

BODY SURVEILLANCE MAY REDUCE THE PSYCHOLOGICAL BENEFITS OF EXERCISE

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Introduction: Body surveillance (i.e., monitoring the body's appearance) is linked with body image disturbance and eating pathology in women. Two studies investigated whether women's levels of body surveillance while exercising were linked with two common positive psychological outcomes of exercise: improved body satisfaction and increased positive mood. **Methods:** In Study 1, we explored correlations between body surveillance while working out, exercise enjoyment, exercise frequency, and trait body dissatisfaction in a sample of 218 women (age range 19–68) who exercised regularly. In Study 2, women ($n = 178$, age range 18–30) completed measures of mood and body satisfaction immediately before and after a 30-minute Zoom fitness class. **Results:** In Study 1, body surveillance while exercising was negatively associated with exercise enjoyment and exercise frequency. Further, a mediation analysis suggested that the negative association between body dissatisfaction and exercise enjoyment was mediated by body surveillance while exercising. Study 2 results indicated that the exercise class increased positive mood. However, higher levels of body surveillance during the class were associated with less mood improvement. Self-reported positive words to describe class experience were negatively related to body surveillance during the class, with the reverse finding for negative descriptive words. **Discussion:** Overall, results suggest engaging in body surveillance during workouts may diminish the typically positive effects of exercise on mood and body satisfaction. Altering fitness contexts to discourage appearance monitoring is recommended.

Keywords: body dissatisfaction, body surveillance, exercise enjoyment, objectification theory

INTRODUCTION

The benefits of exercise are well documented. Regular exercise reduces the risk of cardiovascular disease and improves cognitive functioning in various age groups (USDHHS, 2018). In addition to physical health benefits, exercise is linked to positive psychological outcomes, including improved mood (Aylett et al., 2018; Schuch et al., 2016) and improved body image (Hausenblas & Fallon, 2006). However, from the perspective of objectification theory (Fredrickson & Roberts, 1997), not all exercise is equally likely to have positive psychological effects. If women engage in high levels of body surveillance (i.e., attending to how one's body looks to other people) while working out, this focus could undermine some of the benefits of exercise (Engeln et al., 2018). The current studies explored the role of body surveillance in the link between exercise and women's mood and body satisfaction.

OBJECTIFICATION THEORY

Fredrickson and Roberts (1997) proposed objectification theory as a social psychological explanation of why women, compared to men, experience higher rates of anorexia and bulimia nervosa, depression, sexual dysfunction, and certain types of anxiety. In essence, the theory addresses how features of women's social world and interpersonal experiences shape their internal psychology. When sexually objectified, a woman is evaluated in terms of how visually pleasing her body is to others. Ongoing experiences of sexual objectification can result in women internalizing an observer's view of their bodies—a perspective called self-objectification.

Self-objectification is linked with chronic body surveillance in women (Tiggemann & Lynch, 2001). Perhaps because it redirects women's conscious attention to their body's appearance, body surveillance is related to negative mood and negative body image outcomes, particularly among young women (see Moradi & Huang, 2008, for a review). In samples of girls and women, body surveillance correlates include higher rates of depression and body dissatisfaction, lower body acceptance, and higher rates of disordered eating (Grower et al., 2020; Prichard &

Tiggemann, 2008; Strelan et al., 2003). The application of objectification theory to women's fitness contexts can help explain how the mood and body image benefits of exercise might be negatively influenced by body surveillance.

EXERCISE, MOOD, AND BODY IMAGE

Regular exercise generally improves mood. Both a recent systematic review of randomized controlled trials (Aylett et al., 2018) and a meta-analysis (Schuch et al., 2016) concluded that exercise decreases symptoms of anxiety and depression. More specifically, Schuch and colleagues' (2016) meta-analysis of 25 studies indicated that regular exercise was associated with significant decreases in depression over time—a large effect of just below one standard deviation when corrected for publication bias. In addition to these longer-term mood improvements, exercise can have acute effects on mood. In two studies (both with women only samples), just 30 minutes of aerobic exercise resulted in an immediate increase in positive affect (Engeln et al., 2018; Vocks et al., 2009).

Exercise may also improve body image. A meta-analysis of 121 studies (Hausenblas & Fallen, 2006) concluded that individuals who exercise have more positive body image than those who do not (a moderate overall effect size). An experimental study of 60 young women with pre-existing body image concerns found improvements in state body image for up to 20 minutes following a 30-minute exercise class (Salci & Martin Ginis, 2017). Vocks and colleagues (2009) also found that acute exercise improved body satisfaction in a sample of women at a fitness center. Though experimental studies suggest exercise can directly increase body satisfaction, the association between exercise frequency and body satisfaction among women is likely bi-directional. In other words, while exercise might increase body satisfaction, women with low levels of body satisfaction may also be less likely to exercise. Exercise environments can draw significant attention to the appearance of one's body, making it unsurprising that individuals with higher levels of body dissatisfaction and those who anticipate experiencing weight stigma in fitness environments report more exercise avoidance (More et al., 2019; Vartanian & Novak, 2011).

While exercising appears to be generally beneficial for women's mood and body image, these effects may be attenuated by body surveillance, which is associated with the opposite outcomes. Consistent with this idea, a recent experiment (Engeln et al., 2018) found that having a fitness instructor who made appearance-focused motivational comments (e.g., "Blast that cellulite!") during an all-women fitness class heightened participants' body surveillance during the class. Compared to participants who heard health-focused motivational comments (e.g., "Think of how strong you are getting!"), those in the appearance-focused classes showed smaller improvements in mood and body satisfaction at the end of the class.

BODY SURVEILLANCE, ENJOYMENT OF EXERCISE, AND EXERCISE ADHERENCE

The extent to which individuals enjoy exercising predicts long-term exercise adherence (Aaltonen et al., 2012; 2014; Ryan et al., 1997). One experiment (Helfer et al., 2015) found that men and women who were made aware of the positive mood effects of exercise planned to exercise more regularly and experienced more positive mood after exercising. Additionally, a study of college women (O'Hara et al., 2014) found that participants with higher levels of enjoyment during a fitness class expressed greater intent to participate in a similar exercise class in the future.

Because body surveillance tends to be linked with negative mood states in women, women who engage in body monitoring while working out may experience less pleasure from exercising and therefore less exercise adherence. Consistent with this possibility, one study (Melbye et al., 2008) found that women with low self-objectification self-reported exercising more frequently than women who scored high on self-objectification. Similarly, a survey of men and women found that appearance comparisons (which could trigger or be triggered by body surveillance) were associated with reduced intention to exercise in the future (Li et al., 2019). Exercise environments that prompt body surveillance (e.g., via the presence of mirrors or appearance-related commentary by others) may also directly reduce women's enjoyment of exercise. Consistent with this claim, Raedeke and

colleagues (2007) found that women who exercised in a health-focused class (compared to an appearance-focused class) enjoyed the class more.

In sum, evidence suggests body surveillance may reduce the psychological benefits of exercise for women, both making workouts less enjoyable and diminishing the positive impact of workouts on body satisfaction. Because enjoying exercise is a key predictor of exercise adherence, body surveillance could also reduce women's frequency of exercise, further limiting the potential for exercise to improve mood or body image.

THE CURRENT RESEARCH

The goal of the current research was to examine whether women's body surveillance is associated with lower levels of positive psychological exercise outcomes—specifically, positive affect and body satisfaction. In Study 1, we surveyed women who exercise regularly about their body image and exercise habits. In Study 2, we collected state measures of mood and body satisfaction in a sample of young women immediately before and after they completed an online fitness class. In Study 2, participants also reported the extent to which they engaged in body surveillance during the class. The Institutional Review Board of Northwestern University approved both studies.

STUDY 1

We distributed an online survey to US women over the age of 18 who identified as regular exercisers. Participants completed measures assessing exercise habits, body dissatisfaction, body surveillance, and exercise enjoyment. Consistent with the literature reviewed above, we predicted that participants' self-reported levels of body surveillance while exercising would be negatively correlated with exercise enjoyment and frequency of exercise and positively correlated with trait body dissatisfaction. Further, we predicted that trait body dissatisfaction would be negatively correlated with exercise enjoyment. We also hypothesized that the association between trait body dissatisfaction and exercise enjoyment would be mediated by body surveillance.

Those with negative thoughts and feelings about the appearance of their bodies may enjoy exercise less, in part, because their body dissatisfaction prompts them to engage body monitoring while working out. As noted above, in girls and women, body monitoring is associated with negative mood states and depression (Milan & Dominguez Perez, 2021; Tiggemann & Kuring, 2004; Wollast et al., 2019).

METHOD

Participants. After data cleaning (see Results and Discussion), 218 women in the US ($M_{\text{age}} = 31.37$, $SD = 4.39$, age range = 19–68) participated. Seventy-seven percent of participants ($n = 167$) identified as White, 8% ($n = 18$) as Asian/Asian American, 6% ($n = 13$) as Multiracial, 3% ($n = 6$) as Hispanic/Latina, 2% ($n = 4$) as Black/African, 3% ($n = 6$) as another ethnic identity, 1% ($n = 3$) as Native American, and one participant declined to answer this question. For those who provided values for both height and weight ($n = 208$), we calculated body mass index (BMI). BMI is frequently criticized for being a flawed measure of individual health, in part because it fails to consider the distinction between fat and muscle (Burkhauser & Cawley, 2007). Additionally, evidence shows that BMI cut points (i.e., boundaries between weight classifications like “healthy weight” and “overweight”) do not represent equivalent levels of body fat across racial and ethnic groups (Jackson et al., 2009). Nevertheless, BMI is reliably associated with body dissatisfaction (Bailey & Ricciardelli, 2010), and researchers frequently control for it in statistical analyses involving body image. BMI values in the current sample ranged from 15.82 to 41.62 ($M = 23.30$, $SD = 4.39$). Based on cut points from the Center for Disease Control and Prevention (CDC, 2020), participants represented a range of body sizes, with 7% of reported BMIs categorized as “underweight,” 69% as “healthy,” and 24% as “overweight” or “obese.” Participants reported the number of occasions per week that they exercised: 3% of participants reported exercising 1–2 times per week, 25% reported 3–4 times per week, 40% reported 5–6 times per week, and 32% reported 7 or more exercise occasions per week.

Procedure. Anonymous links to the survey described as focusing on “exercise motivations and settings” were distributed

through social media posts on a wide array of Instagram and Facebook pages. Recruitment methods also included snowball sampling via participants who completed the study. Based on evidence that raffles lead to higher quality data than paying participants small amounts for responding to online surveys (e.g., Griffin et al., 2022), we used raffles as an incentive. Participants could enter a raffle with a 1 in 10 chance to win a \$10 Amazon gift card as thanks for their participation.

MEASURES

Screening and Demographic Questionnaires. Participants had to identify as women, be 18 years or older, be US residents, and indicate that they exercised regularly to qualify for the study. We did not provide a definition of “regular exercise,” leaving it to participants to decide whether they met that criterion. Participants indicated how often they exercised by responding to this question: “In a typical week, on how many separate occasions do you engage in at least 15 minutes of exercise?” Response options to this question ranged from “zero” (no participants selected this option) to “seven or more.”

Body Surveillance. To assess body surveillance during exercise, we used a slightly modified version of the body surveillance subscale of the Objectified Body Consciousness Scale (OBCS; McKinley & Hyde, 1996). To each item, we added the preface, “When I work out.” For example, the first item read, “When I work out, I rarely think about how I look.” Response options range from 1 (“strongly disagree”) to 7 (“strongly agree”). Body surveillance scores are associated with body dissatisfaction (Frederick et al., 2007; Moradi & Varnes, 2017), negative body commentary (Engeln-Maddox et al., 2012), and appearance-contingent self-worth (Modica, 2019). Scores on this measure have shown strong internal consistency in samples of women (Engeln & Zola, 2021).

Enjoyment of Physical Activity. We used the 8-item version of the Physical Activity Enjoyment Scale (PACES; Mullen et al., 2011). The items included in this version of the PACES are rated using a 7-point semantic differential scale with variable labels that reference how participants feel about physical activity. Responses were averaged to create an overall exercise enjoyment score.

Mullen and colleagues (2011) reported strong internal consistency for this measure (McDonald's $\omega = .93$)

Trait-Level Body Dissatisfaction. Body dissatisfaction was measured with the 10-item body dissatisfaction subscale of the Eating Disorders Inventory-3 (EDI-3; Garner, 2004). This subscale measures participant satisfaction/dissatisfaction with regions of their body (e.g., "I think my stomach is too big"). The 6-point response scale ranges from 1 ("Never") to 6 ("Always"). We followed Schoemaker and colleagues' (1994) continuous scoring procedure for nonclinical populations to create an overall score. Scores on this measure show good construct validity through associations with other measures of body dissatisfaction (Garner, 2004) and have demonstrated strong internal consistency in samples of adolescent girls (Cuesta-Zamora, et al., 2018) and adult women (Clausen et al., 2011).

RESULTS AND DISCUSSION

Prior to conducting analyses, we removed data linked with duplicate IP addresses and from IP addresses outside of the US. Additionally, we removed data from any participants who responded to open-ended demographic questions with nonsensical answers and any participant whose self-reported height and weight led to an implausible BMI value (based on Frederick et al., 2022).

See Table 1 for descriptive statistics and correlations between all variables and Cronbach's alpha values for scored measures. As predicted, body surveillance showed moderate negative correlations with exercise enjoyment and frequency of exercise, as well as a moderate positive correlation with body dissatisfaction. Additionally, body dissatisfaction showed a small negative correlation with exercise enjoyment.

We hypothesized that the association between trait body dissatisfaction and exercise enjoyment would be mediated by body surveillance. We used Hayes's (2022) PROCESS macro (model 4; 5,000 bootstraps) to test this hypothesis. Results revealed that although the direct effect between body dissatisfaction and exercise enjoyment was not statistically significant ($p = .08$), the indirect effect (via body surveillance) was statistically significant, 95% CI $[-.02, -.01]$ (see Figure 1).

TABLE 1. Descriptive Statistics and Correlations for Variables in Study 1

Variable	n	α	M	SD	Correlations				
					1	2	3	4	5
1. BMI	208	—	23.30	4.39	—				
2. Exercise frequency ^a	218	—	5.54	1.70	.06	—			
3. Exercise enjoyment ^b	218	.92	5.40	1.16	.06	.31***	—		
4. Body dissatisfaction ^c	215	.85	31.37	8.44	.37***	-.09	-.18**	—	
5. Body surveillance ^d	218	.84	4.21	0.64	-.16*	-.28***	-.29***	.33***	—

^a Estimates of exercise instances per week.

^b Scores from the PACES. Response options ranged from 1 (low exercise enjoyment) to 7 (high exercise enjoyment).

^c Scores from the body dissatisfaction subscale of the EDI-3. Scores range from 10 (low body dissatisfaction) to 60 (high body dissatisfaction).

^d Scores from the modified body surveillance subscale of the OBCS. Possible scores ranged from 1 (low levels of body surveillance while exercising) to 7 (high levels of body surveillance while exercising).

* $p < .05$. ** $p < .01$. *** $p < .001$.

Overall, results were in line with predictions. Participants who reported engaging in more body surveillance while exercising indicated that they enjoyed exercise less and exercised less frequently. Those with higher levels of body dissatisfaction reported enjoying exercise less, and this association was mediated by the extent to which they engaged in body surveillance while working out.

LIMITATIONS

Although these findings were consistent with predictions, correlations were all in the low to moderate range. In other words, while these survey data suggest that body surveillance while exercising may matter when it comes to exercise outcomes, the role body surveillance plays in mood and body image outcomes is likely small. Nonetheless, small effects that occur repeatedly over time can have meaningful cumulative effects (Funder & Ozer, 2019). Further, given the potential of exercise to improve both physical and mental well-being, small effects on exercise enjoyment or exercise frequency are worth consideration.

Though our use of convenience and snowball sampling allowed us to collect data from a wide age range of women who

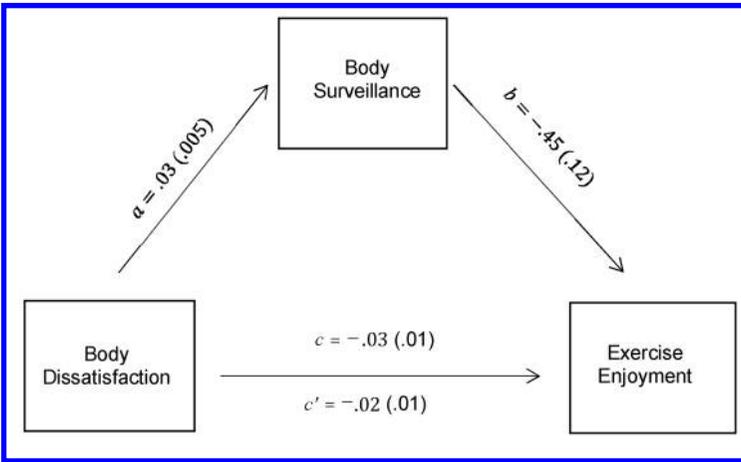


FIGURE 1. Test of Body Surveillance as a Mediator between Trait Body Dissatisfaction and Exercise Enjoyment, Study 1.

exercise regularly, this sampling strategy led to a limited amount of racial and body size diversity. White individuals were over-represented in the sample (relative to the US population) and participants with higher BMIs were under-represented (with most participant BMIs in the “healthy” range as defined by the CDC). This limitation is especially important to consider given findings that those with marginalized bodies may engage in higher levels of body surveillance due to appearance stigmatization and/or internalization of cultural biases, though results are mixed at this point (e.g., Fitzsimmons & Bardone-Cone, 2011; Fitzsimmons-Craft & Bardone-Cone, 2012; Paul, 2021).

This study was conducted in late 2020/early 2021, when in-person exercise opportunities in some areas of the US were limited because of COVID-19. It is possible that respondents were doing more solitary outdoor exercise or in-home exercise than they normally would, which could have affected scores on several variables (e.g., decreasing reports of body surveillance while working out or decreasing exercise enjoyment/frequency). In addition to these limitations, exercise frequency was estimated via a single item that relied on participant memory, and body surveillance while exercising was assessed in the context of general exercise experiences rather than focusing on a specific

workout category. We designed Study 2, in part, to address these weaknesses by assessing mood and body surveillance in the context of a live online fitness class.

STUDY 2

In Study 2, we assessed mood and body image in a sample of young women both immediately before and after they completed an online fitness class. The online fitness classes were all taught live by the same woman, who followed the same script and wore identical, neutral clothing for each class. Prior to each workout, we measured participants' state mood and body satisfaction. At the conclusion of each workout, we measured participants' levels of body surveillance during the class as well as their state mood and body satisfaction. Additionally, participants listed three words that described how they felt at the end of the class.

Consistent with previous research (Aylett et al., 2018; Hausenblas & Fallen, 2006; Schuch et al., 2016; Vocks et al., 2009), we predicted that participants would experience an increase in positive mood and body satisfaction from pre-test to post-test. Further, we predicted that the positive effects of exercise on mood and body satisfaction would be mediated by body surveillance, such that these positive effects would be attenuated among participants who engaged in higher levels of body surveillance during the exercise class (Prichard & Tiggemann, 2005; Strelan et al., 2003; Szymanski et al., 2011). Finally, we hypothesized that the number of positive words participants used to describe their post-class feelings would be positively correlated with mood change scores and body satisfaction change scores and negatively correlated with body surveillance during the class. We predicted the reverse pattern for number of negative words.

METHOD

Participants. One hundred and eighty-one women (178 in the US and 3 in Canada) participated. We excluded four participants from analyses for failing to complete either the pre-test or the post-test due to technical difficulties. All participants were between the ages of 18 and 30 ($M = 23.13$, $SD = 3.37$). Sixty-two percent ($n = 110$) identified as White/Caucasian, 15% ($n = 27$)

as Asian or Asian American, 10% ($n = 17$) as Multiracial, 5% ($n = 10$) as Hispanic/Latina, 5% ($n = 8$) as Black or African American, <1% ($n = 1$) as Middle Eastern, and 2% ($n = 3$) declined to respond to this question. Participants' BMI was calculated for those who reported both their height and weight ($n = 171$), with values ranging from 17.03 to 34.86 ($M = 23.07$, $SD = 3.13$). Using the CDC's guidelines, 2% of BMIs were categorized as "underweight," 77% as "healthy," and 21% as "overweight" or "obese." Participants self-reported the number of separate occasions they exercised each week: 9% exercised 1–2 times per week, 38% exercised 3–4 times per week, 38% reported exercising 5–6 times per week, and 15% reported exercising 7 or more times each week.

Procedure. An invitation to participate was posted on various social media platforms and on fliers in public settings. Recruiting materials advertised a free full-body fitness class via Zoom that entailed brief surveys before and after the workout. Materials included the credentials of the fitness instructor.

Following the pre-test (the link to which was provided using the chat function on Zoom), participants went straight into their 30-minute full-body workout. The workout was a standard high-intensity interval training circuit, including exercises like burpees, jump squats, and V-ups. Afterward, participants completed the post-workout survey (the link to which was provided via Zoom chat) and were sent a \$10 Amazon gift card as thanks for their participation. Class sizes ranged from 8 to 25 participants.

PRE-TEST MEASURES

State Mood and Body Satisfaction. Consistent with Fardouly and colleagues (2015), we measured positive affect and state body satisfaction using computerized visual analogue scale (VAS) items, each with response values ranging from 0 to 100. Five items measured positive affect: *depressed* (reverse coded), *anxious* (reverse coded), *angry* (reverse coded), *confident*, and *happy*. Additionally, three items measured state body satisfaction: *physically attractive*, *satisfied with body size*, and *satisfied with body shape*. Although Fardouly and colleagues (2015) included the item *fat* as a measure of body satisfaction, we excluded this item due to concern about the implication that "fat" is a feeling (vs. a description of the size of one's body). Instead, we separated the original "*satisfied with*

body shape and size" into two items. Responses on the VAS items were averaged to create composite measures of positive affect and body satisfaction.

POST-TEST MEASURES

State Mood, Body Satisfaction, and Body Surveillance. Post-test mood and body satisfaction measures were identical to pre-test measures. We again used a modified version of the body surveillance subscale of the OBCS (McKinley & Hyde, 1996) to assess body surveillance while exercising. The subscale was slightly modified to create a state-based assessment by adding "During the workout" to the beginning of scale items.

Class Experience. At the end of the survey, we asked participants to provide three words describing how they felt following the class. Two independent coders classified responses as positive, negative, or neutral words. Intraclass correlations were high for coder agreement on positive words (.96) and negative words (.95). Neutral words were not included in analyses.

RESULTS

Impact of the Fitness Class on Mood and Body Satisfaction. See Table 2 for descriptive statistics and correlations. We used a paired samples t-test to examine change in positive mood from immediately before the fitness class to immediately after the class. Consistent with Hypothesis 1, there was a significant improvement in participants' mood scores from pre-test ($M = 66.82$, $SD = 16.36$) to post-test ($M = 77.34$, $SD = 15.47$), $t(176) = -10.66$, $p < .001$, $d = -0.80$. We conducted the same analysis to explore change in body satisfaction. There was not a significant change in body satisfaction scores from pre-test ($M = 50.30$, $SD = 22.65$) to post-test ($M = 51.32$, $SD = 23.53$), $t(176) = -0.74$, $p = .46$, $d = -0.06$. Since there was a small significant correlation between change in body satisfaction (from pre-test to post-test) and participant BMI, we repeated the analysis for body satisfaction change controlling for participant BMI. When controlling for BMI, a repeated measures ANOVA indicated a positive effect of the exercise class on body satisfaction, $F(1, 169) = 4.55$, $p = .03$, $\eta_p^2 = .03$, as well as a significant interaction between time point and BMI, $F(1, 169) = 5.11$, $p = .03$,

TABLE 2. Descriptive Statistics and Correlations for Variables in Study 2

Variable	n	α	M	SD	1	2	3	4	5	Correlations							
										6	7	8	9	10			
1. BMI	171	—	23.07	3.13	—												
2. Positive mood time 1 ^a	177	.70	66.82	16.36	.003	—											
3. Positive mood time 2 ^a	177	.76	77.94	15.47	-.03	.62***	—										
4. Body satisfaction time 1 ^b	177	.86	50.30	22.65	-.42***	.40***	.38***	—									
5. Body satisfaction time 2 ^b	177	.90	51.32	23.53	-.26***	.32***	.60***	.69***	—								
6. Body surveillance during class ^c	177	.85	2.69	1.15	.02	-.21**	-.41***	-.29***	-.37***	—							
7. Body satisfaction changed ^d	177	—	1.02	18.28	.17*	-.08	.30***	-.36***	.44***	-.11	—						
8. Positive affect changed ^d	177	—	11.11	13.88	-.03	-.49***	.38***	-.06	.28***	-.21**	.43***	—					
9. Number positive words ^e	176	—	1.56	0.95	-.03	.17*	.50***	.05	.35***	-.30***	.39***	.36***	—				
10. Number negative words ^e	176	—	0.30	0.61	.08	-.13	-.48***	-.07	-.31***	.32***	-.31***	-.38***	-.51***	—			

^a Scores could range from 0 (more negative mood) to 100 (more positive mood).

^b Scores could range from 0 (low body satisfaction) to 100 (high body satisfaction).

^c Scores from the modified body surveillance subscale of the OBCS. Possible scores ranged from 1 (low levels of body surveillance) to 7 (high levels of body surveillance).

^d Calculated as Time 2 score minus Time 1 score.

^e Possible range from 0 (no words in that category) to 3 (all three words in that category).

***p < .001. **p < .01.

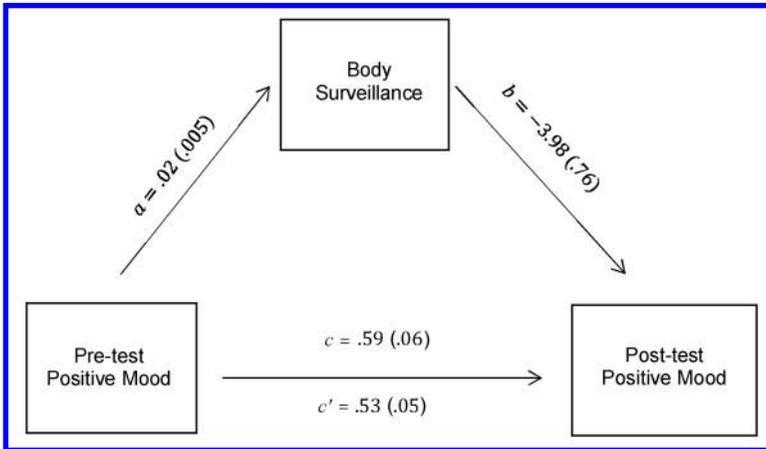


FIGURE 2. Test of Body Surveillance as a Mediator between Pre-test Positive Mood and Post-test Positive Mood, Study 2.

$\eta_p^2 = .03$. These results indicated that higher BMIs were associated with greater improvements in body satisfaction. It is possible that the positive correlation between BMI and change in body satisfaction is explained by participants with higher BMIs beginning the exercise class feeling significantly worse about their bodies (with more room for increases on these scores). Indeed, body satisfaction scores at pre-test showed a moderate, negative association with BMI. However, because we did not originally plan to control for BMI, this analysis should be considered exploratory, and results should be interpreted with caution.

The Mediating Role of Body Surveillance. We used Hayes’s (2022) PROCESS macro (model 4; 5,000 bootstraps) to test whether body surveillance during the exercise class mediated changes in body satisfaction or positive mood. Results were consistent with Hypothesis 2. For mood, results indicated a statistically significant indirect effect, such that higher scores on body surveillance were associated with less mood improvement from pre- to post-class, 95% CI [.42, .12] (see Figure 2). Similar results were found for body satisfaction improvement (see Figure 3): higher scores on body surveillance were associated with a smaller increase in body satisfaction from pre- to post-test, 95% CI [.02, .10].

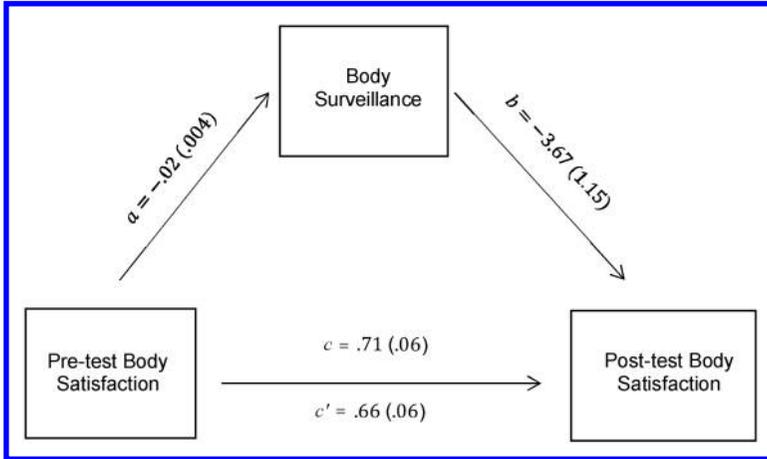


FIGURE 3. Test of Body Surveillance as a Mediator between Pre-test Body Satisfaction and Post-test Body Satisfaction, Study 2.

Correlates of Body Surveillance. Participants listed three words describing how they felt after the workout. Common positive words included happy, satisfied, proud, energized, and accomplished; common negative words included weak, self-conscious, frustrated, and out-of-shape. Consistent with predictions, the number of positive words used to describe post-class feelings had a moderate, positive association with change scores for positive mood and change scores for body satisfaction. Though not surprising, this finding supports the validity of the self-report indicators of mood and body satisfaction; participants who reported more positive changes in these variables also described themselves as feeling more positive after the workout in this open-ended question. Also as predicted, body surveillance scores were moderately negatively correlated with the number of positive words used to describe post-class feelings. In other words, the more participants engaged in body surveillance during the class, the less likely they were to describe their feelings positively after the class. Correlations between these variables and the number of negative words participants generated were all similar in magnitude but in the reverse direction.

DISCUSSION

Consistent with prior research using in-person exercise classes (e.g., Aylett et al., 2018; Engeln et al., 2018; Schuch et al., 2016; Vocks et al., 2009), this study's online exercise class increased participants' positive mood. The class's effect on body satisfaction was less clear. Effects emerged only when controlling for participant BMI, such that those with higher BMIs showed greater increases in body satisfaction from pre- to post-test. This is the first study of which we are aware to replicate these mood and body satisfaction findings for an online (vs. in-person) exercise class.

Similar to findings from Study 1, Study 2 results suggested that body surveillance while exercising may interfere with the psychological benefits of exercise. Specifically, participants who reported engaging in more body surveillance during the class showed smaller increases in both positive mood and body satisfaction. Those who scored higher on body surveillance during the class also described their post-class feelings with more negative and fewer positive words.

Levels of body surveillance during the online fitness class were noticeably lower than those reported in a study examining a similar sample in an in-person group fitness class (Engeln et al., 2018). It is possible that online fitness classes offer fewer objectifying cues and thus prompt less body surveillance. Though participants could see themselves and other participants on their computer screens, this view of the body is much less intense and detailed than what one would see in the mirror in a fitness studio or simply while looking around at others during an in-person workout. These key differences could explain this discrepancy in body surveillance levels.

The online methodology of this study left us unable to measure the extent to which participants looked at others in the class while exercising. Future research on online exercise classes would benefit from such data.

GENERAL DISCUSSION

Though monitoring the appearance of one's body can be conceptualized as an individual difference variable (McKinley &

Hyde, 1996), objectification theory (Fredrickson & Roberts, 1997) makes it clear that this body surveillance is fundamentally social in nature. In essence, objectification theory offers a sociocultural explanation of women's tendency to engage in body surveillance. If those around you (and your culture in general) continually send the message that your worth is in your appearance, you will internalize that message and become your own surveyor (Szymanski et al., 2011). Features of the social environment, such as commentary by others about the appearance of women's bodies (Calogero et al., 2009), can trigger body surveillance. Fitness settings are an environment that may promote body surveillance. As the focus in fitness settings is already on the body, cues like the presence of mirrors or commentary from instructors that emphasizes changing the appearance of the body can increase the body surveillance of those exercising.

Consistencies across Studies 1 and 2 (both focused on samples of women) highlight the negative impact of body surveillance during exercise. Participants who reported engaging in more body surveillance while exercising reported generally enjoying exercise less (Study 1) and experienced less of a mood and body satisfaction boost from an online workout class (Study 2). Higher body surveillance during the workout class in Study 2 was also associated with less positive post-class feelings, as indicated by the words participants listed to describe how they felt at the end of the class.

Exercise can be an important mood management tool. Some research exploring the effectiveness of exercise for reducing depressive symptoms has found effects comparable to pharmaceuticals and psychotherapy (Blumenthal et al., 2012). Women have higher rates of depression than men (Salk et al., 2017), yet in general, women exercise less frequently than men (The Lancet Public Health, 2019). Though the reasons for the gender gap in exercise frequency are likely numerous, one way to increase women's exercise frequency might be to emphasize its mood benefits. This idea is supported by findings that individuals made aware of the positive mood effects of exercise subsequently experienced more positive affect after exercising (Helfer et al., 2015). In other words, simply expecting that exercise could make one feel better could improve its ability to do so and, in turn, increase exercise frequency. Experiencing heightened body dissatisfaction or body surveillance when exercising could have the opposite effect, reducing exercise frequency. Consistent

with previous findings (Melbye et al., 2008), in Study 1, participants who engaged in more body surveillance while working out reported exercising less frequently than those who reported lower levels of body surveillance. In Study 2, we found that engaging in body surveillance while exercising can blunt the positive mood effects of exercise, which may partially explain this Study 1 result. If you enjoy exercise less, you are less likely to exercise, and body surveillance appears to make exercise less enjoyable, on average. The importance of these pathways is underscored by the fact that women tend to score significantly higher on measures of body surveillance than men (Frederick et al., 2007; McKinley 2006; Wang et al., 2020), and chronic body surveillance among women is associated with increased depression (Tiggemann & Kuring, 2004; Wollast et al., 2019).

These mood-focused results are further contextualized by our findings regarding exercise and body satisfaction. Both body satisfaction (Jacobi et al., 2004) and body surveillance (Schaefer & Thompson, 2018) have been consistently linked to eating pathology in samples of women. In Study 1, participants with lower levels of body satisfaction were more likely to engage in body surveillance while exercising. Study 2 results demonstrated that engaging in higher levels of body surveillance during an exercise class was associated with a smaller increase in body satisfaction from immediately before to immediately after the class. Though numerous studies have linked exercise to more positive body image, the effect sizes are generally small (e.g., Hausenblas & Fallen, 2006; Salci & Martin Ginis, 2017; Vocks et al., 2009). The fact that fitness environments can prompt body surveillance may provide one explanation for these small effects. The appearance-focus that many fitness contexts encourage could undercut the power of exercise to improve women's relationships with their bodies (Engeln et al., 2018).

One avenue for avoiding the consequences of body surveillance while exercising may be participating in online fitness classes instead of in-person classes. Participants' average body surveillance scores in Study 2 were significantly lower than in a similar class conducted in person (Engeln et al., 2018). Reduced levels of body surveillance may have been due to the limited ability to monitor one's appearance (i.e., a small self-view window rather than mirrored walls showing the full body). Currently, there is limited research focused on levels of self-objectification in online fitness classes. Most research on exercise using online

platforms focuses on tracking and maintaining exercise behaviors (Lee et al., 2014; Pagoto et al., 2014) or teaching exercise techniques (del Pozo-Cruz et al., 2013). Given the growing availability of online fitness training and classes, the extent to which body surveillance varies between online and in-person settings is an important area for future research.

The current studies provide key evidence that women's body surveillance may dampen the psychological benefits of exercise. However, the effect sizes identified were generally small. Small effects can matter, especially if they accumulate or reinforce negative cycles. Yet the small effect sizes are a reminder that whether and how often one exercises are determined by many factors, including factors likely to have much larger effects, like having the time, resources, and physical ability to work out. Additionally, the convenience-based samples in these two studies offered only limited body size and racial/ethnic diversity, leaving us unable to examine how the effects of body surveillance might vary for different demographic groups. This is especially relevant when it comes to body size, given the stigma and body shaming heavier individuals may face in various fitness settings (Schvey et al., 2017).

Overall, findings from these studies point toward the need to design and evaluate interventions that discourage body surveillance during exercise. A potential avenue may be encouraging more function-focused mindsets while working out, as research has linked focusing on the functions of one's body (rather than appearance) to a more positive body image (e.g., Alleva et al., 2014; 2015). Researchers might also develop trainings for fitness professionals that emphasize the costs of appearance-focused commentary during exercise, as such commentary likely encourages body surveillance.

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