



# A pilot yoga physical education curriculum to promote positive body image



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## ABSTRACT

We examined the effects of a pilot yoga-based physical education (PE) curriculum by testing for change in trait body surveillance, physical self-worth, and body appreciation. Further, we examined the relationships among change in body image variables and the role of state mindfulness in predicting state body surveillance during classes. Adolescents participated in 12 weeks of yoga-based ( $n = 20$ ;  $M_{\text{age}} = 16.45$ , 90% female) or traditional ( $n = 23$ ;  $M_{\text{age}} = 14.52$ , 57% female) PE. Results showed significant ( $p = .004$ ), moderate decreases in trait body surveillance and minimal nonsignificant ( $p = .11$ ) increases in physical self-worth. Change in trait body surveillance was inversely related to change in physical self-worth and body appreciation in yoga participants. Multi-level modeling analyses revealed that more mindful students also surveyed their body less during class. Intentionally structured yoga participation may support positive body image among adolescents.

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## 1. Introduction

The tendency for adolescents to view themselves from an external, observer's perspective and define their self-worth based on outward appearance is a persistent and unsolved problem (Grabe, Hyde, & Lindberg, 2007; Knauss, Paxton, & Alsaker, 2008). This tendency is called self-objectification (Fredrickson & Roberts, 1997) and stems from the internalization of the cultural sexualization of individuals (Fardouly & Vartanian, 2016) or treating individuals as objects and evaluating them based on appearance-related standards (Zurbriggen et al., 2010). This cultural sexualization is widely communicated through social interactions and various forms of media (e.g., magazines, Internet) and may only intensify in light of the nearly ubiquitous use of image-driven photo-sharing social media (Lenhart, 2015). One of the hallmarks of self-objectification is habitual, self-conscious body surveillance or mental body scanning that results from this internalization and is frequently assessed to represent self-objectification (McKinley & Hyde, 1996).

In girls, self-objectification intensifies with age and maturation (Grabe et al., 2007; Harrison & Fredrickson, 2003). Although boys report lower body surveillance compared to girls (Grabe et al.,

2007; Knauss et al., 2008), both boys and girls demonstrate similar patterns wherein higher rates of self-objectification or body surveillance during adolescence are linked to higher body dissatisfaction (Knauss et al., 2008), body shame (Harrison & Fredrickson, 2003; Knauss et al., 2008; Slater & Tiggemann, 2010; Tiggemann & Slater, 2015), and appearance anxiety (Slater & Tiggemann, 2002, 2010). In addition to these negative body image outcomes, self-objectification may impact aspects of positive body image as well. Tylka and Wood-Barcalow (2015b) have encouraged researchers to examine positive body image, since it is conceptualized as independent from negative body image rather than opposing ends of a continuum. Positive body image includes such elements as body appreciation (i.e., appreciating the characteristics and function of the body), functional body orientation (i.e., focusing on what the body can do rather than how it appears), and functional body satisfaction (i.e., being satisfied with what the body can do). Body surveillance is inversely associated with positive body image indicators such as body appreciation (Avalos, Tylka, & Wood-Barcalow, 2005; Tylka & Wood-Barcalow, 2015a) and physical self-worth (i.e., general feelings about the physical self; Cox, Ullrich-French, Cole, & D'Hondt-Taylor, 2016) in adults. Although evidence clearly supports the role that self-objectification plays in predicting negative body image in adolescents, we do not yet know if reducing self-objectification will increase positive body image.

Physical activities that emphasize the internal experience of moving the body rather than the body's outward appearance may provide a useful tool to combat adolescents' objectified view of the self and promote positive body image. Engaging in embody-

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ing activities specifically that promote the integration of the mind and the body (e.g., yoga) has been proposed as a critical factor in supporting positive body image (Cook-Cottone, 2015, 2016; Menzel & Levine, 2011; Piran, 2015, 2016). Hatha yoga combines physical postures (i.e., asanas) with breath work and meditation (Iyengar, 1966). This specific physical form of yoga is what we are referring to when we use the term yoga in this paper. Yogic teaching promotes a unified view of mind and body as well as steady control of the mind. During practice, participants are often encouraged to cultivate mindfulness as well as self-compassion (Neff, 2004). Mindfulness is a curious and non-judgmental attention to and awareness of one's current experience (Bishop et al., 2004; Brown, Ryan, & Creswell, 2007). Thus, yogic teaching emphasizes listening to and being fully present in the body rather than trying to change or discipline the body (Dittman & Freedman, 2009; Douglass, 2011). In support of these principles of yoga, there is evidence to support that yoga practice associates with higher levels of mindfulness, self-compassion, body awareness, and body responsiveness (Daubenmier, 2005; Gard, Brach, & Hölzel, 2012; Mackenzie, Carlson, Ekkekakis, Paskevich, & Culos-Reed, 2013).

The tenets of yoga may provide a useful tool to combat adolescents' objectified view of the self and support positive body image. Evidence supports this showing that yoga participation is associated with decreases in self-objectification and increases in physical self-worth in adults (Cox, Ullrich-French, Cole et al., 2016; Impett, Daubenmier, & Hirschman, 2006). These changes in positive and negative body image may be facilitated by the open and accepting attention to one's internal physical experiences during yoga. This "in the moment" attention to one's physical sensations is called state mindfulness of the body (Cox, Ullrich-French, Cole et al., 2016; Tanay & Bernstein, 2013). A study of adult physical activity participants (including some who practiced yoga) revealed that when participants experienced greater state mindfulness of their physical sensations, they were engaged in less state body surveillance during a single bout of physical activity (Cox, Ullrich-French, Cole et al., 2016). However, this study assessed mindfulness of the body immediately following one bout of physical activity participation, thus capturing participants "state" experience at only one point in time. An important next step is assessing state experiences, such as mindfulness, at multiple time points within individuals in order to examine the "micro" processes that may help explain changes in body image over time.

The important role of engaging in embodied practices such as yoga for the prevention and treatment of eating disorders and the development of positive body image has been highlighted in recent years (Cook-Cottone, 2016; Cook-Cottone and Douglass, 2017; Neumark-Sztainer, 2014). Cook-Cottone (2015) argues that embodied practices may support a positive shift in the very experience of one's body by teaching individuals how to inhabit their bodies in a mindful, caring way. Overall, research findings with adults suggest that yoga participation is associated with body image improvements. Research is now needed to test both the effect of yoga participation on positive and negative body image in adolescents and the potential mechanisms at the macro (e.g., trait body surveillance) and micro (e.g., state mindfulness) levels that might help explain changes in body image during yoga participation. Identifying the mechanisms that explain why yoga participation is associated with positive body image outcomes is an essential step towards specifically designing yoga programs for this purpose (Feagans Gould, Dariotis, Greenberg, & Mendelson, 2015).

Thus, the aims of this study were to (a) test for change in body image variables during participation in a 12-week, yoga-based high school physical education (PE) pilot curriculum, (b) examine how change in trait body surveillance relates to change in physical self-worth and body appreciation, and (c) test the concurrent relationships between state mindfulness of the body and state body

surveillance during yoga classes. We hypothesized that students in the yoga class would experience decreases in trait body surveillance (i.e., self-objectification), and increases in physical self-worth and body appreciation over the course of the 12-week curriculum that were greater in magnitude compared to students in a traditional PE class. Change in trait body surveillance was expected to be inversely associated with change in physical self-worth and change in body appreciation over the 12 weeks for participants in the yoga class. Finally, we predicted that students who reported greater state mindfulness of the body during the yoga classes would also engage in less state body surveillance.

## 2. Method

### 2.1. Procedure

In collaboration with a high school (grades 9–12) PE teacher in the Northwest region of the United States, we delivered a yoga-based curriculum to a class of PE students. The class that was selected for the new curriculum was a "fitness only" class, which is an option for upper-level students pursuing one of their final required PE classes. Anecdotally, students who select this class do not typically participate in school sports, may have low interest in traditional PE activities, and are mostly female. However, students range in their interest regarding personal fitness. We worked with a certified yoga instructor (200-h Anusara Yoga Teacher Training certification program, 200-h Yandara Institute Yoga Teacher Training certification program) with expertise in youth yoga to develop and deliver a 12-week yoga-based curriculum. The curriculum was designed to help students focus internally on the physical experience of moving (i.e., experience greater mindfulness of the body), view their bodies more in terms of what they can do rather than how they appear (i.e., low self-objectification) and experience improvement in what their body can do (i.e., physical self-worth) while maintaining a compassionate and accepting view of the self (e.g., body appreciation). This was accomplished through the use of cues that emphasize how the movement should feel (e.g., "notice your sternum. . . rises on inhale and falls as you exhale"), discussion of how certain poses improve the function of the body, and an emphasis on modifications and tailoring the poses so each student could find an appropriate level of challenge from which to grow and improve. Yoga was taught in the Anusara style which uniquely weaves a heart theme (e.g., self-compassion) into and throughout each class along with a focus on one or two key physical actions (Anusara School of Hatha Yoga, 2014). Table 1 details the theme for each week and the peak yoga pose that students worked towards that week. Each yoga practice included an introduction and centering exercise, practice moving through and holding different asanas (i.e., poses) and a closing and meditation exercise.

In a typical week, students attended one 40-min and one 75-min yoga class. Students completed a third yoga class during the first week to provide them with additional instruction relating to proper alignment in the poses for a total of 25 classes. In addition to these yoga classes, students continued to attend their regular "fitness only" class for two additional days each week taught by their regular PE teacher. On these two days, students engaged in aerobic-based fitness activities. Absences ranged between one and nine missed yoga practices ( $M = 4.6$ ). A freshman PE class taught by the original PE teacher and based on a curriculum similar to the "fitness only" class was selected as the comparison class. This meant that the participants in the comparison class were younger than the yoga class participants; however, we deemed this general PE class preferable to selecting one of the other upper level PE options such as strength training or competitive team sports where students were expected to be even more dissimilar to the students

**Table 1**  
Description of the yoga curriculum for intervention group participants.

Week	Theme/topic	Peak pose
0	Pre-surveys completed	
1	The dust covering the brilliance of your heart. “Cloaks” that we wear to protect us.	Half moon
2	Yoga warrior (strength): learning to create a solid, grounded, supported center so we can be soft, kind, and forgiving on the outside.	Chaturanga/crow
3	Yes & no: choosing a deliberate path through life that serves your highest self. How to say yes to what serves our path and no to the things that don't.	Lotus/scales
4	Ahimsa (non-harming): living in a way that does not harm other beings; using mindfulness and acting/speaking carefully.	Upward bow/dancer
5	Obstacles: sitting with what is including life's troubles, denials and setbacks. These are the best teachers. Plugging into the center of your strength.	Elephant trunk/8-crooked pose
6	Revisit “Cloaks”. The “cloaks” or malas allow us to forget our true nature so that we can rediscover it all over again in a new light.	Supine standing sage and supine bound angle
7	Grounding: when we are grounded in our highest self, our actions, words, and our connections with others mean more.	Malasana squat/crow
8	Gratitude: thinking about the things we are grateful for.	Warrior 3
9	Compassion: breathe into your own love, brightness and strength and then send it out to others.	Mermaid
10	Joy: how can we find authentic joy?	Side plank
11	Befriend happiness and “beauty”	Revolved triangle
12	Another world is possible – yoga revolution: begin to look for what is beautiful in each living being.	Standing sage
13	Post surveys completed	

Notes: The yoga class met for two days each week. The first class was 40 min long, and the second was 75 min long.

in the “fitness only” class. This class met 4 days per week for the same length of time as the yoga class and engaged in aerobic and strength-training activities.

Students in the yoga class completed a survey assessing all outcome variables six days before their first yoga practice and four days after their last class. Students in the traditional PE class completed surveys of the same outcome variables at the same time points as the yoga students. In addition to these outcome variables, survey measures of the yoga students' experiences during the class (i.e., state measure of mindfulness, body surveillance, and engagement) were completed immediately following yoga practice on the second session of every week, with the exception of Week 2 during which no state data were collected. Participants completed an average of 8.6 out of 11 possible state surveys. State data was not collected from the traditional PE class. Finally, we collected additional qualitative and quantitative data that were not related to the purpose of this study and are not published to date.

Study procedures were reviewed by the university's Institutional Review Board and received approval with exempt status. Specifically, although still held to ethical standards related to conducting research with students, we were not required to obtain signed assent from the students since this research was in line with standard educational practice. All students participated in the yoga curriculum or the comparison curriculum since it was part of their PE class; however, students could choose not to complete the surveys. Parents provided signed consent for their child to participate and all students agreed to complete the surveys.

## 2.2. Participants

The yoga class began with 21 students; one additional student joined seven days after the first practice and another student joined after 49 days ( $N=23$ ). This latter student plus two others (one had developmental limitations that prevented survey completion and one did not complete the final survey) were not included in the analyses for a final sample of 20 students in the yoga class. The participant who joined seven days late completed the pre-survey just after joining the class and is included in all analyses. There were 24 students in the traditional PE class; however, one student in this class did not complete the post-survey for a final sample of 23 students. Students were primarily Caucasian in the yoga (85.0%) and comparison class (73.9%). In the yoga class, students were in the 10th ( $n=4$ ), 11th ( $n=11$ ), and

12th ( $n=5$ ) grades ( $M_{age} = 16.45$ ,  $SD = 1.0$ ); 18 of the 20 students were female. In the traditional PE class, students were in the 9th grade ( $M_{age} = 14.52$ ,  $SD = 0.51$ ); 13 of the 23 students were female. Of the participants in the yoga class, most (90%) self-reported their yoga ability as beginning or beginning-intermediate level on a 5-point scale (i.e., beginning, beginning-intermediate, intermediate, intermediate-advanced, advanced). Class attendance in the yoga class ranged from 16–24 classes ( $M = 20.40$ ,  $SD = 2.28$ ).

## 2.3. Measures

### 2.3.1. Trait and state body surveillance

Trait and state body surveillance were assessed using the Body Surveillance subscale of the Objectified Body Consciousness Scale (OBC; McKinley & Hyde, 1996). This subscale asks participants to indicate their agreement with eight statements regarding the degree to which they think about their appearance from an observer perspective (e.g., “I rarely worry about how I look to other people;” “During the day, I think about how I look many times”). Item scoring ranged from 1 (*strongly disagree*) to 7 (*strongly agree*). Seven items were modified for the state version to refer to the yoga class they just experienced (e.g., “I rarely thought about how I looked;” “I thought more about how my body felt than how my body looked”). One item was eliminated because it is not relevant to a state experience (i.e., “I think it is more important that my clothes are comfortable than whether they look good on me”). Five items are reverse coded, all items are averaged, and higher scores indicate higher body surveillance. Evidence supports internal consistency and construct validity for this subscale in adolescents (Slater & Tiggemann, 2002) and adults (McKinley & Hyde, 1996), as well as the reliability and validity of the state version in adults (Cox, Ullrich-French, & French, 2016). Cronbach's alpha was .76–.83 for the trait version and .81–.97 for the state version in the yoga sample, and .86–.88 for the trait version in the traditional PE sample in this study.

### 2.3.2. Physical self-worth

The Global Physical Subscale of the Physical Self-Description Questionnaire (PSDQ) measured participants' positive feelings about their physical self (Marsh, Richards, Johnson, Roche, & Temayne, 1994). The subscale consists of six questions (e.g., “I am satisfied with the kind of person I am physically”) measured on a scale ranging from 1 (*false*) to 6 (*true*). The mean of the six items was

calculated, and higher scores indicate better physical self-concept. The Global Physical Subscale shows internal consistency ( $\alpha = .95$ ) and evidence of construct validity when used with adolescents (Dishman et al., 2006). Cronbach's alpha was .98 in the yoga sample and .97–.98 in the traditional PE sample in this study.

### 2.3.3. Body appreciation

The Body Appreciation Scale (Avalos et al., 2005) assessed participants' respect of, acceptance of, and satisfaction with their body. Participants respond to 13 items using a 5-point Likert-type scale ranging from 1 (*never*) to 5 (*always*) (e.g., "Despite flaws, I accept my body for what it is"). The 13 items are averaged, and higher scores represent higher body appreciation. Evidence supports the internal consistency reliability, unidimensional factor structure, and construct validity of scale scores in adults and adolescents (Andrew, Tiggemann, & Clark, 2016; Avalos et al., 2005). Cronbach's alpha was .95 in the yoga sample and .91–.92 in the traditional PE sample in this study.

### 2.3.4. State engagement

State engagement during the yoga classes was assessed using items modified from the intrinsic motivation subscale of the Situational Motivation Scale (Guay, Vallerand, & Blanchard, 2000). The original items tap into how strongly participants endorse intrinsic reasons for participation such as fun, interest, and feeling good. We modified the items to simply ask if students experienced fun, interest, and feeling good in class that day. Since two of the original items tap into enjoyment (i.e., "fun," "pleasant"), we replaced these with an item referring to "enjoyment" and another item about challenge since this can also be an internal source of motivation that engages students. Thus, students responded to the four items ("I enjoyed the class today;" "I was challenged by the activities in class today;" "I felt good doing the activities in class today;" "I thought the class was interesting today") on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*). Items are averaged, and higher scores indicate higher engagement in class that day. Scale scores with the original items have exhibited construct validity and internal consistency reliability ( $\alpha = .85$ ) in an adolescent sample (Ullrich-French, Cox, Cole, Cooper, & Gotch, 2017). Cronbach's alpha was .77–.97 in the yoga sample in this study.

### 2.3.5. State mindfulness

The State Mindfulness Scale for Physical Activity (SMS-PA; Cox, Ullrich-French, & French, 2016) was used to assess physical or bodily targets of participants' mindfulness during their yoga class. The SMS-PA, although based on the State Mindfulness Scale (Tanay & Bernstein, 2013), was developed to specifically assess aspects of mindfulness most relevant in a physical activity context. Thus, it measures nonjudgmental state attention to and awareness of mental and physical events during the yoga lesson just completed. Only the six items pertaining to mindfulness of the body, or one's physical experiences, were used in this study (e.g., "I noticed the sensations in my body;" "I listened to what my body was telling me"). Participants were instructed to think about the yoga class they just completed when responding to how much they experienced each of the items using a response scale ranging from 0 (*not at all*) to 4 (*very much*). Items are averaged, and higher scores indicate higher mindfulness of one's physical experience in class that day. Evidence for internal consistency reliability ( $\alpha = .87$ –.93) and construct validity of the physical subscale score is available in college student and middle school student samples (Cox, Ullrich-French, Cole et al., 2016; Ullrich-French et al., 2017). Cronbach's alpha was .75–.93 in the yoga sample in this study.

## 2.4. Data analysis

Data were screened for missing items, normality, and outliers. Means, standard deviations, and item internal consistencies were calculated for all variables. Independent *t*-tests and chi-squared tests were performed to compare pre-curriculum demographics and outcome variable scores between the yoga and traditional PE classes. In order to test our first hypothesis, a repeated measures 2(Time: pre- vs. post-curriculum)  $\times$  2(Condition: yoga vs. traditional PE) MANCOVA was used to test for differences in trait body surveillance, physical self-concept, and body appreciation across time and condition. Age and gender were included as covariates. A significant omnibus test was followed up with univariate tests to identify which variables exhibited change. In order to test our second hypothesis, standardized residual change scores were calculated from pre and post scores and then correlations were calculated to examine the hypothesized relationships among change in body image variables.

In order to test our third hypothesis (with yoga students only), multi-level modeling (MLM; Hox, 2010; et al., 2002; Raudenbush & Bryk, 2002) was used to accommodate the nested data structure of the state variables that were assessed immediately following yoga practice on 11 separate occasions ( $N = 164$  observations). MLM is a robust likelihood-based analytic approach that allows for missing data on assessment occasions, thus utilizing all available data in the yoga sample, maximizing power, and minimizing biased estimates (Hox, 2010). MLM offers higher power compared to other analytic approaches due to more accurate modeling of the variance–covariance structure of the data, especially in the presence of relatively high intraclass correlations (Hox, 2010). In order to test the hypothesized concurrent relationships between state mindfulness of the body and state body surveillance across the 11 time points, the MLM utilized the 164 observations that were available from participants. Since our research question relates to within-person relationships, the 164 observations at the within-person level was the criterion used to determine power (Snijders, 2005). A recent yoga study from Mackenzie et al. (2014;  $N = 18$ ) demonstrated adequate power with 144 within-subject observations.

An unconditional, intercept-only model was first conducted, followed by the inclusion of linear, quadratic, and cubic slopes to confirm if variance in state body surveillance was explained by time and if intra-class correlations (ICCs) indicate nesting conditions that are best accommodated by using a MLM approach. Next, a multi-level model was specified with state mindfulness of the body, grand-mean centered (i.e., each individual's average over time centered around the sample mean) predicting within- and between-student state body surveillance intercept and slope. In this model, we also controlled for students' average state engagement during class (grand-mean centered). Engagement reflects participant responsiveness, an important component of program implementation to produce intended effects (Feagans Gould, et al., 2015). MLM analyses were conducted using Mplus 7, and parameter estimates are reported as unstandardized estimates. When interpreting all results, we considered both statistical significance ( $p < .05$ ) as well as effect size (see Ferguson, 2009). Specifically, we used Ferguson's guidelines for interpreting  $\eta^2$  values in social science research: minimal effect (.04), moderate effect (.25), and strong effect (.64); *r* values: minimal effect (.20), moderate effect (.50), and strong effect (.80).

## 3. Results

### 3.1. Preliminary analyses

Missing values (.5% of total data) on the pre/post surveys were missing completely at random,  $\chi^2(5166) = .00$ ,  $p = 1.00$ , and expect-

**Table 2**  
Interaction effects for repeated measures univariate follow-ups.

Measure	Range	Time 1		Time 2		F	$\eta_p^2$
		Yoga M (SD)	Traditional PE M (SD)	Yoga M (SD)	Traditional PE M (SD)		
Body surveillance	1–7	4.94 (1.00)	3.91 (1.32)	4.40 (1.05)	4.06 (1.20)	9.26*	.19
Female only		5.00 (0.99)	4.49 (1.31)	4.46 (1.09)	4.59 (1.04)	6.51*	.18
Physical self-worth	1–6	2.76 (1.44)	4.52 (1.35)	3.56 (1.42)	4.58 (1.21)	2.70	.06
Female only		2.58 (1.36)	4.56 (1.26)	3.51 (1.45)	4.53 (0.99)	4.42*	.13
Body appreciation	0–4	2.07 (0.89)	3.03 (0.74)	2.31 (0.86)	3.05 (0.71)	0.67	.02
Female only		1.99 (0.90)	2.88 (0.77)	2.27 (0.85)	2.94 (0.67)	0.95	.03

Notes:  $n = 20$  for yoga participants,  $n = 18$  for female students only;  $n = 23$  for traditional PE (comparison group) participants,  $n = 13$  for female students only.

\*  $p < .05$  (2-tailed).

tation maximization was used to replace these values. State surveys that were missing due to class absence were not replaced, as the MLM analyses utilize all available data (164 observations). All trait and state variables were normally distributed and no outliers were detected. Means and standard deviations at both time points can be found in Table 2. The traditional PE class was younger,  $t(41) = -7.79$ ,  $p < .001$ , and contained more male students,  $\chi^2(1) = 5.96$ ,  $p = .02$ . Compared to the yoga class, the traditional PE class had higher physical self-concept,  $t(41) = 4.11$ ,  $p < .001$ , higher body appreciation,  $t(41) = 3.87$ ,  $p < .001$ , and lower trait body surveillance,  $t(41) = -2.83$ ,  $p = .01$ , prior to the yoga curriculum.

### 3.2. Change in trait body surveillance, physical self-worth, and body appreciation

Age was not a significant covariate ( $p = .696$ ) and was removed from the analysis. Gender was included as a covariate in the analysis ( $p = .05$ ). The omnibus test revealed a nonsignificant effect for time, Pillai's Trace = .05,  $F(3, 38) = 0.70$ ,  $p = .559$ ,  $\eta_p^2 = .05$ , a nonsignificant time  $\times$  gender interaction, Pillai's Trace = .02,  $F(3, 38) = 0.26$ ,  $p = .856$ ,  $\eta_p^2 = .02$ , and a significant, moderate time  $\times$  condition interaction, Pillai's Trace = .25,  $F(3, 38) = 4.28$ ,  $p = .011$ ,  $\eta_p^2 = .25$ . Follow up tests showed a significant, moderate time  $\times$  condition effect for body surveillance,  $F(1, 40) = 9.26$ ,  $p = .004$ ,  $\eta_p^2 = .19$ , a nonsignificant, minimal time  $\times$  condition effect for physical self-worth,  $F(1, 40) = 2.70$ ,  $p = .108$ ,  $\eta_p^2 = .06$ , and no effect for body appreciation,  $F(1, 40) = 0.67$ ,  $p = .418$ ,  $\eta_p^2 = .02$ . Specifically, body surveillance declined whereas physical self-worth increased for the yoga class but not for the traditional PE class. Table 2 displays the descriptive statistics for each class.

Due to the imbalance of female to male students in the yoga class, we also ran this analysis with only the female students from the comparison ( $n = 13$ ) and yoga classes ( $n = 18$ ). Again, the omnibus test revealed a significant, moderate time  $\times$  condition interaction, Pillai's Trace = .29;  $F(3, 27) = 3.66$ ,  $p = .025$ ,  $\eta_p^2 = .29$ . As with the total sample, follow up tests showed a significant, moderate time  $\times$  condition effect for body surveillance,  $F(1, 29) = 6.51$ ,  $p = .016$ ,  $\eta_p^2 = .18$ . There was a significant, minimal to moderate time  $\times$  condition effect for physical self-worth,  $F(1, 29) = 4.42$ ,  $p = .044$ ,  $\eta_p^2 = .13$ . This effect was of greater magnitude relative to the total sample. There was still no effect for body appreciation,  $F(1, 29) = 0.95$ ,  $p = .337$ ,  $\eta_p^2 = .03$ . See Table 2 for descriptive statistics.

### 3.3. Relationships among change in body image variables

In the yoga class participants, change in trait body surveillance was negatively associated with change in physical self-worth and body appreciation, whereas the latter two were positively correlated (see Table 3). Correlations represented moderate-to-strong effects and were nearly identical when conducted without the two male students in the yoga class. In the traditional PE class participants, none of the correlations were significant; however, the

positive relationship between physical self-worth and body appreciation represented a minimal-to-moderate effect. These weaker relationships in the traditional PE class participants mirror the lack of change in these variables that was discovered in the repeated measures difference tests.

### 3.4. State mindfulness of the body predicting state body surveillance

The unconditional model, examining intercepts only was compared to models including linear, quadratic, and cubic slopes. The quadratic and cubic slope effects were not significant or meaningful and were not included in further models. State body surveillance started at a moderate level ( $\gamma = 3.04$ ) that varied between participants ( $p < .001$ ) and declined linearly ( $\gamma = -.06$ ,  $p = .07$ ) over time at a rate of .06 units per week. For the model including linear slope, there was significant within- ( $p < .001$ ) and between-student ( $p < .001$ ) variance in the intercept and slope variance, allowing for variance to be predicted in conditional models. A moderate amount of residual variance ( $R^2 = .21$ ) was accounted for by the linear slope and the intraclass correlation (ICC) was .62, supporting the use of MLM with a conditional predictor model.

Next, controlling for mindfulness of the body and engagement, the average baseline body surveillance was moderate ( $\gamma = 3.09$ ,  $p < .001$ ) with a linear decrease over time ( $\gamma = -.08$ ,  $p = .001$ ). At the within-person level, higher mindfulness of the body ( $\gamma = -.37$ ,  $p = .01$ ) predicted lower body surveillance across the yoga curriculum, while controlling for engagement. Engagement was a negative, but non-significant, predictor ( $\gamma = -.19$ ,  $p = .21$ ) of body surveillance. The within-student association of higher mindfulness of the body with lower levels of body surveillance during class was consistent across the curriculum as there were no cross-level interactions. The model explained minimal ( $R_1^2 = .08$ ) within-person variance. At the between-person level, neither variable was significant, although coefficients were negative and the model explained moderate ( $R_2^2 = .31$ ) between-person variance (see Table 4).

When we conducted the models with female students only ( $n = 18$ ) the results were similar (see Table 5). An intercept only model showed state body surveillance started at a moderate level ( $\gamma = 3.11$ ) that varied between participants ( $p < .001$ ) and declined linearly ( $\gamma = -.06$ ,  $p = .09$ ) at a rate of .06 units per week. The quadratic and cubic slope effects were not significant or meaningful and were not included in further models. There was significant within- ( $p = .04$ ) and between-student ( $p = .01$ ) variance in the linear intercept and slope variance, a moderate amount of residual variance ( $R^2 = .23$ ) accounted for by the linear slope, and the intra-class correlation was .64, all supporting use of MLM with a conditional predictor model.

In the conditional model the average baseline body surveillance was moderate ( $\gamma = 3.11$ ,  $p < .001$ ) with a linear decrease over time ( $\gamma = -.08$ ,  $p = .001$ ). Higher within-person mindfulness of the body ( $\gamma = -.39$ ,  $p = .02$ ) predicted lower body surveillance across time

**Table 3**  
Correlations among residual change scores for yoga and traditional PE classes.

Variable	Trait body surveillance	Physical self-worth	Body appreciation
Trait body surveillance	–	–.10	–.12
Physical self-worth	–.56*	–	.35
Body appreciation	–.72*	.85*	–

Notes:  $n = 20$  for yoga participants;  $n = 23$  for traditional PE (comparison group) participants. Yoga class correlations are below the diagonal; traditional PE class correlations are above the diagonal.

\*  $p < .01$  (2-tailed).

**Table 4**  
Conditional model predicting body surveillance with mindfulness of the body and engagement among the intervention group (yoga) participants ( $n = 20$ ).

	Body surveillance	
	Estimate	SE
Means		
Intercept	3.09**	.24
Linear slope	–.08*	.02
Level 1 (within)		
Mean mindfulness of the body	–.37*	.15
Mean engagement	–.19	.15
Level 2 (between)		
Mean mindfulness of the body	–.35	.95
Mean engagement	–.48	.77
	Slope of body surveillance	
Mean mindfulness of the body	–.11	.07
Mean engagement	.09	.05
Variance	$\Sigma$	SE
Within-student intercept variance	.61**	.16
	$\tau$	SE
Between-student intercept variance	.67	.37
Slope variance	.00	.00
Covariance between intercept and slope	.01	.02
$R_1^2$	.08	
$R_2^2$	.31	

Notes:  $R_1^2$  = within-person explained variance.  $R_2^2$  = between-person explained variance.

\*  $p < .05$ .

\*\*  $p < .01$ .

while controlling for engagement. Engagement was a negative, but nonsignificant, predictor ( $\gamma = -.20, p = .22$ ) of body surveillance. There were no cross-level interactions. The model explained minimal ( $R^2 = .09$ ) within-person variance. At the between-person level, higher mindfulness of the body negatively predicted ( $\gamma = -.15, p = .04$ ) and higher engagement positively predicted ( $\gamma = .10, p = .04$ ) the slope of body surveillance, and the model explained moderate ( $R^2 = .36$ ) between-person variance.

#### 4. Discussion

Findings revealed that implementing yoga in PE holds potential for reducing self-objectification and supporting positive body image in adolescents. The first hypothesis was partially supported by the moderate decline in body surveillance and minimal-to-moderate increase in physical self-worth in yoga participants, but not students in a traditional PE class over 12 weeks. These findings with an adolescent sample support and extend both prospective (Cox, Ullrich-French, Cole et al., 2016; Impett et al., 2006), and cross-sectional yoga studies (Daubenmier, 2005) with adults. Consistent with objectification theory (Fredrickson & Roberts, 1997; Impett et al., 2006), these changes occurred within a social context that cultivated an internal perspective of the body through instructional cues related to what it feels like to attain proper alignment in the poses and being mindful of physical sensations. These findings also support Cook-Cottone's assertions that embodying activities will

**Table 5**  
Conditional model predicting body surveillance with mindfulness of the body and engagement female. Only sample of yoga intervention group participants ( $n = 18$ ).

	Body surveillance	
	Estimate	SE
Means		
Intercept	3.11**	.22
Linear slope	–.08**	.02
Level 1 (within)		
Mean mindfulness of the body	–.39*	.17
Mean engagement	–.20	.16
Level 2 (between)		
Mean mindfulness of the body	–.53	1.07
Mean engagement	–.36	.86
	Slope of body surveillance	
Mean mindfulness of the body	–.15*	.07
Mean engagement	.10	.05
Variance	$\Sigma$	SE
Within-student intercept variance	.60**	.18
	$\tau$	SE
Between-student intercept variance	.75	.39
Slope variance	.00	.00
Covariance between intercept and slope	.00	.03
$R_1^2$	.09	
$R_2^2$	.36	

Notes:  $R_1^2$  = within-person explained variance.  $R_2^2$  = between-person explained variance.

\*  $p < .05$ .

\*\*  $p < .01$ .

support positive body image through the encouragement of being in the body in a mindful, caring way (Cook-Cottone, 2015).

Of note is that variance explained in change in physical self-worth more than doubled when the analyses were conducted with female students only. Therefore, female students in the yoga class not only experienced a meaningful reduction in body surveillance but an equally meaningful increase in their overall feelings of worth about the physical self. There has been a recent upsurge in attention to the study of positive body image (Andrew et al., 2016; Cook-Cottone, 2015; Tylka & Wood-Barcalow, 2015b) and the specific conditions that may support or thwart positive body image variables. The results of this study demonstrate that changes in indicators of both positive and negative body image are associated with yoga participation. However, no change was observed in body appreciation. Implementation studies are needed that can help identify the key aspects of the yoga curriculum that have the biggest impact on these different body image variables and perhaps identify the specific ingredients necessary to support body appreciation (Feagans Gould et al., 2015).

Our second hypothesis was supported through the negative relationships of change in trait body surveillance to change in physical self-worth and body appreciation for yoga participants. These findings extend our knowledge of the consequences of adolescents' self-objectification by including positive body image variables in addition to the more often-studied negative body image variables (Harrison & Fredrickson, 2003; Knauss et al., 2008). Although

in Fredrickson and Robert's (1997) original paper on objectification theory, they discuss peak motivational states (i.e., flow) and awareness of internal bodily states as key consequences of self-objectification, negative outcomes such as shame and anxiety have received far more empirical attention. The current findings illustrate how reductions in self-objectification that take place while participating in mindful forms of movement such as yoga may help participants perceive their body as an integrated part of the self and thereby support the development of more positive body image. Future research is needed to continue to explore how change in self-objectification relates to change in other indicators of positive body image.

Our third hypothesis was supported by the finding that when students were more mindful of the physical experience of moving during the yoga classes, they engaged in less state body surveillance during class. This supports the assertion, consistent with objectification theory (Fredrickson & Roberts, 1997), that when attention is drawn towards one's internal experience it appears to detract from participants' concerns about their appearance and mental scanning of their body (i.e., body surveillance) during the practice of yoga (Impett et al., 2006). These results also extend and support research with adults that when more mindful and internally focused experiences are realized, fewer thoughts and concerns about one's external appearance occur (Cox, Ullrich-French, & French, 2016). This internally focused physical activity experience contrasts with exercising in more traditional settings that have been shown to associate with higher self-objectification (Prichard & Tiggemann, 2008). Assessing state mindfulness weekly throughout the duration of the program addresses the inherent limitation of only testing for average change in participants by examining pre- and post-program time points. Conducting multi-level analyses allowed us to account for individual differences in the degree to which students were mindful of their bodies during the practice of yoga and provides a potential explanation of how the "micro" level yoga experiences may contribute to overall declines found in yoga participants' (trait) body surveillance across the 12 weeks. This explanation can be tested in future research. Research addressing the mechanisms that explain the positive body image correlates of yoga participation is lacking, and this study provides initial evidence to support more targeted research on explanatory mechanisms. Future research is needed to test other potential state-level processes such as state body appreciation (Homan, 2016) that may help explain the effects of yoga participation on body image.

Although the results of this study contribute to our understanding of the potential benefits of incorporating mindfulness-based movement into PE, it does have limitations that should be addressed as we move forward. First, students were not randomly assigned to yoga or traditional PE. In fact, at pre-intervention, the traditional PE students were younger, more likely to be male, had higher physical self-concept and body appreciation, and lower body surveillance than the yoga students. Students in the yoga class were part of a "fitness-only" PE class, designed to appeal to students who are not typically participating in school sports and may have lower interest in physical activity and/or traditional PE activities. It is possible that yoga may be more likely to provide positive benefits for students who feel like they do not belong in traditional sports-based PE, female students, or those who begin the class with more negative body image. More stringent research designs that use random assignment, are more balanced across gender, and include multiple school sites are needed to generalize the results of this study. Second, the participants in the yoga class were mostly female students. One of the effects (i.e., changes in physical self-worth) was stronger when the male students were excluded from the analysis. However, there were not enough male participants to draw conclusions about the effects of yoga participation on body image in adolescent boys. This is an important direction for future

research in both adolescent and adult populations since most studies of yoga and body image have predominately female samples (e.g., Daubenmier, 2005; Impett et al., 2006).

There were a number of challenges that could have attenuated the impact of the yoga curriculum at this school. These included holding the class in an open commons area where others walking by could potentially observe or disrupt the class, major construction projects occurring at the school and some conflicts between what "participation" means within a PE school context and what it means in a yoga context. For example, some students felt they had to follow along at the same pace as the instructor or they would lose participation points, whereas it is typically acceptable and encouraged in yoga that individuals look inside themselves to determine what their body needs on a given day. Although these situational factors represent challenges of real-world interventions, such limitations impact the rigor of the design and implementation of this study. Addressing implementation issues, such as these, are important in order to optimize the effects of such interventions (Feagans Gould et al., 2015).

This study extended the current literature in several key ways and the results can be applied in PE or other youth physical activity settings. First, the negative association between yoga practice and self-objectification (Cox, Ullrich-French, Cole et al., 2016; Impett et al., 2006) was extended to a sample of high school students. Second, the comparison to traditional PE allows us to observe how mindful forms of physical activity may be more effective than traditional physical activity at fostering a functional view of the body, which in turn supports more positive body image (i.e., physical self-worth, body appreciation). Third, changes in self-objectification were examined in relation to two indicators of positive body image. Finally, the examination of state data representing students' weekly experience during the yoga practices advanced our understanding of the mechanisms that explain the positive body image outcomes associated with yoga. Data supported our hypothesis that when participants are more mindful of their internal bodily experience during yoga, they externally monitor their body less. This association reflected the intentionally designed mindfulness-based yoga curriculum.

In a PE setting, teachers may be able to create curricula that support an internal rather than objectified view of the self and positive body image more generally by directing students' attention to the physical experience of moving. This could be accomplished by including yoga as an activity option in PE, but that is not always feasible as teachers may not have the expertise to teach yoga. Supporting an internal, functional view of the self may also take place in sport or fitness-related curricula. In sport units for example, the emphasis can be more on the process and internal experience of acquiring new skills. Teachers can promote this internal focus by drawing students' attention to kinesthetic feedback (e.g., body placement, form) that provides them with information about skill development and performance. This approach may support physical self-worth while simultaneously drawing students' attention away from appearance-related concerns. In fitness-related units, teachers can avoid discussing exercise as a means to shape the body or control weight and place the emphasis on learning how to read internal cues. For example, students can be taught to use ratings of perceived exertion to tune into how hard they are working rather than focusing on external sources of information like a heart rate monitor. These suggestions will not only contribute to a less objectified view of the self, but may better support interest and enjoyment of physical activity itself (Etkin, 2016).

The effects of this yoga-based PE curriculum reflected meaningful body image improvements in participants. In sum, the yoga students developed a less objectified view of their body and the more they did so, the better they felt about their overall physical self and appreciated their body. Further, initial evidence support-

ing a mechanism to explain the positive changes was indicated by participant reports of being more mindful of internal physical experiences during the class predicting lower body surveillance during class. Mindfulness-based PE curriculums show promise for providing a context that helps counteract the cultural pressures to focus on external appearance while supporting positive body image.

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