A randomized experimental evaluation of a yoga-based body image intervention

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Highlights

- The paper evaluates a four-session yoga-based body image intervention.
- The intervention improved young women’s body image and mood.
- Improvements were sustained at 4-week follow-up.
- Effect sizes were equivalent to those found in 12-week yoga programs.

Abstract

Recent literature argues that body image interventions need to become more embodied. This paper evaluates a brief yoga-based body image intervention which incorporates themes specifically tailored to focus on positive body image. Young women (M_{age}= 20.21, SD_{age} = 2.15) were randomly allocated to a four-session yoga intervention (n = 22) or a control condition (n = 22). Compared to controls, participants in the yoga condition reported significant increases in body appreciation, body connectedness, body satisfaction, and positive mood at posttest and at 4-week follow-up. There were no significant changes in negative mood or body surveillance. These findings add to existing evidence that yoga can improve women's body image and positive mood. In addition, they suggest that a strong thematic focus on positive body image can achieve benefits at relatively low yoga doses. These findings are important as intervention length impacts the potential for dissemination.

Keywords: Embodiment, positive body image, yoga, intervention, body appreciation

1. Introduction

The risks associated with negative body image are well-documented; among adolescent girls and young women body dissatisfaction predicts negative affect (Stice & Bearman, 2001), reduced levels of physical activity (Neumark-Sztainer, Paxton, Hannan, Haines, & Story, 2006), and eating disorders (Stice, Marti, & Durant, 2011). Conversely, positive body image predicts adaptive eating behaviors and other aspects of physical and psychological well-being (Andrew, Tiggemann, & Clark, 2016). Therefore, it is important to identify interventions that foster positive body image (Halliwell, 2015). Positive body image is multifaceted, comprising distinct and independent factors (Tylka & Wood-Barcalow, 2015b). Embodying activities, such as yoga, are critical to the development and maintenance of positive body image (Menzel & Levine, 2011). Indeed, the importance of embodying activity that locates the body at the center of an individuals' experience and supports connection to bodily experiences, appreciation of body function, self-expression, and competence has been highlighted by the developmental theory of embodiment since 2002 (e.g., Piran, 2002, 2017). The current study builds on existing literature to examine the impact of a yoga-based body image intervention on body image and mood.

Between 50-70% of young girls report negative body image (Wertheim & Paxton, 2011). Effective body image interventions do exist. An evidence-based and widely-disseminated body acceptance program for girls is *The Body Project* (Stice, Shaw, & Marti, 2007; Watson et al., 2016). Based on cognitive dissonance theory (Festinger, 1957), this involves 4-hours of discussion-based intervention focusing on the unrealistic nature of appearance ideals, the cost of pursuing these appearance ideals, and strategies to resist and challenge appearance ideals. There are also classroom-based interventions, which focus on media literacy, body acceptance, and social comparisons, that show at least short-term improvements in adolescent girls' body image and related outcomes (Diedrichs et al., 2015; Yager, Diedrichs, Ricciardelli, & Halliwell, 2013). Although existing interventions incorporate some behavioral elements, they are primarily cognitive and based on models of

attitude change. Theories of embodiment suggest that, in addition to shifting how individuals think about their body, body image interventions must also change how individuals experience and inhabit their bodies. In other words, body image interventions must become more *embodied* (Piran, 2015).

Embodiment is multifaceted, encompassing physical, mental, and social domains, and positive body image is a central component of the broader construct of embodiment (Piran, 2017). The conceptualization of positive body image is informed both by qualitative accounts of adults and adolescents and also by psychometric analysis (Tylka & Wood-Barcalow, 2015a,b). Several independent facets of positive body image have been identified. These include appreciation of the body, acceptance and love for the body, holding a broad conceptualization of beauty, self-care of the body and appearance, channeling inner positivity, and adapting self-protective cognitive processing (Tylka & Wood-Barcalow, 2015b). Similarly, the experience of embodiment includes having a positive connection with, and comfort in, the body, feeling agency of the body, an ability to freely express bodily desires, engaging in attuned self-care, and resistance to objectification (Piran, 2017). The developmental theory of embodiment (Piran, 2002, 2017) highlights a state of body-self integration that is characterized by feeling 'at one' with the body as an important element of embodiment. It is clear from these definitions that embodying activities need to encourage awareness of and responsiveness to the body, connection with the body, experiences of competence, self-care, and freedom from appearance pressures.

Many of the characteristics of embodying activities are central to the practice of yoga (Desikachar, 1995). There is considerable interest in the potential for yoga-based treatment or prevention in the field of body image and disordered eating (e.g. Cook-Cottone, 2016; Neumark-Sztainer, 2014). Yoga is an ancient tradition. The seminal text, the Yoga Sutra, was written 2000 years ago and references to yoga date back 5000 years (Desikacar, 1995). Yoga is formulated as a life-long practice to support health, well-being, spirituality, and as a route to achieve a state that has been variously described as enlightenment, contentment, happiness,

or freedom (Desikacar, 1995). The practice of yoga combines physical exercises (asanas), meditation (dyana), focused attention (dahrana), and breathing techniques (pranayama; Desikachar, 1995). Yoga focuses on unifying the mind and the body whilst increasing internal bodily awareness. There is also evidence that yoga promotes a stronger connection with, and a greater appreciation and acceptance of, oneself and one's body (Boudette, 2006; Douglass, 2011). Interviews with adults who participated in at least 30 minutes of yoga each week revealed a number of ways in which yoga promoted positive body image (Neumark-Sztainer, Watts, & Rydell, 2018). Participants reported that yoga positively influenced their body image through awareness of physical changes to the appearance and functionality of the body, an increased gratitude for the body, an increased sense of accomplishment, an increased confidence in the body, and an increased appreciation for diverse body shape gained through exposure to a variety of bodies in class. Consistent with this, regular yoga practice is associated with greater body awareness, responsiveness, satisfaction (Daubenmier, 2005), appreciation, embodiment (Mahlo & Tiggemann, 2016), and reduced self-objectification (Daubenmier, 2005; Mahlo & Tiggemann, 2016) relative to aerobic or non-activity comparison groups. It is important to note that causality is unclear in these studies and it may be that yoga is more likely to be chosen by women with positive body image. However, recent analysis of 5-year longitudinal data supports the assertion that yoga participation leads to improved body satisfaction (Neumark-Sztainer, MacLehose, Pacanowski, & Eisenberg, 2018). Many people develop life-time relationships with yoga and the existing research suggests that regular practice supports positive body image.

A handful of experimental studies have examined the impact of yoga participation on body image and well-being. Rather than studying individuals with an established yoga practice, these studies explore the effects of participation in a specific and discrete yoga program. Cook-Cottone and colleagues have developed and evaluated an eating disorder prevention program that draws on both embodiment and attitude-change theories (Cook-Cottone, Kane, Keddie, & Haugli, 2013). Girls Growing in Wellness and Balance (GGWB,

Cook-Cottone et al., 2013) integrates a range of intervention strategies including yoga, media literacy, stress reduction, assertiveness practice and group processing. There is evidence that both the 10- and 14-week versions of the program significantly improve a range of risk and protective factors for eating disorders (e.g., Cook-Cottone, Talebkhan, Guyker, & Keddie, 2017; Scime & Cook-Cottone, 2008).

A few studies have examined yoga in isolation as a body-image intervention. One of the first experimental studies in this area compared six weekly 45-minute sessions of yoga with a cognitive dissonance intervention and a no-treatment control condition (Mitchell, Mazzeo, Rausch, & Cooke, 2007). In this research the yoga content was not specifically tailored to address body image or disordered eating. Yoga participation was not associated with significant changes in body dissatisfaction, disordered eating, or drive for thinness compared to the control group. The authors suggested that six weeks may not be long enough for benefits to emerge. Indeed, there is evidence that longer 12-week programs do improve aspects of body image (Ariel-Donges, Gordon, & Perri, 2018; Cox, Ullrich-French, Howe, & Cole, 2017). Cox et al. (2017) developed a curriculum for adolescent girls and boys that combined asanas with session themes focusing on the internal experiences of the body moving, body function rather than body appearance, increasing individuals' physical abilities, and acceptance of the body. High school students who signed up for a 'fitness only' class participated in the 12-week yoga curriculum, completing three classes in the first week and two classes in subsequent weeks. Compared to students completing traditional physical education, yoga participants reported reductions in body surveillance and increased physical self-worth. However, there were no changes in body appreciation. In a similar study with young adult women, Ariel-Donges et al. (2018) examined the effectiveness of a 12-week, twice-weekly yoga program. The content of the yoga sessions was based on classes delivered at local community sites and included warm up, flow of poses, cool down, and relaxation. Although there was no specific focus on positive body image, the instructors deliberately avoided comments on body shape, appearance, or weight. They included general affirmations

and statements about body acceptance, and concluded with poems focusing on acceptance, present-moment focus, and non-judgement. Compared to wait-list control participants, women who completed yoga reported improved appearance evaluation, increased satisfaction with specific body parts, and reduced appearance orientation at posttest. Positive body image measures were not included in this study and there were no significant changes in mindfulness, depressive symptomatology, or disordered eating.

In summary, cross-sectional (Boudette, 2006; Daubenmier, 2005; Douglass, 2011; Mahlo & Tiggemann, 2016) and longitudinal (Neumark-Sztainer, MacLehose, et al., 2018) research suggests that habitual yoga practice promotes positive body image. In addition, evidence suggests that discrete yoga interventions can also promote positive body image (Ariel-Donges et al., 2018; Cox et al., 2017). The philosophy of yoga recommends life-long practice and values the journey more highly than the destination. However, public health providers request brief, evidence-based interventions that can be widely disseminated. Therefore, evidence demonstrating the efficacy of discrete yoga interventions is encouraging. The two studies reporting that yoga programs can improve body image (Ariel-Donges et al., 2018; Cox et al., 2017) did not include follow-up data, so it is unclear whether the changes were sustained. In addition, immediate positive effects emerge for relatively extensive yoga interventions involving 25 (Cox et al., 2017) or 24 (Ariel-Donges et al., 2018) sessions delivered over 12 weeks. Effective body image interventions based on models of attitude change tend to be four or six weeks long (Yager et al., 2013) and intervention length is an important factor in determining the potential scale of dissemination. For example, while schools offer an excellent infrastructure to reach inclusive groups of young people, over-crowed curriculums leave little space for dissemination of lengthy programs (Patel, Kieling, Maulik, & Divan, 2013). The two studies demonstrating positive effects of yoga varied in the extent to which the sessions were specifically focused on body image. Arial-Donges et al. (2018) presented an orientation toward positive body image language and focus across the sessions. Cox et al. (2017) were more directive in creating a specific curriculum to focus on

body image. However, it is possible that a stronger thematic focus on body acceptance may achieve positive intervention effects at a lower dose. Identifying whether benefits can be achieved at lower yoga doses is important to inform the feasibility of disseminating yoga-based interventions.

Existing research included measures of body evaluation (Ariel-Donges et al., 2018; Cox et al., 2017), appearance investment (Ariel-Donges et al., 2018; Cox et al., 2017), and positive body image (Cox et al., 2017). It would also be valuable to extend the outcome measures to assess body connection as an aspect of embodiment. Ariel-Donges et al. (2018) did not find an impact on negative mood. However, other research reports improvements in mood after a single yoga session (Luu & Hall, 2016) and after a 5-week (Bowden, Gaudry, Ann, & Gruzeller, 2012) or a 6-week program (Hartfield, Harenhand, Khalsa, Clarke, & Krayer, 2011). Therefore, it would be valuable to further investigate the relationship between yoga and mood.

The current research addresses several gaps in the existing literature. It examines the impact of a low dose, four-session yoga-based body image intervention on positive body image and mood immediately posttest and at 4-week follow-up. As previously discussed, yoga is already aligned with many elements of positive body image. Drawing on the existing literature, the content of our yoga-based body image intervention was designed to emphasize aspects of the practice that map into key aspects of positive body image and embodiment. Specifically, we focused on connection to the body, appreciation of the body, acceptance and love for the body, and self-care of the body and appearance. Based on previous research, we hypothesized that participants in a yoga-based body image intervention would report increased body satisfaction, body appreciation, body connectedness, and positive mood, and reduced body surveillance and negative mood at posttest and follow-up, compared to participants in an active control condition.

2. Method

2.1. Participants

Participants were 44 undergraduate women (M_{age}= 20.21, SD_{age} = 2.15, M_{BMI}= 22.21, SD_{BMI} = 3.63). Most participants were White (89%); 61% had tried yoga in the past, but only four participants were currently participating in yoga (three in the control condition and one in the experimental condition).

2.2. Materials

2.2.1. Yoga condition. The yoga sessions were run by the third author who is an advanced Krama Vinyasa yoga teacher with the International Yoga Network with 13 years of teaching experience. Participants attended 60-minute classes once a week for four weeks. Yoga mats, blocks, and blankets were used during the sessions. The content of the yoga sessions is presented in Table 1 and the lessons were based on Anusara, Iyenga, and Vinyasa styles. Each week there was a theme related to positive body image and embodiment. These themes were developed collaboratively by the first and third author. The theme for Week 1 focused on body connection and inviting a new perspective on how the body is perceived; Week 2 focused on body gratitude and appreciation of body function; Week 3 focused on body acceptance; and Week 4 focused on valuing the body, engendering self-respect, and self-care. Reference to the themes were weaved through the asanas. For example, during cat/cow leg stretches, the teacher said, “consider all of the times your intestines have eliminated waste keeping you healthy;” and during downward-facing dog, “look at your hands, consider every time you have used your hands to write a letter, take notes, bake bread, hold hands with loved ones, texted friends, held on tight to stop you from falling, flown a kite. How precious our hands are.” During child’s pose participants were asked to contemplate the question “If your body could speak to you right now, what would it say to you?” During the fourth session, which introduced the yogic concept that our body is a guesthouse for our soul, participants were asked to contemplate “how are you going to look after this one precious home for your soul?”

2.2.2. Control condition. Participants in the control condition reviewed two printed leaflets about the benefits of yoga selected from yoga websites. Participants were asked to read the leaflets, provide feedback about the information, and select their preferred leaflet.

2.3. Measures

2.3.1. Body appreciation. The Body Appreciation Scale-2 (Tylka & Wood-Barcalow, 2015a) was used to assess positive body image. Participants responded to 10 items on a 5-point scale ranging from 1 = *never* to 5 = *always*, and an average scale score was calculated. Statements include "I respect my body" and "I am attentive to my body's needs." The scale has good internal consistency, test-retest reliability, and construct validity with college women (Tylka & Wood-Barcalow, 2015). In the current study, reliability was good at baseline, posttest, and follow up ($\alpha = .94$, $\alpha = .96$, $\alpha = .96$, respectively)

2.3.2. Body connectedness. The Positive Connection with the Body Subscale of the Experience of Embodiment Scale was used to measure body connectedness (Piran & Teall, 2012). The 7-item subscale assesses the extent to which an individual feels connected to their body, for example, "I feel in tune with my body." Items were rated on a 5-point Likert scale from 1 = *strongly disagree* to 5 = *strongly agree*, and an average scale score was calculated. The scale shows convergent and discriminant validity among adolescent and adult women (Piran & Teall, 2012). In the current study, internal consistency was good at baseline, posttest, and follow-up ($\alpha = .84$, $\alpha = .88$, $\alpha = .90$, respectively).

2.3.3. Body satisfaction. The Body Areas Satisfaction Subscale (BASS) of the Multidimensional Body-Self Relations Questionnaire (Brown, Cash & Mikulka, 1990; Cash, 2000) was used to measure body satisfaction. The 9-item scale asked participants to rate their satisfaction with aspects of their body (e.g., face, weight, upper torso) on a 5-point scale from 1 = *very dissatisfied* to 5 = *very satisfied*, and an average scale score was calculated. This subscale shows convergent and discriminant validity and test-retest reliability among adult

men and women (Cash, 2000). In the current study, internal consistency was good at baseline, posttest, and follow-up (α = .77, α = .85, α = .85, respectively).

2.3.4. Body surveillance. The Body Surveillance Subscale of the Objectified Body Consciousness Scale (OBC; McKinley & Hyde, 1996) was used to measure body surveillance. The eight items include statements such as, "I often worry about whether the clothes I am wearing make me look good." Respondents rated items on a 5-point Likert scale from 1 = *definitely disagree* to 5 = *definitely agree*, and an average scale score was calculated. Good construct validity and internal consistency has been reported for the OBC among young and middle-aged women (McKinley & Hyde, 1996). In the present study, internal consistency was good at baseline, posttest, and follow-up (α = .79, α = .88, α = .87, respectively).

2.3.5. Mood. The Positive and Negative Affect Scale (PANAS; Watson, Clark, and Tellegen, 1988) was used to measure positive and negative mood. Participants rated the extent they experienced each of the 10 positive affect items (e.g., interested, proud, inspired) and 10 negative affect items (e.g., distressed, irritable, nervous) over the last week on a 5-point scale ranging from 1 = *never* to 5 = *always*. Items were averaged to create a positive and negative mood score. The scale is valid for use in nonclinical adult populations (Crawford & Henry, 2004). In the present study, internal consistency for the Positive Affect Subscale was good at baseline, posttest, and follow-up (α = .78, α = .83, α = .91, respectively). Similarly, the Negative Affect Subscale had good reliability at baseline, posttest, and follow-up (α = .81, α = .88, α = .93, respectively).

2.3.6. Feedback on the yoga sessions. Four open-ended questions were included to further explore participants' experiences of the yoga sessions. The questions were: (a) How did you find the yoga classes?; (b) What parts of the classes did you like?; (c) Is there anything that you would change about the classes?; and (d) Have you noticed any changes in yourself or your life because of the yoga?

2.4. Procedure

The study was approved by the Institutional Ethics Committee. The study was presented as exploring the "links between yoga and women's health, well-being, and body image." Participants were told that the study would involve participating in yoga and may also involve reviewing information about yoga. Female undergraduate psychology students signed up to participate in the study in return for course credit. A maximum of 13 yoga participants could be accommodated in our research space at one time. We ran two waves of data collection. Participant flow is reported in Figure 1. Twenty-four hours before attending Session 1, the online sign-up sheets were printed, and names were randomly allocated to yoga (n = 22) or control (n = 22) using a randomization table. Participants were emailed and directed to attend different lab rooms according to condition. Participants allocated to the yoga condition were also sent information about appropriate clothing. All data collection and yoga sessions took place in seminar rooms on campus and there were no mirrors present in these rooms. In Wave 1, nine participants were allocated to the yoga condition and nine to the control. In Wave 2, 12 months later, 13 participants were allocated to yoga and 13 to the control group. At Session 1, participants in the yoga condition completed baseline questionnaires supervised by one of the researchers. Participants in the yoga condition were then introduced to the yoga instructor and participated in their first yoga session. They attended weekly yoga sessions for a further three consecutive weeks. Immediately after the final yoga session, participants completed the posttest questionnaire, which included the feedback questions about the yoga course, supervised by a researcher. Four weeks later they completed the follow-up questionnaire, supervised by a researcher. All participants in the yoga condition attended all four intervention sessions.

At Session 1, participants in the control condition attended a group session where they completed the baseline questionnaire and then reviewed and rated two articles about yoga. They attended group sessions to complete the posttest and follow-up questionnaires at the same time-points as the yoga participants. After the follow-up questionnaire, participants in the control condition attended a one-hour yoga session and provided qualitative feedback

on the session, which is not presented here. This yoga session was included to ensure that all participants had the opportunity to experience yoga.

2.5. Analysis Plan

The primary analysis was a mixed design analysis of variance (ANOVA) with Condition as the between-subjects variable (yoga vs. control) and Time as the within-subjects variable (baseline, posttest, follow-up). Mauchly's tests indicated that assumptions of sphericity were met. The interaction term is of most interest as it explores whether the changes over time differed for participants in the control condition and the yoga condition. The analyses were run separately for each dependent variable. Significant interaction effects were followed up with repeated measures ANOVAs and post-hoc baseline to posttest and baseline to follow-up contrasts separately by Condition. Effect size is reported as partial eta squared, η^2. Tentative benchmarks help effect size interpretation: $.01 < \eta^2 < .09$ indicates a small effect, $.09 < \eta^2 < .25$ indicates a medium sized effect, $.25 < \eta^2 < .50$ a large effect, and $\eta^2 > .50$ indicates a very large effect (see Cohen, 1988). Thematic analysis was used to code the open-ended responses. The first author, a Ph.D researcher with considerable experience and expertise in thematic analysis, read all questionnaire responses to identify dominant themes in the data.

A power analysis was conducted to identify the sample size required to detect medium effects sizes similar to those found in previous research (e.g., $\eta^2 = .110$ for Time × Condition interaction effect on body satisfaction; Ariel-Donges et al., 2018). For an interaction effect in a mixed-design ANOVA with significance set at the .05 level, α error probability at .05, correlation between measures at .70, and power at .80, a total sample size of 44 would be needed to detect a medium effect size $f = .22$.

3. Results

The Shapiro-Wilk test indicated that the data were normally distributed for all variables except body surveillance at posttest. The histogram revealed body surveillance at

posttest was left-skewed, clustered at higher values. Power transformation was used across all body surveillance data to allow comparison in analysis, and squared data were normally distributed. Across all outcome variables, there were missing data in 4% of cases. The Little's MCAR test revealed that data were missing at random, $\chi^2(30) = 27.79$, $p = .582$. Bennet (2001) indicated analyses are prone to bias if more than 10% of the data are missing. Therefore, we did not replace missing data.

The means and standard deviations for all variables are reported in Table 2. At baseline, a MANOVA indicated there was no significant difference between women assigned to the yoga or control condition on BMI, age, positive mood, negative mood, body satisfaction, body appreciation, body connectedness, or body surveillance, Wilks' Lambda = .65, $F(8,29) = 1.93$, $p = .093$.

3.1. Body Appreciation

The full output for the primary set of ANOVAs are reported in Table 3. For body appreciation, the ANOVA revealed a significant Condition × Time interaction, $F(2,37) = 10.49$, $p < .001$, $\eta_p^2 = .36$. To explore the interaction further, repeated measures ANOVAs were run separately for each condition. In the control condition, there was no significant change in body appreciation across the three time points, $F(2,17) = 1.77$, $p = .201$, $\eta_p^2 = .17$.

In the yoga condition, there was a significant change over time, $F(2,19) = 21.48$, $p < .001$, $\eta_p^2 = .69$. Within-subjects contrasts revealed that body appreciation was significantly higher at posttest than at baseline, $F(1,20) = 25.66$, $p < .001$, $\eta_p^2 = .56$. This change was sustained, as body appreciation was significantly higher at 4-week follow-up than at baseline, $F(1,20) = 43.99$, $p < .001$, $\eta_p^2 = .69$.

3.2. Body Connectedness

There was also a significant interaction between Time and Condition for body connectedness, $F(1,37) = 12.03$, $p < .001$, $\eta_p^2 = .39$. In the control condition, there was an

unexpected significant effect of Time on body connectedness $F(1,18) = 5.93$, $p = .011$, $\mu = .39$. Contrasts indicated that there was no significant difference in body connectedness between baseline and posttest, $F(1,18) = 0.07$, $p = .800$, $\eta_p^2 = .004$. However, body connectedness was significantly lower at 4-week follow up than at baseline, $F(1,18) = 9.96$, $p = .010$, $\eta_p^2 = .36$.

In the yoga condition, there was a significant effect of Time, $F(2,18) = 5.93$, $p = .011$, $\eta_p^2 = .39$. There was significantly higher body connectedness at posttest, $F(1,20) = 13.99$, $p = .001$, $\eta_p^2 = .43$, and at 4-week follow-up, $F(1,20) = 15.99$, $p = .001$, $\eta_p^2 = .44$, than at baseline.

3.3. Body Satisfaction

Once again, there was a significant interaction between Time and Condition, $F(2,37) = 7.05$, $p = .003$, $\eta_p^2 = .28$. In the control condition, there was no change in body satisfaction across the time points, $F(2,17) = 0.39$, $p = .682$, $\eta_p^2 = .04$.

In the yoga condition, the effect of Time was significant, $F(2,19) = 12.61$, $p < .001$, $\eta_p^2 = .57$. There was a significant increase in body satisfaction from baseline to posttest, $F(1,20) = 25.34$, $p < .001$, $\eta_p^2 = .56$, and from baseline to 4-week follow-up, $F(1,20) = 9.67$, $p = .006$, $\eta_p^2 = .34$.

3.4. Body Surveillance

Contrary to hypotheses, there was no significant interaction between Time and Condition for body surveillance, $F(2,37) = 0.67$, $p = .520$, $\eta_p^2 = .04$. There was a significant effect of time, $F(2,37) = 8.07$, $p = .001$, $\eta_p^2 = .30$, indicating that body surveillance decreased over time in both conditions. There was also a significant effect of condition, $F(1,38) = 4.90$, $p = .033$, $\eta_p^2 = .11$, indicating that body surveillance was higher in the control condition than in the yoga condition.

3.5. Mood

Similarly, there was no significant interaction between Time and Condition for negative mood, $F(2,37) = 0.13$, $p = .880$, $\eta_p^2 = .01$. There was a significant effect of time, $F(1,37) = 3.53$, $p = .040$, $\eta_p^2 = .16$. In both conditions, negative mood was significantly higher at 4-week follow-up than at posttest, $p = .028$, or at baseline, $p = .011$. Consistent with hypotheses, there was a significant Time by Condition interaction for positive mood, $F(2,37) = 5.83$, $p = .006$, $\eta_p^2 = .24$. There was no change in positive mood in the control condition, $F(2,17) = 1.39$, $p = .280$, $\eta_p^2 = .14$. In the yoga condition, there was a significant change in positive mood, $F(2,19) = 18.98$, $p < .001$, $\eta_p^2 = .67$. Positive mood was significantly higher at posttest, $F(1,20) = 8.52$, $p = .008$, $\eta_p^2 = .30$, and at 4-week follow-up, $F(1,20) = 39.93$, $p < .001$, $\eta_p^2 = .67$, compared to baseline.

3.6. Additional Analyses

Nine of the participants in the yoga condition continued practicing yoga between posttest and follow-up data collection. This sustained participation may have contributed to the effects at 4-week follow-up. Therefore, paired *t*-tests were conducted using only data from participants who had not continued with yoga. The pattern of results was unchanged. Among this group there were significant improvements from baseline to 4-week follow up on body appreciation, $t(12) = -7.23$, $p < .001$, body connectedness, $t(12) = -3.83$, $p = .001$, body satisfaction, $t(12) = -2.69$, $p = .020$, and positive mood, $t(12) = -4.15$, $p = .001$.

3.7. Qualitative Feedback on the Yoga Sessions

All yoga participants reported comments in response to the open-ended questions. One participant described the yoga sessions negatively, as “difficult” and “tiring.” All the other participants described the sessions positively. Three participants made suggestions for changes, these were “less downward dog,” “a larger room,” and “more classes.” The most frequent theme, evident in responses of 15 participants, related to relaxation and stress reduction, for example, “I was very tense… but after each session I just felt at peace with myself,” they were “relaxing and I looked forward to them each week,” or “I felt so much

calmer after. I was really inspired by the classes." The second theme evident in accounts of 12 participants related to positive body image. For example, participants noted they were "more attentive of my body and how it feels," "able to use my body in different ways and appreciate what it can do," "more inspired by my body and how good it really is," or "enjoying my body more and appreciating it more." The final theme related to broader impacts in women's lives and was evident in accounts of five participants, for example they "contributed to me feeling more positive about my life and future now," "I feel better and happier with myself," that they encouraged "a positive outlook on life," or that "they made life's stresses seem trivial."

4. Discussion

This study examined whether a brief yoga intervention specifically tailored to focus on positive body image could improve body image and mood among young women. Compared to a control condition, women participating in yoga reported higher body appreciation, body connectedness, body satisfaction, and positive mood at posttest. Moreover, these improvements were sustained at 4-week follow-up. This is a novel finding as previous research exploring the impact of yoga as a standalone body image intervention has only investigated changes immediately after yoga participation. Moreover, the effect sizes in the current study at both posttest and follow-up were moderate to large (η_p^2 = .30 - .69) and are equivalent to effect sizes from baseline to posttest after more intensive 12-week programs (Ariel-Donges et al., 2018; Cox et al., 2017). This suggests that the effect sizes reported in previous research could be achieved at a lower yoga dose. However, to achieve this, the yoga may need to be specifically tailored to address body image. These effect sizes are also comparable to posttest effects on body image measures achieved by attitude-change interventions such as cognitive dissonance interventions that tend to show moderate effects (Stice et al., 2007), and classroom-based attitude-change interventions that tend to show small effects (Yager et al., 2013). This suggests that yoga-based programs may provide a valuable, additional approach in body image interventions. Participation in this yoga-based body image intervention was associated with improvements in aspects of positive body image and

embodiment that were specifically targeted in the practice. We used two measures that specifically assessed aspects of positive body image linked to our thematic focus. Connection to the body was operationalized through the Positive Connection with the Body Subscale (Piran & Teall, 2012). The BAS-2 was used to assess appreciation for the body, acceptance and love for the body, and self-care (Tylka & Wood-Barcalow, 2015). Women in the yoga condition reported sustained improvements on both of these measures. We also found sustained improvements on body satisfaction, which was not directly targeted by the yoga intervention. However, it is likely that increasing acceptance of the body would also lead women to experience greater satisfaction with parts of their body, and measures of body evaluation are positively correlated with positive body image measures (Tylka & Wood-Barcalow, 2015a). Therefore, it is not surprising to see improvements on body evaluation.

Contrary to hypotheses, yoga did not impact body surveillance. Instead we found that body surveillance reduced over time in both conditions. Body surveillance assesses the extent to which an individual adopts an observers' perspective on their own body. An individual with positive body image would reject taking this observers' perspective and report low levels of body surveillance (Augustus-Horvath & Tylka, 2011). Therefore, we would expect that an increase in positive body image would be accompanied by a decrease in body surveillance. To understand our results, it is helpful to reflect on how our findings differ from previous research. Cox et al. (2017) found that yoga participation was associated with significant reductions in body surveillance but no significant changes in body appreciation. In contrast, we found significant, sustained improvements in body appreciation but no changes in body surveillance. It is possible that differences in the focus of the yoga in each study may explain this pattern. Cox et al. (2017) designed a yoga program with the primary aim of reducing body surveillance and a focus on the outward appearance of the body. They targeted body surveillance through instructional cues focused on correct bodily alignment and attending to the sensations of the body. Their curriculum focused on three aspects relating to body surveillance (i.e., increased internal focus on physical experiences, viewing bodies in terms of

abilities rather than appearance, and focusing on improved ability), and on one aspect relating to body acceptance which is central to body appreciation (i.e., maintaining an accepting view of the self). In the current study, our primary focus was on body appreciation and body connection. Specifically, our themes were body connection, gratitude and appreciation of body function, body acceptance, valuing the body, and engendering self-care. These themes did include appreciation of body function and we had expected that this would be associated with adopting an internal perspective on the body. However, our instructional cues focused more strongly on gratitude for body functions than on body alignment and awareness. Therefore, it may be that the lesson themes evaluated in this study did not target body surveillance as strongly as the instructional cues in Cox et al. (2017). These differences in the thematic focus may explain differences in the pattern of results. It is unclear whether changes in body surveillance could be achieved in four weeks with a stronger thematic focus on this aspect of body image. As noted by Cox et al. (2017), we need further research to assess which aspects of the yoga curriculums most strongly target different aspects of body image.

An alternate explanation for these divergent findings relates to differences in the intervention duration. Body surveillance, as an aspect of self-objectification, is a strong and enduring socialized trait that reflects a habitual way of viewing the body (McKinley & Hyde, 1996) and represents the appearance orientation component of body image (Cash, 1994). It may be that a 4-week intervention is not long enough to impact on habitual body surveillance. In contrast, a 12-week program did impact on body surveillance (Cox et al., 2017), and this sustained yoga practice may be necessary to impact habitual body orientation. However, intervention duration would not explain the divergent findings for body appreciation. In this case, a 4-week program improved body appreciation, but a 12-week program did not. Ariel-Donges et al. (2018) examined the impact of level of attendance on intervention effects. In their study, 16% of participants attended five or less of the 24 yoga lessons in the curriculum, 35% attended 10-16 lessons, and 49% attended 20 or more lessons. Attendance predicted improvement in the evaluative component of body image, so women who attended more

sessions reported greater improvements in appearance evaluation and body areas satisfaction. However, attendance did not impact on body image investment as measured by appearance orientation. This suggests that improvement in body evaluation is sensitive to dose, but improvement in appearance orientation is not sensitive to yoga dose. Therefore, based on Ariel-Donges et al. (2018), we would expect precisely the opposite pattern of results relating to intervention length and body image dimension. Clearly, further research is needed to explore the impact of yoga intervention duration on specific aspects of body image.

In the current study, all participants reported increased negative mood at follow-up. However, there were no significant changes in negative mood associated with yoga participation. This mirrors Ariel-Donges et al.'s (2018) findings that yoga participation did not impact depressive symptomatology. Arial-Donges et al. suggested a floor effect for depression among their sample. In the current study, the baseline mean for negative mood was low: 2.29 (*SD* = 0.47) on a scale were 1 was *never* and 5 was *always*. However, other research has shown that five (Bowden et al., 2012) or six (Hartfield et al., 2011) weeks of yoga practice is associated with reductions in depression and stress among a non-clinical population. Hartfield et al. (2011) reported that yoga participation was also associated with increased agreeableness, clear mindedness, confidence, life purpose, and satisfaction. This is consistent with our finding that yoga participation was associated with sustained improvements in positive mood. Given the inconsistencies in the literature, further research is needed into the impact of yoga on mood.

One participant, despite having chosen to participate in yoga, found the sessions difficult, and it is important to be aware that this type of intervention may not appeal to all young women. However, the yoga intervention was positively evaluated by all of the other participants. All participants assigned to the yoga condition attended all yoga sessions, and nine participants (40%) continued with a yoga practice after the study. These indicators suggest that the intervention is acceptable. Moreover, the continuation of yoga is encouraging.

Although existing research suggests that yoga positively impacts on body image, yoga is not embodying *per se* and under some conditions it may have a negative impact. Specifically, some yoga practitioners report that yoga negatively impacted on their body image due to comparisons they made with the bodies and physical abilities of others in class and their focus on the limitations of their own practice (Neumark-Sztainer, Watts, et al., 2018). Recently we have seen an increase in the range of yoga that is offered and an increasing emphasis on appearance ideals within the yoga industry (Webb et al., 2017). There are also a number of yoga programs available that seem to take yoga away from the basic philosophical routes of self-compassion and acceptance (e.g., "Beach Body Yoga for Beginners," 2018). These developments make it more challenging to simply recommend yoga as a route to improve well-being. Indeed, in recognition of challenges of this nature, Neumark-Sztainer, Watts, et al. (2018) provide guidelines for yoga teachers to enhance the positive impact of yoga on body image. Dissemination of brief evidence-based yoga intervention may provide a useful strategy for introducing people to yoga and providing a foundation for developing their future adaptive relationship with yoga.

The strengths of the current research include the randomized design, follow-up data collection, the inclusion of a measure of embodiment, and low levels of missing data. There are also limitations. The sample consisted of young, predominately white, able-bodied, and well-educated women. Baseline and posttest data were collected on the same day as the yoga sessions. The follow-up period was relatively short, and all of the yoga sessions were taught by the same instructor, so we cannot isolate the impact of the yoga content from the impact of the specific instructor. Therefore, there are some clear directions for future research. It is important to explore the impact of this intervention among a more diverse group of women and among men. It would also be valuable to examine whether the benefits were maintained across a longer timeframe and to include a range of yoga teachers delivering the sessions. Future research could include a wider range of measures that tap into additional aspects of positive body image and embodiment, such as functionality appreciation (Alleva, Tylka, &

Kroon Van Diest, 2017). It would be interesting to explore the effectiveness and acceptability of an online version of this intervention which could offer great potential for dissemination.

Integrating the current findings with the results of other research on standalone yoga interventions highlights additional key directions for future research. It is important to further tease apart the impact of the yoga dose, the thematic focus, and the physical practice. It may be that the thematic focus alone is responsible for some changes in body image and mood. In addition, some body image variables may be amenable to change over relatively short periods, and others may take longer to influence. Future research should compare yoga-based body image interventions of different duration. Research should also compare the impact of body image themes combined with yoga to a condition in which the thematic messages were communicated without a physical movement practice. Finally, research should explore the impact of specific themes on different aspects of body image.

Overall, the findings indicate that a relatively short yoga-based body image intervention can improve body image and mood among young women. Further research is needed. However, these findings suggest that short-term yoga programs may be valuable interventions to improve young women's body image. The results contribute to a growing evidence base suggesting that yoga is an effective body image intervention strategy. The findings of this research, specifically, suggest that yoga-based interventions could be relatively brief and easy to disseminate.

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Table 1

An outline of the themes and postures included in the yoga sessions

Theme and content	Physical postures
Session 1: Connection to the body	
• Inviting a new perspective on the body • Yogic concept of Koshas (different layers of ourselves beyond the material body) • The importance of listening to all layers of ourselves • Each body is different, permit yourself to practice only what feels useful and comfortable • Fit the pose to your body, not your body to the pose • Question for contemplation: What if your body is the most important relationship you will ever have?	• Yogic breathing practice • 30-minute yoga sequence and practice, guided through postures and transitions. Cat/cow leg stretches, hip circles, downward facing dog, warrior poses, standing balance, twists, cobra, forward fold, seated twist • Savasana posture accompanied by a guided relaxation/meditation through the body
Session 2: Gratitude and appreciation of body function	
• Yogic ideas about the benefits of gratitude introduced • Appreciation of body functionality	• Building on yoga sequence and practice from Session 1 • Meditation practice: Envision losing your sight, losing the use of your legs. Next envision regaining your sight, the use of your legs

• Consider five things about your body for which you feel really grateful	• Savasana posture accompanied by a guided relaxation/meditation through the body
Session 3: Body acceptance	
• Everyone is unique, our bodies are different with different shapes and functionalities • Accepting your own body and its limitations without comparison with others • Finding your developmental edge, the limit of your comfort zone, in and through the practice	• Building on yoga sequence and practice from previous sessions • Uttanasana (forward fold) was used to demonstrate the concept of developmental edge • Savasana posture accompanied by a guided relaxation/meditation through the body
Session 4: Valuing your body, engendering self-respect and self-care • Your body is a guesthouse for your soul (Poem by Rumi) • Considering the care that is needed to maintain your guesthouse • Returning to the concept of developmental edge • Drawing on previous sessions gratitude for your body and its functions, being mindful of your developmental edge, taking care	• Building on yoga sequence and practice from previous sessions • A mediation through the body as a house, letting go of any thoughts or ideas about parts of your body that are not useful for vibrant health and well-being, envisioning freeing the body for clear movement of energy

of your guesthouse and being

compassionate with yourself

Table 2.

Mean body appreciation, body connectedness, body satisfaction, body surveillance, and mood by Condition and Time

	Yoga Condition			Control Condition		
	Baseline *M (SD)*	Posttest *M (SD)*	Follow-up *M (SD)*	Baseline *M (SD)*	Posttest *M (SD)*	Follow-up *M (SD)*
Body appreciation	3.27 (0.69)	3.75 (0.83)	3.75 (0.85)	3.31 (0.79)	3.45 (0.78)	3.25 (0.77)
Body connectedness	3.49 (0.66)	3.97 (0.58)	3.94 (0.76)	3.69 (0.55)	3.65 (0.67)	3.31 (0.70)
Body satisfaction	3.13 (0.63)	3.60 (0.63)	3.47 (0.75)	3.23 (0.61)	3.25 (0.65)	3.15 (0.60)
Body surveillance	3.46 (0.50)	3.10 (0.69)	3.11 (0.66)	3.77 (0.65)	3.62 (0.82)	3.61 (0.69)
Negative mood	2.33 (0.51)	2.29 (0.55)	2.65 (0.95)	2.25 (0.43)	2.24 (0.58)	2.61 (0.76)
Positive mood	3.35 (0.46)	3.60 (0.50)	4.06 (0.51)	3.32 (0.45)	3.43 (0.54)	3.49 (0.58)

Note. The range for all scales is 1 to 5.

Table 3.

ANOVA output for body appreciation, body connectedness, body satisfaction, body surveillance, and mood by Condition and Time

	df	*F*	η_p^2	*p*
Body appreciation				
Time	2,37	16.53	.41	< .001
Condition	1,38	0.69	.02	.411
Time × Condition	2,37	10.49	.36	< .001
Body connectedness				
Time	2,37	4.52	.20	.018
Condition	1,38	1.09	.03	.250
Time × Condition	2,37	12.03	.39	< .001
Body satisfaction				
Time	2,37	6.54	.26	.004
Condition	1,38	0.65	.02	.427
Time × Condition	2,37	7.05	.28	.003
Body surveillance				
Time	2,37	8.07	.30	.001
Condition	1,38	4.90	.11	.033
Time × Condition	2,37	0.67	.04	.520
Negative mood				
Time	2,37	3.53	.16	.040
Condition	1,38	0.24	.01	.630
Time × Condition	2,37	0.13	.01	.880
Positive mood				
Time	2,37	16.23	.47	< .001
Condition	1,38	2.44	.06	.127
Time × Condition	2,37	5.83	.24	.006

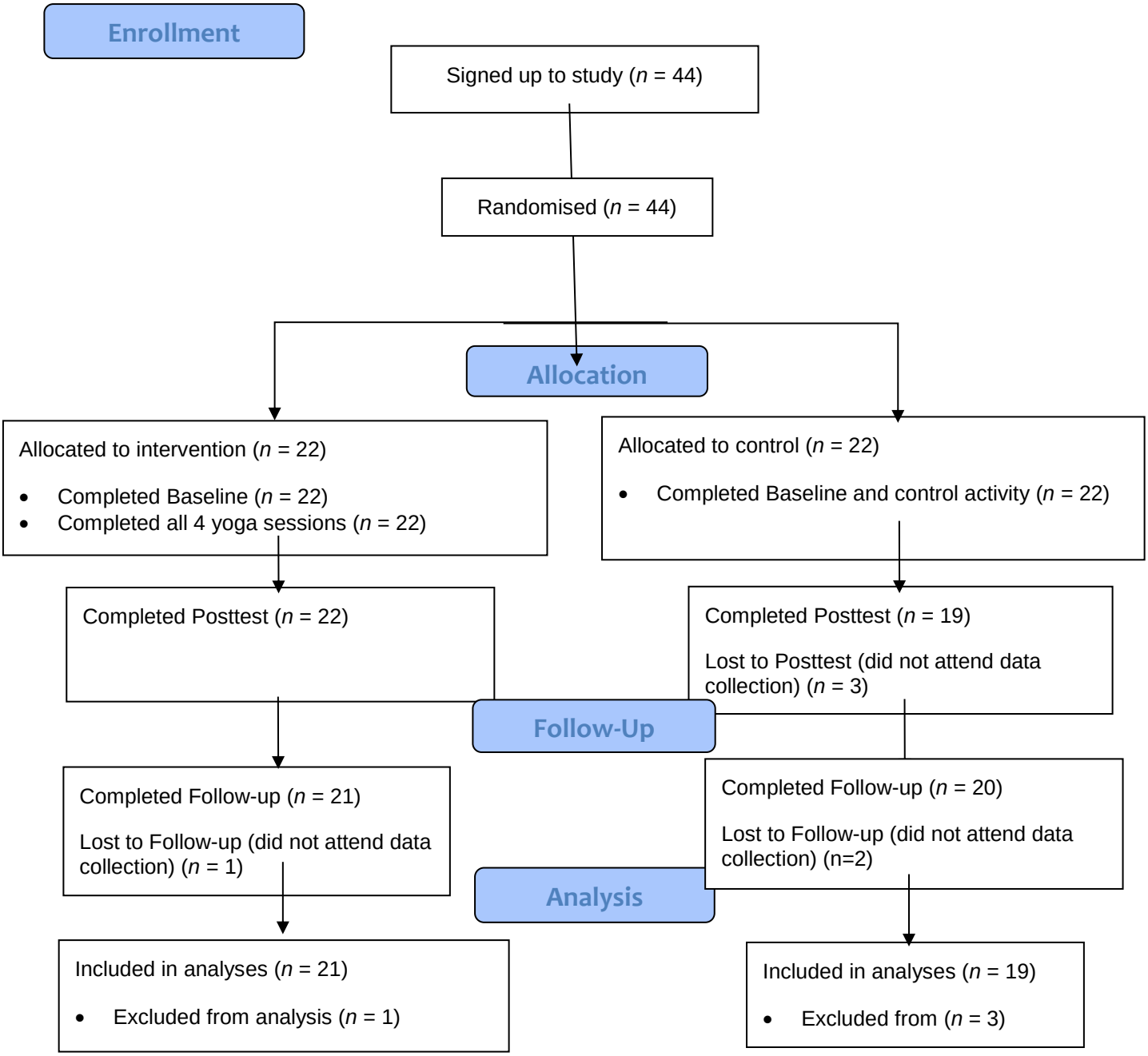

Figure 1. *Participant flow throughout the study.*