"I just feel so guilty": The role of introjected regulation in linking appearance goals for exercise with women's body image

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Abstract

Appearance goals for exercise are consistently associated with negative body image, but research has yet to consider the processes that link these two variables. Self-determination theory offers one such process: introjected (guilt-based) regulation of exercise behavior. Study 1 investigated these relationships within a cross-sectional sample of female UK students ($n = 215$, 17-30 years). Appearance goals were indirectly, negatively associated with body image due to links with introjected regulation. Study 2 experimentally tested this pathway, manipulating guilt relating to exercise and appearance goals independently and assessing post-test guilt and body anxiety ($n = 165$, 18-27 years). The guilt manipulation significantly increased post-test feelings of guilt, and these increases were associated with increased post-test body anxiety, but only for participants in the guilt condition. The implications of these findings for self-determination theory and the importance of guilt for the body image literature are discussed.

Keywords: exercise regulation; exercise goals; self-determination theory; guilt; body anxiety; body appreciation

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Exercising to lose weight and improve one's appearance is a prominent goal for physical activity in Western culture, particularly for women: a content analysis of women's health and fitness magazines found that over 50% of main features were presented in an appearance or weight loss frame (Aubrey, 2010) and women appear to endorse these reasons for exercise more strongly than men (e.g., Furnham, Badmin, & Sneade, 2002). This endorsement of reasons for exercise such as weight loss, improving appearance, and increasing muscle tone is consistently associated with more negative body image (Furnham et al., 2002; Tiggemann & Williamson, 2000). In contrast, health reasons for exercise are associated positively with body image (Strelan, Mehaffrey, & Tiggemann, 2003). Given the potential consequences of poor body image for disordered eating behavior (e.g., Stice, 2002) and physical and mental health more broadly (e.g., Wilson, Latner, & Hayashi, 2013), it is important to understand why appearance reasons for exercise may be linked with negative body image. However, previous research has not directly evaluated the mechanisms underlying these associations.

Self-determination theory (SDT) offers a framework within which to contextualize these different associations, with its focus on the motivation underlying human behavior (e.g., Ryan & Deci, 2006). SDT divides individuals' goals, or reasons for behavior, into extrinsic goals, which focus on externally evaluated attributes or acquisitions, and intrinsic goals, which focus on self-development and supporting others around them. According to Ryan and Deci (2006), the pursuit of intrinsic goals fulfils basic psychological needs, resulting in higher levels of psychological functioning, whereas the pursuit of extrinsic goals does not. This proposition is well supported, with the endorsement of extrinsic goals, such as image

and financial success, consistently associated with negative outcomes such as lower subjective well-being and mental health difficulties (e.g., Twenge et al., 2010). Overall life goals have also been shown to predict body image: in a sample of adolescent girls, the intrinsic life goal of health was associated with better body image, whereas the extrinsic goal of image was associated with more negative body image (Thøgersen-Ntoumani, Ntoumanis, & Nikitaras, 2010). Thus, the differential correlations of appearance and health reasons for exercise with body image could be understood to reflect the extrinsic and intrinsic nature of those reasons.

Crucially, SDT provides an explanatory mechanism for interpreting these correlations, although it has not been directly tested in the domain of exercise: the regulation underlying the behavior. SDT suggests that the behavior we engage in when pursuing our goals can be regulated in a variety of ways, varying in levels of self-determination (how much the motivation stems from inside the self; Ryan & Deci, 2006). External regulation occurs when we engage in behavior due to external rewards or pressures, such as when someone exercises to please others. Introjected regulation is where the motivation for the behavior has been partially, but not fully, internalized: an individual might exercise to avoid the guilt they experience if they do not attend a session. Identified regulation is associated with valuing the benefits of the behavior, whatever these are believed to be, rather than the behavior itself. Finally, at the most self-determined end of the continuum, intrinsic regulation is experienced by those who engage in a behavior because they enjoy the behavior itself.

Ryan and Deci (2006) suggest that more self-determined regulation should be associated with better well-being, due to the feelings of autonomy that it provides, and review a considerable amount of evidence supporting this assertion, across multiple domains. Self-determined regulation of behavior has positive associations with body image, both when considering regulation in general (Pelletier & Dion, 2007) and, in particular, for exercise

behaviors (Brunet, Sabiston, Castonguay, Ferguson, & Bessette, 2012; Brunet & Sabiston, 2009; Markland, 2009; Thøgersen-Ntoumani & Ntoumanis, 2007). However, research also suggests that self-determined regulation is more likely to be associated with intrinsic goals, and non-self-determined regulation with extrinsic ones. Within the exercise domain, research has consistently found that extrinsic goals (e.g., weight loss, appearance reasons) are associated with less self-determined regulation, and that intrinsic goals (e.g., health, affiliation) are associated with more self-determined regulation (Gillison, Standage, & Skevington, 2006; Ingledew & Markland, 2008).

Introjected regulation, with its foundation in avoiding guilt and shame, may be particularly relevant in this context. Although guilt is often conceived as a potentially positive motivating force, spurring us into action (e.g., Hoffman, 1982), self-determination theory suggests that guilt-based, introjected motivation may be detrimental to individuals' well-being, especially when related to body-modification behaviors, such as eating regulation and exercise (Verstuyf, Patrick, Vansteenkiste, & Teixeira, 2012). Guilt-based regulation may be particularly relevant for women's body image, given gender differences in the experience of self-conscious emotions. Women are more prone to experiencing guilt than men, particularly in individualistic cultures, such as the UK and US (Fischer & Manstead, 2000). Roberts and Goldenberg (2007), in fact, explicitly link women's increased propensity to shame and guilt to the objectification of women's bodies by society, and suggest that there should be an even greater gender divide in self-conscious emotions when bodies are made salient, such as in the exercise environment. Introjected regulation may therefore be particularly important in linking women's body image to their reasons or goals for exercise.

However, previous research has not considered appearance goals for exercise, introjected regulation, and body image simultaneously, tending to focus on just one of the associations between these three constructs. This approach may obscure the shared variance

between these constructs, and a potential pathway between appearance goals and body image: body image may be associated with appearance reasons in part as a result of their shared association with guilt-based regulation.

The Present Research

The current research investigated the proposal that appearance goals for exercise may be associated with body image via their joint association with introjected regulation. As only components of this pathway have been explored previously in the literature, the aim of the first study was to provide initial cross-sectional support for this proposal. Thus, the first study employed a structural equation framework to model the direct and indirect associations between appearance goals, regulation of exercise behavior, and body image. This method allowed the confirmation of the shared variance between these three variables of interest, while controlling for their numerous correlates, such as health goals for exercise and other forms of exercise regulation (e.g., external, identified, and intrinsic).

Notwithstanding the importance of cross-sectional evidence, it cannot provide true evidence of mediation: to fully test mediation, the mediator should be manipulated orthogonally from the independent variable (Bullock, Green, & Ha, 2010). Thus, in a second study, guilt in relation to exercise, the proposed mediator, was manipulated orthogonally from appearance goals, the proposed independent variable. Using a 2 x 2 experimental design, appearance goals for exercise and guilt related to not exercising were manipulated separately, allowing a more robust test of this proposed mediation process. By using a combination of correlational and experimental designs, the present research aimed to explore both the direction of causality in these relationships and the naturally occurring relationships between them, allowing for a fuller picture of this process than either method alone.

For both studies, a sample of young adult women was used, due to the high frequency of body image issues within this group (Bucchianeri, Arikian, Hannan, Eisenberg, &

Neumark-Sztainer, 2013) and research suggesting that exercise has negative associations with body image for this group, but not older women or men (Tiggemann & Williamson, 2000). Furthermore, research suggests that women experience introjected regulation differently than men (Gillison, Osborn, Standage, & Skevington, 2009) and experience greater levels of self-conscious emotions in Western cultures (e.g., Fischer & Manstead, 2000). Exercise is an important behavior in the pursuit of contemporary appearance ideals for both men and women (e.g., Pope et al., 2000; Tiggemann, 2011); however, the studies reported here focus on women's experiences of exercise, in order to provide a specific examination of the motivational processes involved in linking their appearance reasons for exercise to body image, which may be very different from men's.

Study 1

Study 1 was designed to identify the regulations for exercise most strongly associated with body image *and* appearance goals for exercise and share variance with both. As discussed above, introjected, or guilt-based, regulation may be particularly relevant in linking appearance goals for exercise to body image in women. However, SDT would also predict that external regulation may be associated with appearance goals and with body image, as a non-self-determined form of regulation.

In identifying the specific regulations that share most variance with both appearance goals and body image, this study aimed to provide initial evidence for potential pathways between these constructs. Given the lack of previous research demonstrating this degree of shared variance, between the three constructs rather than simply two, this cross-sectional study represents a necessary stage in the development of this research area.

Method

Participants and Procedure. Following institutional ethical approval, 215 female students (17-30 years, $M = 19.77$ years, $SD = 2.0$; 86% white) were recruited from a university

participant pool to complete an online questionnaire. The ethical procedures of the study complied fully with APA and BPS ethical guidelines, with informed consent given before the study and debriefing for all participants after completion.

Measures.

    Goals for exercise. The Exercise Motivations Inventory was used to measure participants' goals for exercise (EMI-2, Markland & Ingledew, 1997). Participants indicated how true (on a 5-point response scale ranging from *not at all true for me* to *very true for me*) each of 51 statements was of their reasons for exercising. The appearance goals measure consisted of the Appearance and Weight subscales (8 items; e.g., "I exercise to help me look better"; $\alpha = .95$). The health goals measure, included to contrast appearance goals, consisted of the Ill Health Avoidance and the Positive Health subscales (6 items; e.g., "I exercise to have a healthy body"; $\alpha = .91$). Appearance and Health emerged as distinct factors in an exploratory factor analysis of the full inventory, with no substantive cross-loading of items.

    Regulation of exercise behavior. Participants' regulation of their exercise behavior was measured using the Behavioural Regulation of Exercise Questionnaire 2 (BREQ-2, Markland & Tobin, 2004). This 19-item questionnaire includes measures of four subtypes of regulation: external (e.g., "I exercise because other people say I should"; $\alpha = .82$), introjected (e.g., "I exercise because I feel guilty when I don't exercise"; $\alpha = .82$), identified (e.g., "I exercise because I value the benefits of exercise"; $\alpha = .86$) and intrinsic (e.g., "I exercise because it's fun"; $\alpha = .95$). Participants indicated the extent to which items described their regulation of exercise behavior on a 5-point scale (*not at all true for me* to *very true for me*).

    Body image. Three measures of body image were used. Participants completed a trait version of the Physical Appearance State and Trait Anxiety Scale (PASTAS, Reed, Thompson, Brannick, & Sacco, 1991), which presents eight body anxiety items (legs, waist, stomach, muscle tone, buttocks, hips, size, weight) alongside 12 filler items. Participants

rated how anxious they had felt over the past six months about each item on a 5-point scale, ranging from *not at all* to *extremely so* ($\alpha = .91$).

The Body Appreciation Scale (BAS, Avalos, Tylka, & Wood-Barcalow, 2005) was included as a positive measure of body image. The scale includes 12 items which assess participants' positive feelings and behaviors towards their body, using a 5-point response scale ranging from *not at all true for me* to *very true for me* (e.g., "I take a positive attitude towards my body"; $\alpha = .92$).

Third, participants completed the Self-Discrepancy Index (SDI, Halliwell & Dittmar, 2006). Participants were asked to generate four different things about themselves they would like to change (self-discrepancies) in an open-ended format, and then rated on a scale from 1 to 6 how concerned they were about each of these discrepancies (importance) and how different they were from their ideal (size). Participants' responses were coded to identify weight, shape or tone (WST) discrepancies ("I am a size 12, but I would like to be a size 8"). These were coded separately from appearance-related discrepancies that could not be affected by exercise. The weight, shape and tone discrepancies were correlated with the PASTAS and BAS scores ($r = .44$ and $-.38$, respectively, ps $< .05$). A second researcher coded a subset of 25% of these discrepancies and inter-rater agreement on the identification of general appearance vs. weight-related discrepancies was high (98.3%). As per the published guidelines, size and importance of discrepancy were multiplied together and summed to provide a composite total score for weight, shape and tone discrepancies.

Physical activity and Body Mass Index (BMI). Participants completed the Leisure Time Exercise Questionnaire (LTEQ, Godin & Shephard, 1985). Participants reported how many times within an average week they engaged in mild, moderate, or strenuous physical

activity for more than 15 minutes. A combined moderate-strenuous 'METs' score was computed from these figures.[1] BMI was calculated using self-reported height and weight.

Results

Mplus 7.4 (Muthén & Muthén, 1998-2015) was used to run a structural equation model, in order to assess the relationships between goals, regulations, and body image (see Table 1 for zero-order correlations and descriptive statistics). Appearance and health goals were modelled to be correlated and to be associated with the four regulations, which, in turn, were associated with body image.

Goals and regulations were represented as observed variables using their scale means. Body image was modelled as a latent construct, with the PASTAS scale mean as the reference indicator due to its strong position within the body image literature, and with the BAS scale mean and the WST discrepancies score as the other indicators. Although PASTAS was used as the reference indicator, the weight of the factor loading was fixed to -1 (rather than the traditional +1), in order to keep the latent variable as a *positive* measure of body image. Residuals did not covary within this latent factor, but the residuals of the regulations (external, introjected, identified, intrinsic) were allowed to covary. BMI and participants' METs score from the LTEQ were included as covariates, by modelling these as covariates of goals and directly associated with regulations and body image. This model had very good overall fit indices, with CFI above .95, RMSEA below .08 and SRMR below .06 ($\chi^2 = 28.60$, $df = 16$, $p = .03$; CFI = .99, RMSEA = .06, SRMR = .03; Figure 1); the local fit of the model was also good with standardized residual covariances suggesting that no relationships in the data were poorly represented by the model (all < 2). Thus, no additional paths were inserted.

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[1] The combined METs score is calculated using the Godin and Shephard (1985) guidelines: a moderate exercise session contributes 5 units; a session of strenuous exercise contributes 9.

Given the focus of the research on appearance goals specifically, analysis of this model is focused on the associations, both direct and indirect, between appearance goals for exercise and body image.[2] Appearance goals were strongly associated with introjected regulation and more weakly with external regulation. There was also a significant but small link between appearance goals and identified regulation. Introjected regulation was negatively associated with body image, whereas intrinsic regulation showed a positive association. External regulation was marginally negatively associated with body image (p = .09).

Bootstrapping with 2000 samples was used to assess whether the associations between appearance goals for exercise and body image were due in part to their shared association with regulations. Appearance goals had a strong negative direct association with body image, but also a significant indirect association via introjected regulation (β = -.14, SE = .05, p = .003, 95% bias-corrected CI [-.05, -.23]). The other three indirect pathways (via external, identified, and intrinsic regulation) were non-significant (ps > .05, 95% bias-corrected CIs across zero). The link between appearance goals and body image is therefore partially due to their shared association with introjected regulation.

Brief Discussion

These findings provide novel correlational evidence for the shared variance between appearance goals for exercise, introjected regulation, and body image, and suggest that introjected regulation may be a key link between appearance goals for exercise and body image. The individual importance of introjected regulation for exercise as an associate of body image has been highlighted previously (e.g., Brunet et al., 2012; Thøgersen-Ntoumani,

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[2] The associations between health goals for exercise, regulations and body image can still be seen in Figure 1. For a full summary of these pathways and the associated indirect effects, please contact the first author.

& Ntoumanis, 2007); however, previous research has not identified this type of regulation's potential importance in linking appearance goals for exercise to body image. These findings provide a framework within which to place previous research relating appearance and health reasons for exercise to body image (Furnham et al., 2002; Strelan et al., 2003; Tiggemann & Williamson, 2000), by considering these as domain-specific extrinsic and intrinsic goals, which are differentially associated with the regulation of exercise behavior and, in turn, body image.

These findings, linking appearance goals for exercise, introjected regulation, and body image, provide necessary information for a more causal test of the links between appearance goals and body image. From this cross-sectional work, it is not possible to draw conclusions about the direction of this effect or to truly identify it as a case of mediation (Bullock et al., 2010). For this, we must experimentally manipulate both our proposed independent variable (appearance goals) *and* the proposed mediator (introjected regulation) to establish causation.

Study 2

The initial cross-sectional study suggests that introjected regulation shares considerable variance with both appearance goals for exercise and body image. In our second study, to test the causal links between these variables, appearance vs. health frames for exercise were manipulated at the same time as inducing guilt vs. no guilt regarding exercise behavior, using a magazine article style of manipulation, as successfully used in previous research (Aubrey, 2010). It was hypothesized that participants in both of the guilt conditions (health and guilt; appearance and guilt) would experience more post-test guilt than participants in the no guilt conditions, but that post-test guilt would not be influenced by the appearance vs. health manipulation. Furthermore, for the proposed mediation to hold, the guilt manipulation should affect participants' post-test body anxiety, whereas the appearance vs. health manipulation should not. That is, appearance reasons for exercise should *only* be

problematic when paired with the guilt manipulation, if this is indeed the mediator in this case. By experimentally manipulating the proposed mediator in addition to the independent variable, this study offers a strong test of introjected regulation (guilt-based exercise motivation) as the underlying mechanism through which appearance goals influence body image.

In establishing this effect of the guilt manipulation, there is the challenge of individual variation in responses to it: among those in the guilt condition, there is likely to be variation in how susceptible participants are to the manipulation, with some participants feeling guiltier than others as a result. As such, it would be plausible to predict a treatment-mediation interaction effect (Valeri & Vanderweele, 2013), with the guilt manipulation predicting increases in post-test guilt and this, in turn, predicting body anxiety, but only among those in the guilt condition. In other words, the impacts of a guilt manipulation on body anxiety can be expected *to the extent that* the manipulation succeeds in inducing guilt.

Method

Participants and design. One hundred and sixty-five female university students (aged 18 – 27 years, $M = 19.44$, $SD = 1.40$) were randomly assigned to a 2 (appearance vs. health frame) x 2 (no guilt vs. guilt) between-subjects design. Participants were recruited through a university participation pool. Participants were predominantly white (77.7%), and within the 'normal' range for BMI (75% between 18.5 and 25, $M = 21.31$, $SD = 3.59$). Ethical approval for the experiment was granted by the ethics committee of the University, and the research process met APA and BPS ethical standards.

Procedure. Participants attended group testing sessions, which ranged in size from 1 to 10 participants and took between 20 and 35 minutes to complete. After reading the information sheet and providing informed consent, participants worked through the pack at

their own pace. Participants were informed that the study related to magazine preferences and requested that they read the article carefully.

Appearance vs. health manipulation. All participants were given a passage of text reportedly written by 'Helen', another student at the university. The passage outlined three tips for fitting exercise into a busy schedule. In the "appearance" conditions, the appearance and weight-related benefits of these tips were highlighted, such as toning and calorie burning, whereas in the "health" conditions, the health benefits of these tips were highlighted, such as cardiovascular health and injury prevention. Providing exercise advice with either a health or appearance focus is an effective means of priming health or appearance reasons for exercise respectively (Aubrey, 2010). The texts were closely matched in length and sentence construction, to ensure that the only substantive difference was the framing of the advice.

Guilt manipulation. The final paragraph of the text differed by guilt condition. In both conditions, the author acknowledged that she did not always do as much exercise as she would like to. In the 'no guilt' condition, this was followed by a self-compassionate statement about not feeling guilty for not doing enough. In the 'guilt' condition, this statement was adapted to focus on experiencing guilt for not doing enough, by rephrasing key statements to a more self-critical approach to missing a workout.[3]

Participants were asked to reread the final paragraph and to imagine they were the author. Participants then listed five reasons why they might feel as described in this paragraph. Measures of guilt often use responses to scenarios to assess this emotion (see Robins, Noftle, & Tracy, 2007, for a full review), and thus this was considered an appropriate technique with which to manipulate guilt. The majority of participants provided 5 reasons (84.3%), with only 4 participants providing 2 or fewer.

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[3] For reasons of brevity, the manipulation text is omitted here. All experimental materials are available upon request; please contact the first author for further details.

Post-test measures.

Questions on the article. Participants were asked to describe the material to confirm they had read the article; all participants accurately described the content. They also were asked how similar they thought the author was to them and how likeable the author was (rated on a 5-point Likert scale, *not at all* to *extremely*). There were no significant main effects or interactions on perceptions of author likeability and similarity to participants (appearance vs. health, guilt vs. no guilt, appearance x guilt; all ps > .05; descriptive statistics in Table 2). Participants were also asked how health- and appearance-focused they thought the author was, as a manipulation check (see Results for full details).

Post-test guilt and negative emotion. Post-test guilt was assessed using a short form of the Positive and Negative Affect Scale (I-PANAS-SF, Thompson, 2007), with one additional item (guilty) included. This item was included as a manipulation check for the guilt conditions. Participants were asked to what extent they were experiencing each of 11 mood adjectives *right now* and responded on a 7-point Likert scale (*not at all* to *very much*). In addition to guilt, the mean of five other negative emotion terms (hostile, upset, nervous, afraid, ashamed) was used to control for a general negative response to the article (α = .79).

This scale occurred only after the manipulation had taken place; there was no pre-test of guilt or other emotions. This was a purposeful decision on the part of the research team, to avoid multiple questions relating to guilt sensitizing participants to this emotion and altering their response to the guilt manipulation, a potential pre-test-treatment interaction effect (Shadish, Cook, & Campbell, 2001). Demand characteristics and other manipulation effects may be particularly relevant in the body image domain, where many findings are well-known in popular culture (e.g., the effects of thin ideal media or focusing on appearance) and demand characteristics have been shown to influence repeat measurements (e.g., Fingeret, Gleaves, & Pearson, 2004; Krawczyk, Menzel, & Thompson, 2014). The risk of heightening

sensitivity to guilt was also noted in the development of our materials in a pilot study (N = 50): our first guilt-inducing Helen was too obvious in her attempts to manipulate participants' guilt. Participants in this condition did not feel guilty, and instead disliked the author significantly more than the other conditions.

Body anxiety (state). The Physical Appearance State Trait Anxiety Scale (PASTAS, Reed et al., 1991) was used to measure body anxiety. Participants were asked how anxious they were about a range of elements of their lives *right now* and responded on a 5-point Likert scale (*not at all anxious* to *very anxious*). Embedded within the 20-item scale were 7 items relating to appearance issues, such as "my size", and "the extent to which I look overweight". These 7 items demonstrated excellent reliability ($\alpha = .85$).

Regulation of exercise behavior (state). An adapted, shortened version[4] of the Behavioural Regulation of Exercise Questionnaire 2 (BREQ-2, Markland & Tobin, 2004) was used to measure participants' immediate motivation for exercise. The introductory text was rephrased to ask participants to consider why they would be exercising *today* if they did so, to attain a 'state' measure. We used the introjected regulation subscale in our analyses (e.g., "I would be exercising today because I feel guilty when I don't exercise"; $\alpha = .85$).

Demographic information, BMI, and demand characteristics. Participants reported their age, ethnicity, height, and weight. Height and weight were used to calculate body mass index (available for 150 participants). Participants were asked what they thought the study was investigating. No participants recognized that they had experienced a guilt manipulation.

Trait measures. Two weeks after the experimental session, participants were emailed a link to an online survey and provided their trait measures via this portal ($n = 130$), in order to control for these in later analyses if necessary. As the effects of the exposure manipulation

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[4] The original 19-item questionnaire was shortened to 12 items, by removing the amotivation subscale and the weakest loading item from the other subscales, as found in Study 1.

(a 660 word piece of text) were expected to be relatively short-lived, it was considered appropriate to use a two-week follow-up questionnaire to collect trait data, especially as previous research within an exposure paradigm (e.g., Ashikali, Dittmar, & Ayers, 2014) has included trait measures *after* the exposure and post-test state measures.

Participants completed trait measures of body anxiety, goals for exercise, and introjected regulation. For body anxiety, participants completed the PASTAS (Reed et al., 1991) a second time, but this time were asked how anxious they were about a range of elements of their lives *in general*. The measure once more demonstrated high reliability (α = .92). A 15 item form of the Goal Content for Exercise Questionnaire (GCEQ, Sebire, Standage, & Vansteenkiste, 2008) was used to measure participants' appearance and health goals for exercise, with three items for each goal (αs = .85 and .82, respectively). Participants rated to what extent various goals for exercise were important to them on a 5-point Likert scale (*not at all important* to *very important*). The shortened BREQ-2 (Markland & Tobin, 2004) was used to assess participants' trait introjected regulation of exercise behavior (α = .84).

Data analysis.

Missing data. There was no missing data on the post-test measures of body anxiety or guilt. The post-test measure of negative emotions comprised five items and on three of these there was missing data for one (but each different) respondent and these were replaced by mean substitution to provide complete data. For the pre-test measure of trait body anxiety, however, there was missing data on just under 10% of cases (16 out of N=165). For the mediation analyses, this was handled using Full Information Maximum Likelihood (Enders, 2010); for the ANCOVA, we imputed missing values using the EM algorithm in SPSS.

Manipulation checks and overall effects of manipulations. Manipulation checks were conducted using a 2 x 2 Analysis of Variance (ANOVA). Tests for the overall effects of the

manipulations (appearance vs. health frame; guilt vs. no guilt) were conducted using an Analysis of Covariance (ANCOVA), with any trait variables that differed significantly between the conditions included as covariates. These analyses were conducted in SPSS (version 23).

Mediation analysis. As the manipulation was expected to influence post-test body anxiety due to its effect on post-test guilt, this assumption was tested via a structural equation model. However, mediation is complicated in a situation where the treatment or experimental condition may interact with the mediator itself (Muthén & Asparouhov, 2015; Valeri & Vanderweele, 2013), as may be the case in this design: post-test guilt does not represent the same type of guilt in each condition, and may therefore have a different effect on the outcome of body anxiety. 'Guilty' participants in the guilt condition should theoretically be feeling this way due to the manipulation; their guilt should be specifically associated with not exercising enough. In contrast, variation in the guilt ratings of participants in the no guilt condition will not necessarily be associated with guilt regarding exercise (which this condition specifically aims to reduce), but rather should represent other, general, sources of guilt. Thus, we would expect variation in guilt associated with not exercising, mostly aroused in the guilt condition, to affect post-test body anxiety, but variation of other kinds of guilt, most aroused in the control condition, not to affect post-test anxiety. Hence, we predicted a mediation by post-test guilt, but also a moderation by the condition of the mediator's effect, as indicated by a treatment-mediator interaction effect.

The counterfactual method detailed by Muthén and Asparouhov (2015; see also Valeri & Vanderweele, 2013) was employed to examine this possibility, allowing the simultaneous consideration of the mediation and treatment-mediator interaction. Briefly put, this method involves the decomposition of the total effect into two components. In classic treatments of mediation (Baron & Kenny, 1986), where there is no treatment-mediator

interaction, the total effect comprises a direct effect and an indirect effect, and comprises three path coefficients. The presence of an interaction, however, introduces additional coefficients that contribute to the total effect, and that need to be taken into account when defining direct and indirect effects. Thus, the total effect can be decomposed either into the Pure Natural Direct Effect (PNDE) and the Total Natural Indirect Effect (TNIE), or into the Total Natural Direct Effect (TNDE) and the Pure Natural Indirect Effect (PNIE: Muthén & Muthén, 2015; Valeri & Vanderweele, 2013). For our purposes, the first decomposition is the most appropriate since it is the TNIE that represents the change in the outcome when the condition is held constant at the treatment condition (the guilt condition) and the mediator changes from the level of the control (no guilt) to the level of the treatment condition. Thus, it includes the product of the interaction effect and the effect of the treatment on the mediator, and hence here captures the expectation that it is the guilt aroused in the treatment condition that has an effect, but not the guilt found in the control condition.

The counterfactual method relies on the assumption that confounding variables of the mediator-outcome relationship are controlled (Valeri & Vanderweele, 2013). We therefore included two variables as covariates of post-test guilt and post-test body anxiety: trait body anxiety and post-test negative emotions (the mean of five negative emotions from the I-PANAS-SF). Thus, we conducted what MacKinnon and Pirlott (2015) refer to as a "comprehensive structural equation model" (p.35), which explicitly models the influence of known confounding variables measured in the study. We further tested the specificity of the mediation via post-test guilt by directly replacing it with post-test negative emotions in a further analysis.

Results

Descriptive statistics can be seen in Table 2, by condition.

Random assignment checks. A series of ANOVAs were conducted to assess whether the trait levels of key variables were significantly different between any of the conditions. Only trait levels of body anxiety significantly varied between conditions; specifically, participants in the health conditions had higher trait levels of body anxiety than those in the appearance conditions, $F(1, 125) = 7.19$, $p = .01$; health conditions: $M = 2.87$, $SD = 1.09$; appearance conditions: $M = 2.40$, $SD = 0.98$. As such, trait levels of this variable were controlled for throughout the analyses. No other potential covariates varied significantly between conditions (age, BMI, trait endorsement of health or appearance goals, trait introjected regulation; all $ps > .05$).

Manipulation checks.

Health and appearance focus. ANOVAs were conducted to establish whether the articles primed the intended concerns. Participants perceived the author in the appearance conditions as significantly more appearance-focused than the author in the health conditions $F(1, 161) = 31.62$, $p < .001$; health conditions: $M = 3.33$, $SD = 0.81$; appearance conditions: $M = 4.05$, $SD = 0.82$. The two authors were perceived as equally health-focused, $F(1, 161) = 1.44$, $p = .23$; health conditions: $M = 3.75$, $SD = 0.79$; appearance conditions: $M = 3.59$, $SD = 0.93$. This suggests that both articles primed health concerns, rather than only the health condition. However, the clear perception of the appearance author as more appearance-focused suggests that the manipulation was successful in its main purpose of highlighting appearance reasons for exercise.

Guilt inducement. The success of the guilt manipulation was assessed with two measures: the immediate post-test rating of guilt and the state measure of introjected regulation. In the case of post-test guilt, a 2 x 2 ANOVA indicated that the guilt manipulation had a significant effect on participants' immediate emotional reports of guilt, $F(1, 161) = 13.02$, $p < .001$; guilt conditions: $M = 2.95$, $SD = 1.69$; no guilt conditions: $M = 2.02$, $SD =$

1.58. There was no main effect of appearance condition, or of the interaction between the two conditions (both ps > .05). In the case of introjected regulation, neither the guilt nor appearance manipulation had a significant effect on this outcome; the interaction between conditions was also non-significant (all ps > .05).

Overall effects of manipulations on body anxiety. A 2 x 2 ANCOVA was conducted to assess whether the guilt manipulation, the appearance vs. health manipulation, or the interaction between the two predicted post-test state body anxiety (PASTAS), using trait body anxiety as a covariate. There were no main effects of appearance and no interaction effect, but trait body anxiety had a strong effect on state scores, $F(1, 160) = 330.63, p < .001$.

Post-test guilt: Mediation and treatment-mediator interaction. Mediation analyses were carried out using Mplus 7.4 (Muthén & Muthén, 1998-2015) using bootstrap standard errors with 1000 bootstrap samples. We first carried out an analysis in which post-test guilt mediated the effect of the guilt manipulation (the treatment) on post-test body anxiety, controlling for trait body anxiety and post-test negative emotions. Trait body anxiety significantly affected post-test body anxiety (b = .0.67, p <.001) but not post-test guilt (b = 0.12, p > .05). Negative post-test emotions significantly affected post-test guilt (b = 0.89, p < .001) and post-test body anxiety (b =0.12, p < .05). The treatment significantly affected post-test guilt (b = 0..73, p <.001), but post-test guilt did not significantly affect post-test body anxiety (b = 0.05, p = .10) and the treatment-mediator interaction was also not significant (b = 0.09, p = .10). The results from the mediation analysis, however show that the TNIE was significant (see Table 3 for direct and indirect effects), indicating that there was a significant indirect effect of experimental condition, via post-test guilt, on post-test body anxiety, but *only* for those in the guilt condition. Women in the no guilt condition did not demonstrate this mediation effect (PNIE was non-significant), and no other effects in the mediation analysis were significant.

When post-test guilt was replaced in the analysis by post-test negative emotions as the mediating variable, TNIE was not significant and there were no other significant effects in the mediation analysis, suggesting the critical role of guilt rather than negative emotion more generally. It seems, then, that the guilt manipulation had an effect on post-test body anxiety via the particular kind of guilt that it aroused (which we assume to be guilt about lack of exercise), guilt that was not aroused in the control condition.

Brief Discussion

The total effect of the guilt condition on body anxiety was not significant and this is due to the fact that the direct effect is negligible and not significant. The effect of the guilt manipulation was fully mediated by the extent to which it aroused guilt; not all women experienced guilt as a result of our manipulation, but those that did felt more anxious about their bodies. Higher levels of post-test guilt for women in the no guilt condition were not associated with higher levels of body anxiety. This finding suggests that guilt related to exercise is a mechanism through which appearance goals may influence body image. The effect of appearance vs. health framing observed by Aubrey (2010) appears to be superseded by the guilt manipulation introduced in this experiment: appearance goal priming was not problematic for body image when combined with the no guilt manipulation.

In further support of the importance of guilt, these findings were not replicated when post-test guilt was replaced by post-test negative emotions more generally in our mediation analysis; the negative link to body anxiety appears to be specific to the guilt elicited by our manipulation. The inclusion of negative emotions beyond guilt and their inclusion as controls and replacing guilt in the analysis is a key strength and contribution of this study. Our findings support the importance of guilt *in particular* in the relationship between appearance reasons for exercise and body anxiety and shows the divergent validity of guilt, compared to negative affect more generally.

In considering this study's contribution, it is important to note that the experimental materials closely imitated the materials that women are regularly exposed to. Guilt was induced not through an artificial cognitive task, such as scrambled sentences (e.g., Zemack-Rugar, Bettman, & Fitzsimons, 2007), but by an active discussion of guilt by the author, an event that regularly occurs in the real-life media exposures that women experience (e.g., 'true life testimonials' in magazines). This similarity gives this experiment a much greater degree of ecological validity than might otherwise be expected of a lab-based experiment. Aubrey (2010) argues that this form of exposure represents a single 'meal' in women's 'media diets': this is only a single text endorsing appearance goals, but given the cultural prominence of these messages, it is likely that women are exposed repeatedly to these, experiencing these state effects on body image multiple times a day, and that over an extended period these effects may become cumulative, altering trait levels. Future work should consider these relationships longitudinally, to confirm the direction of the relationship between appearance goals for exercise and body image, via introjected regulation, in a naturalistic environment.

In spite of the valuable insights from this study, restrictions within the methodology and the results mean that they must be interpreted with caution, particularly with respect to the mediating role of guilt in influencing body anxiety. There was no main effect of the guilt manipulation on post-test body anxiety, and the mediation analysis presented utilizes post-test guilt as part of the indirect effect: the mediator (guilt) is measured at the same time (post-test) as the proposed outcome variable (body anxiety). The study's findings around mediation and the guilt manipulation's influence on body anxiety are therefore limited by their cross-sectional nature, in spite of being situated overall within an experimental design. This raises the possibility of either a reverse effect, whereby the manipulation increased body anxiety, which was responsible for an increase in guilt, or of other unmeasured variables being responsible for the association, as is the case in other cross-sectional mediation analyses (e.g.,

Bullock et al., 2010). Although we included trait body anxiety and post-test negative emotions as potential confounding variables, there is no guarantee that there are not others at work. As such, the study does not provide as strong a test of mediation of appearance goals' influence on body image via guilt as intended in the initial study design; its findings must be interpreted in this light, and supported by further investigation.

A further methodological limitation of the study was that guilt was not measured before the manipulation. Although a deliberate decision, in order to avoid pre-test sensitization, this design leads to two difficulties. First, the study cannot analyze a *change* in guilt, and therefore must assume that random assignment to conditions has eliminated potential variation between groups *or* that this is sufficiently controlled for by the associated trait variables, such as body anxiety and introjected regulation. Second, even if the conditions as *groups* had similar levels of pre-test guilt, the random variation between *participants* within these conditions may act to introduce additional uncontrolled variation which may serve to obscure the true causal relationships being considered. This may be particularly relevant given the lack of a direct effect found and the specific indirect effect reported: if only particular women respond to the manipulation, pre-test measures of guilt would be vital in future research to identify who these women are and what the consequences are for them.

General Discussion

Across the two studies, there is initial support for the importance of guilt as a key process through which appearance goals for exercise are associated with body image. Study 1 provides cross-sectional evidence for the shared variation in appearance goals, introjected regulation, and body image, assessing all three within a single model, while controlling for other regulations and goals. The experimental manipulation of these variables within Study 2 provides support for the proposition that guilt relating to exercise may result in increased body anxiety, in spite of the limitations discussed previously.

These findings support the theoretical proposal that regulation of exercise behavior may mediate the association between women's goals for exercise and their body image, as predicted by self-determination theory (e.g., Ryan & Deci, 2006), given the consistent association of extrinsic goals with controlled regulations (e.g., Gillison et al., 2006; Ingledew & Markland, 2008) and of controlled regulations with worse body image (e.g., Brunet & Sabiston, 2009; Thøgersen-Ntoumani & Ntoumanis, 2007). However, although the results replicate the broad theoretical predictions of less self-determined regulation being associated with lower well-being (e.g., Sheldon, Ryan, Deci, & Kasser, 2004), these findings also raise a question for self-determination theory: the most controlled form of regulation, external, is not most strongly associated with negative wellbeing outcomes. In our analyses, introjected regulation emerges as the key regulatory pathway linking appearance goals and negative body image, and future theoretical and empirical work should seek to understand why guilt as a motivation for exercise behavior may have more negative associations or consequences than more external pressures.

Guilt is often discussed as a positive motivator, driving us to reparatory action to fix a perceived wrong, but the evidence presented here and the growing body of work in the body image domain (e.g., Brunet & Sabiston, 2009; Calogero & Pina, 2011) suggests that this may not be the case. Guilt appears to be an important emotional response and motivational process resulting from exposure to or endorsement of the extrinsic goal of attractiveness. That guilt relating to exercise behavior has such negative associations for body image is an important finding, as it may open up a new avenue of interventions, suggesting that the negative association between appearance goals and body image could be mitigated by decoupling these goals from the guilt associated with not exercising enough. This provides a potential solution for researchers seeking to reduce the negative impact of appearance goals on women's body image, without appearing to criticize individuals' reasons for exercise: by

introducing interventions aimed at reducing guilt-based motivation for exercise, practitioners can potentially disrupt one of the negative pathways from appearance goals to body image. From a public health perspective, this form of intervention could have a double reward, reducing the associated health issues of negative body image, but also increasing long-term exercise persistence, which has been negatively associated with introjected regulation (Pelletier, Fortier, Vallerand, & Briere, 2001).

In addition to methodological issues relating to the individual studies, previously discussed, the nature of the sample limits the extent to which its findings can be generalized beyond female undergraduate students in the UK. Although there is clear justification for selecting the particular samples of young women in the present work, future research should focus on extending such work to other 'at-risk' groups, such as young men (Pope et al., 2000). Thus, future research should investigate whether the importance of guilt as motivation for exercise is an issue unique to women, or whether it can be generalized to men as well. This may be particularly important given research suggesting that young men and women experience introjected regulation differently, with women focusing on the avoidance of guilt and men focusing on the attainment of social status and appreciation (Gillison et al., 2009).

These results set an agenda for further work to evaluate the unfolding causal relations between appearance motivations for exercise and body image over time. This study provides evidence of the potential importance of guilt in linking appearance goals for exercise and body image; future research should focus on the task of further investigating the causal nature of this relationship, employing longitudinal research to examine this relationship over longer periods of time and in a more naturalistic setting, alongside further experimental manipulations to fully confirm causality.

Acknowledgements

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Table 1. Zero-order correlations and descriptive statistics for exercise goals, exercise regulations, body image and covariates (Study 1).

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1. Activity (METs)	22.59	19.46											
2. External Regulation	1.61	0.74	.15*										
3. Introjected Regulation	2.59	1.05	.21*	.29*									
4. Identified Regulation	3.10	0.99	.48*	.10	.66*								
5. Intrinsic Regulation	2.92	1.18	.40*	.02	.36*	.75*							
6. Health Goals	3.51	0.94	.18*	.17*	.27*	.47*	.39*						
7. Appearance Goals	3.75	1.04	.14*	.24*	.55*	.37*	.10	.25*					
8. PASTAS	2.78	1.01	.08	.32*	.50*	.24*	-.05	.09	.67*				
9. BAS	2.94	0.82	-.02	-.19*	-.39*	-.08	.17*	.10	-.57*	-.67*			
10. ASDs	9.48	14.78	-.02	.09	.04	.03	-.10	-.03	.12	.20*	-.13		
11. WSDs	10.17	14.46	-.02	.10	.28*	.15*	.04	-.07	.35*	.44*	-.36*	.23*	
12. BMI	22.38	4.28	.03	.19*	.01	-.06	-.09	-.15*	.14	.24*	-.19*	-.01	.20*

Note. Activity is the composite measure used to divide the women into higher and lower activity groups. PASTAS – Physical Appearance State Trait Anxiety Scale (Trait form); BAS – Body Appreciation Scale; ASDs – General appearance related self-discrepancies; WSDs – Weight, shape and tone self-discrepancies; BMI – Body Mass Index. $N = 215$, apart from BMI correlations ($N = 198$). * $p < .05$

Table 2. Descriptive statistics for the four experimental conditions (Study 2).

	Guilt		No Guilt	
	Appearance	Health	Appearance	Health
	n = 40	*n = 41*	*n = 41*	*n = 43*
Perceptions of author				
Likeable	3.63 (0.98)	3.76 (0.83)	3.76 (0.99)	3.79 (0.91)
Similar	3.33 (0.33)	3.10 (1.00)	2.90 (1.04)	2.98 (1.06)
Health-focused	3.53 (0.88)	3.56 (0.77)	3.65 (0.99)	3.91 (0.78)
Appearance-focused	3.95 (0.81)	3.46 (0.67)	4.15 (0.82)	3.21 (0.91)
Post-test measures				
Guilt	2.93 (1.72)	2.98 (1.70)	2.02 (1.54)	2.02 (1.64)
Body anxiety	2.68 (0.98)	2.75 (0.93)	2.38 (0.85)	2.65 (1.13)
Introjected regulation	2.27 (1.10)	2.54 (0.95)	2.29 (0.93)	2.34 (1.18)
Trait measures	*n = 31*	*n = 32*	*n = 34*	*n = 32*
Body anxiety	2.40 (0.97)	2.87 (1.03)	2.39 (1.01)	2.87 (1.16)
Introjected regulation	2.51 (1.00)	2.85 (1.14)	2.33 (0.87)	2.51 (1.13)
Appearance goals for exercise	3.85 (0.78)	3.82 (0.88)	3.89 (1.00)	4.21 (0.76)
Health goals for exercise	3.56 (0.99)	3.76 (0.91)	3.80 (0.83)	3.60 (1.04)

Note: N for body mass index: health-no guilt = 38; health-guilt = 38; appearance-no guilt = 40; appearance-guilt = 34.

Table 3. Total and natural, direct and indirect effects of the guilt manipulation on post-test body anxiety (Study 2).

	Description of effect	Formula[a]	Effect size (unstand.)	Bias-corrected 95% Confidence Intervals
Total Natural Indirect Effect	Change in DV in the Guilt condition participants, when post-test guilt increases from level of No Guilt condition to the level of the Guilt condition	$\beta_1\gamma_1 + \beta_3\gamma_1$	0.11*	[0.04, 0.24]
Pure Natural Indirect Effect	Change in DV in the No Guilt condition participants, when post-test guilt increases from level of No Guilt condition to the level of the Guilt condition	$\beta_1\gamma_1$	0.04	[-0.01, 0.16]
Total Natural Direct Effect	Change in the DV when changing from No Guilt to Guilt condition, holding post-test guilt constant at the level of the No Guilt condition	$\beta_2 + \beta_3\gamma_0 + \beta_3\gamma_1$	-0.04	[-0.18, 0.22]
Pure Natural Direct Effect	Change in the DV when changing from No Guilt to Guilt condition, holding post-test guilt constant at the level of the Guilt condition	$\beta_2 + \beta_3\gamma_0$	0.02	[-0.27, 0.15]

* $p < .05$. Note: Values in this table are drawn from the model where negative emotions and trait body anxiety included as co-variates.

[a] With a treatment-mediator interaction, $y_i = \beta_0 + \beta_1 m_i + \beta_2 x_i + \beta_3 x_i m_i + e_{1i}$ and $m_i = \gamma_0 + \gamma_1 x_i + e_{2i}$ where y_i is the outcome, m_i is the mediator, and x_i is the treatment. From these equations, Muthen and Asparouhov (2015) derive the components of each type of effect shown in the table.
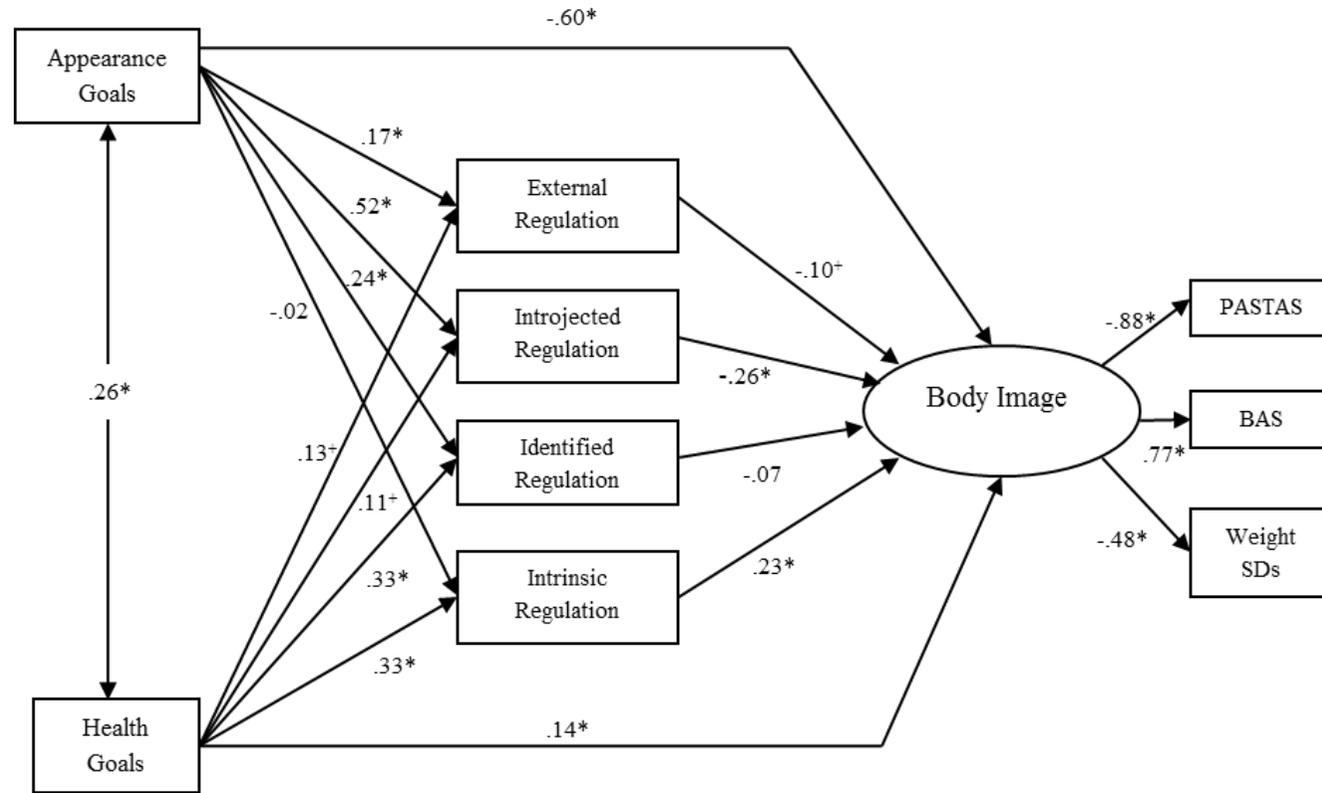
Figure 1. Structural model of relationships between goals for exercise, regulations for exercise and body image (Study 1).

Note to Figure 1. $+ p < .10$, $* p < .05$.
BMI and activity were modelled to predict all variables in the model, in order to control for their effects in the analysis. Moderate-strenuous activity was positively associated with introjected ($\beta = .12$), identified ($\beta = .39$) and intrinsic regulation ($\beta = .35$), and both types of goals (appearance: $\beta = .13$; health: $\beta = .18$; all $ps < .05$). BMI was positively associated with external regulation ($\beta = .18$) and appearance goals ($\beta = .14$). It was negatively associated with body image ($\beta = -.15$) and health goals ($\beta = -.14$; all $ps < .05$).