairwise comparisons according to the Benjamini-Hochberg procedure.

Supplementary Material

Visual Analogue Scale Wording

Full wording for the Visual Analogue Scale items assessing state risk factors for disordered eating is described below, assessed on a scale from 0 (*not at all*) to 100 (*very much*).

1. *Weight satisfaction*: How satisfied do you feel about your weight, right now?

2. *Weight distress*: How distressed are you by your feelings about your weight, right now?

3. *Appearance satisfaction*: How satisfied do you feel about your overall appearance, right now?

4. *Appearance distress*: How distressed are you by your feelings about your overall appearance, right now?

5. *Appearance-ideal internalisation*: Right now, how much do you wish your body looked like those of the females you see in the media?

6. *Pressures*: Right now, how much pressure do you feel to look like the females you see in the media?

7. *Pressures distress*: Right now, how distressed do you feel by pressures to look like females you see in the media?

8. *Positive mood*: Right now, how positive is your mood?

Data screening

No multivariate outliers were observed. Two extreme univariate outliers (mindfulness, negative affect) were transformed to be one unit from the next most extreme score (Tabachnick & Fidell, 2013). All final variables reflected a normal distribution. Three missing cases (1.49%) were observed for BMI, 10 cases (4.95%) in the mindfulness condition for all post-test state measures (due to a technical error), and 12 cases (5.94%) for all 1-week follow-up measures (due to drop-out; dissonance = 5, mindfulness = 3, control = 4). Little's Missing Completely At Random (MCAR) test using all continous observed dependent variables at all timepoints was non-significant ($p = .746$), indicating support for data being completely randomly distributed. However, a series of t-tests specifically assessed whether missingness at immediate post-test and at 1-week follow-up was associated with baseline characteristics. This showed that participants who had missing data on state

variables assessed immediately following the micro-intervention evidenced lower body appreciation at baseline than those with complete data ($p = .028$) – despite the reason being due to a technical error – and that those who dropped out prior to 1-week follow-up evidenced significantly lower mindfulness at baseline than participants who completed the study ($p = .020$). This indicates plausibility that data were conditionally missing at random (MAR), in that they can be predicted by observable values. Thus, potential bias was addressed by conducting multiple imputation, which is appropriate when data are considered at least MAR (Little & Rubin, 2002).

Multilevel Mixed Model Analayses to Test Effects of Microinterventions on Later Media Exposure

Table S1

Results from Multilevel Models Assessing Change in State Outcomes Pre and Post-Media Exposure, Controlling for Baseline Scores and BMI

Outcome	EC M_{adj} (SE)	MI M_{adj} (SE)	CD M_{adj} (SE)	Joint Tests of Condition and Interaction with Time	$F (p)$
Weight satisfaction					
Pre-media exposure	48.89 (2.42)	54.47 (2.35)	54.43 (2.33)	Condition (C):	**3.31 (.037)**
Post-media exposure	47.54 (2.40)	55.30 (2.33)	56.18 (2.32)	Condition x Time (C x T):	0.68 (.508)
Weight distress					
Pre-media exposure	26.83 (2.26)	21.79 (2.18)	24.20 (2.15)	C:	1.09 (.337)
Post-media exposure	25.74 (2.25)	23.38 (2.18)	21.18 (2.13)	C x T:	1.58 (.205)
Appearance satisfaction					
Pre-media exposure	50.44 (2.47)	52.31 (2.38)	54.35 (2.39)	C:	1.09 (.336)
Post-media exposure	48.25 (2.48)	53.85 (2.41)	52.33 (2.37)	C x T:	0.80 (.451)
Appearance distress					
Pre-media exposure	27.30 (2.23)	21.52 (2.15)	22.40 (2.15)	C:	2.27 (.103)
Post-media exposure	24.41 (2.23)	19.82 (2.16)	19.36 (2.12)	C x T:	0.13 (.881)
Appearance-ideal Internalisation					
Pre-media exposure	43.30 (2.69)	36.18 (2.61)	33.43 (2.57)	C:	**4.86 (.008)**
Post-media exposure	43.17 (2.68)	33.13 (2.58)	32.88 (2.55)	C x T:	0.65 (.524)
Pressures					
Pre-media exposure	36.50 (2.46)	26.55 (2.38)	23.04 (2.35)	C:	**8.64 (<.001)**
Post-media exposure	34.77 (2.46)	23.64 (2.38)	24.03 (2.34)	C x T:	1.18 (.308)
Pressures distress					
Pre-media exposure	25.76 (2.22)	18.22 (2.16)	16.80 (2.10)	C:	**4.38 (.013)**
Post-media exposure	24.98 (2.23)	19.18 (2.17)	17.91 (2.11)	C x T:	0.46 (.663)
Positive mood					
Pre-media exposure	57.27 (2.81)	62.38 (2.67)	57.60 (2.63)	C:	0.71 (.493)
Post-media exposure	55.55 (2.80)	59.25 (2.65)	59.50 (2.62)	C x T:	2.60 (.074)

Note. EC = educational control, MI = mindfulness-based intervention, CD = cognitive dissonance-based intervention, M_{adj} = Mean score adjusted for covariates, *SE* = Standard Error, BMI = body mass index.

Table S2

Mixed Model Analysis of State Outcomes Pre and Post Media Exposure: Overall Between-Group Planned Comparisons Averaged Over Time, with Associated Effect Sizes (Glass's Δ)

	MI vs EC			CD vs EC			CD vs MI		
Variable	M_{diff} (SE)	p	Δ [95% CI]	M_{diff} (SE)	p	Δ [95% CI]	M_{diff} (SE)	p	Δ [95% CI]
State outcomes									
Weight satisfaction	**6.67 (3.09)**	**.031**	**0.38 [-2.59, 3.34]**	7.10 (3.07)	.021	0.40 [-2.57, 3.37]	0.42 (3.00)	.888	0.02 [-2.94, 2.99]
Weight distress	-3.70 (2.85)	.194	-0.22 [-2.99, 2.55]	-3.60 (2.83)	.204	-0.22 [-2.99, 2.55]	0.10 (2.77)	.970	0.01 [-2.76, 2.78]
Appearance satisfaction	3.73 (3.02)	.217	0.21 [-2.71, 3.14]	4.00 (3.01)	.184	0.23 [-2.69, 3.15]	0.27 (2.94)	.928	0.02 [-2.91, 2.94]
Appearance distress	-5.19 (2.75)	.059	-0.33 [-2.99, 2.33]	-4.98 (2.73)	.068	-0.31 [-2.97, 2.35]	0.21 (2.66)	.937	0.01 [-2.65, 2.67]
Appearance-ideal Internalisation	**-8.58 (3.48)**	**.014**	**-0.43 [-3.79, 2.94]**	**-10.07 (3.47)**	**.004**	**-0.50 [-3.87, 2.86]**	-1.50 (3.37)	.657	-0.08 [-3.44, 3.29]
Pressures	**-10.54 (3.16)**	**.001**	**-0.58 [-3.64, 2.49]**	**-12.10 (3.14)**	**.000**	**-0.66 [-3.72, 2.40]**	-1.56 (3.07)	.612	-0.09 [-3.15, 2.98]
Pressures distress	**-6.67 (2.91)**	**.022**	**-0.40 [-3.21, 2.41]**	**-8.02 (2.88)**	**.005**	**-0.48 [-3.29, 2.33]**	-1.34 (2.81)	.633	-0.08 [-2.89, 2.73]
Positive mood	4.40 (3.73)	.238	0.20 [-3.42, 3.83]	2.14 (3.66)	.559	0.10 [-3.53, 3.72]	-2.26 (3.56)	.525	-0.11 [-3.73, 3.52]

Note. EC = educational control, MI = mindfulness-based intervention, CD = cognitive dissonance intervention; M_{diff} = difference in means; *SE* = standard error; Δ = Glass's Delta between-groups effect size ($M_{diff}/SD_{control}$), where 0.2 is considered small, 0.5 is medium, and ≥ .8 is large. Bolded items indicate significance according to the Benjamini-Hochberg procedure