American Psychological Association
SSM Society for the Science of Motivation

Motivation Science

2333-8113/19/$12.00

2019, Vol. 5, No. 4, 314–325
http://dx.doi.org/10.1037/mot0000121

The Look of Success or Failure: Biased Self-Perceptions Serve as Informational Feedback During Goal Pursuit

Kristina Howansky, Janna K. Dominick, and Shana Cole
Rutgers University—New Brunswick

Three studies tested whether and how engaging in goal-relevant behaviors affects people's visual self-perceptions. In Study 1, participants who had just finished exercising at the gym perceived their bodies to be smaller than did participants leaving a neutral academic building. In Study 2, participants who had just eaten at a fast food restaurant perceived their stomachs to be larger than did participants leaving a retail store. In Study 3, participants in the lab either exercised or watched neutral videos and then created avatars to represent themselves. Avatars created by individuals who exercised were rated as fitter and healthier than were those created by individuals in the control condition. Moreover, biased self-perceptions served as information about goal progress (Studies 2 and 3). This work is the first to suggest that goal-relevant behaviors influence visual self-perceptions and that biased self-perceptions may contribute to successful goal pursuit.

Keywords: motivation, self-regulation, self-perception, exercise

Supplemental materials: http://dx.doi.org/10.1037/mot0000121.supp

Individuals with weight loss goals are often confronted with opportunities to behave in goal-consistent or -inconsistent ways. On their lunch break they could choose to eat at the salad place or the local burger joint. After work they could stop by the gym or head home to their beckoning couch. The momentary decisions people make—to pig out or work out—can affect how they think and feel about themselves (Bongers, Dijksterhuis, & Spears, 2009). But do the goal-relevant choices people make also affect how they literally see themselves? Do people see themselves as heavier after indulging in a calorie-rich lunch and as leaner after exercising? In the present work, we asked (a) what are the consequences of engaging in goal-consistent or -inconsistent behavior for people's self-perceptions? and (b) what are the implications of those perceptions for future goal-relevant behavior?

Prior work has suggested behaving in line with one's goals has important implications for personal evaluations. Engaging in goal-consistent behavior can lead individuals to evaluate themselves more positively. For example, women with health goals who were assigned to exercise reported a more favorable body image and believed themselves to be thinner compared to women in a control group (Salci & Martin Ginis, 2017). Alternatively, unhealthy eating behaviors, such as binge eating, were related to more negative body images (Schwartz & Brownell, 2004). Other work has suggested goal successes and failures can influence self-esteem, such that successful goal pursuit boosts self-esteem whereas goal failure decreases it (e.g., Heatherton & Polivy, 1991). Indeed, goal-relevant behavior can have important consequences for how individuals think and feel about themselves.

In this work, we suggest goal-related actions may influence not only how people *think* about

This article was published Online First November 29, 2018.

Kristina Howansky, Janna K. Dominick, and Shana Cole, Department of Psychology, Rutgers University—New Brunswick.

Correspondence concerning this article should be addressed to Shana Cole, Department of Psychology, Rutgers University—New Brunswick, 53 Avenue East, Piscataway, NJ 08854. E-mail: shana.cole@rutgers.edu

themselves but also how they *perceive* themselves. Studying visual representations is important because people put extraordinary faith in their visual experiences, often above other forms of information (Andrade, 2011). This faith in the visual system is what scholars call naïve realism (Ross & Ward, 1995, 1996), a philosophical view that suggests people believe their sensory experiences accurately correspond to the world as it really is (see Lehar, 2003, for discussion). Such a belief leads people to be confident in their visual experiences and unlikely to discount them. Moreover, the way people see the world—or think they see the world—serves as input for their later cognitions and behavioral decisions. As a result, studying perceptual representations may help capture indirect and implicit processes that guide people's decisions about whether and how to act in future goal-relevant situations.

The inordinate trust people put in their visual experiences is ironic given much recent work has suggested people's perceptions of the world can actually be quite malleable. Revisiting and expanding upon the New Look perspective (e.g., Bruner & Goodman, 1947), recent research has suggested visual experiences can be shaped by characteristics of perceivers themselves, including their active goals and motivations (Dunning & Balcetis, 2013; Riccio, Cole, & Balcetis, 2013). For example, thirsty people perceived a bottle of water as physically closer than did people whose thirst was quenched (Balcetis & Dunning, 2010). People motivated to protect their romantic relationships perceived interested singles as less attractive compared to people not currently in a relationship (Cole, Trope, & Balcetis, 2016). Goals influence individuals' visual representations of goal-relevant environments and individuals.

Despite a growing body of work demonstrating motivated perceptual experiences, there is less work exploring biased visual representations of the self. Some work has shown individuals mentally represent themselves as more attractive than they actually are (Epley & Whitchurch, 2008), especially when making downward comparisons to unattractive others (Zell & Balcetis, 2012). Other work has demonstrated individuals high in negative affectivity perceive themselves as less healthy compared to individuals high in positive affectivity (Mirams et al., 2014). Work in the eating disorder literature has suggested individuals with and without eating disorders perceive their bodies as larger than they really are (e.g., Tovée, Benson, Emery, Mason, & Cohen-Tovée, 2003). Existing work on visual representations of the self has typically investigated how trait-like characteristics of the perceiver affect self-representations. As such, causality is difficult to establish. The present work is among the first to use an experimental design to test the causal effects of statelike effects on visual representations of the self. The current project examines how self-perception is affected when people engage in goal-relevant behaviors. Engaging in behaviors that are consistent with weight loss goals (e.g., exercising) may lead people to view themselves as more fit, whereas engaging in goal-inconsistent behaviors (e.g., eating an unhealthy meal) may lead people to view themselves as less fit.

Moreover, biases in self-perception may be linked to self-regulatory outcomes such as estimations of goal progress. Monitoring progress toward goal attainment is an effective self-regulation strategy, and frequent monitoring can positively impact goal attainment (Harkin et al., 2016). Furthermore, breaking larger goals down into smaller subcomponents allows more opportunities to assess progress, makes forward progress more noticeable (Brown & Lahey, 2015), and leads to continued motivation toward goal pursuit (Locke & Latham, 1990; Uetake & Yang, 2017). Visual self-perceptions may provide ongoing feedback about progress.

Overview of the Present Studies

The present work had two main aims. First, we sought to determine whether goal-consistent and -inconsistent behavior influences self-perceptions. Second, we sought to link self-perceptions to goal-relevant outcomes. Across studies, we predicted individuals would visually perceive themselves as fit after behaving in a health goal−consistent way (Studies 1 and 3). Additionally, we predicted individuals would perceive themselves as unfit after behaving in a health goal−inconsistent way (Study 2). Furthermore, we predicted these biased self-perceptions would function as goal feedback, influencing evaluations of goal progress (Studies 2 and 3). In the present work, we used only female participants because men and women

may have different goals when they exercise. Whereas women often have a goal to lose weight (Brown, 2013), men often exercise with the intention to gain muscle (McCreary, Hildebrandt, Heinberg, Boroughs, & Thompson, 2007). Thus, to make sure our results could be interpreted as indicating goal-consistent self-perceptions (e.g., seeing oneself as smaller after exercising), we constrained our sample to women. Across all studies, we set a priori criteria to exclude participants who (a) reported not having at least moderate health and fitness goals and (b) were greater or less than 3 *SD*s from the mean on any of our primary variables of interest. We report all measures and conditions for variables of interest to the research question. Data for all studies, along with analyses, syntax, and materials, are available at https://osf.io/fzq24/.

Study 1

In Study 1, we tested how self-perceptions were affected by behaving in line with an exercise goal. In a quasi-experimental field study, we recruited undergraduate women leaving the gym or the student center and tested whether their self-perceptions of body size differed. We predicted individuals who had just behaved in line with their fitness goal (i.e., exercised) would see themselves as healthier and leaner than would those who had not.

Method

One hundred female participants (M_{age} = 21.01, SD = 2.98) were recruited either leaving an on-campus gym (goal-consistent condition; n = 50) or an academic building (control condition; n = 50). Participants chose a small gift, such as nail polish or a pen, as compensation for participation. We aimed to recruit 50 participants per cell of the experimental design, because this was a previously unexplored question with no effect sizes on which to base a power analysis. This is the recommended minimum sample size needed when effect sizes are unknown (Simmons, Nelson, & Simonsohn, 2013).

Participants looked at themselves in a full-length mirror (12 in. wide × 48 in. high) while standing 35 in. away. While looking in the mirror, participants made several visual estimates of their body size. They first estimated the circumference of their hips and waist by pulling off string from a ball of yarn. Participants were not allowed to place the string around their bodies to measure. They cut each piece of string where they believed it accurately captured the size of first their hips and then their waist. Next, participants did a visual replication task. They looked at a rectangular outline of the mirror printed on a piece of paper. They then drew the silhouette of their body to represent the area they believed their body was taking up in the mirror in front of them.

Following the perceptual tasks in all studies, participants reported their mood and self-esteem.[1] Participants next reported their state subjective body image across seven items (e.g., thin, tight, chubby, squishy) and responded to several positive characteristics that we did not expect to be affected by exercise (e.g., friendly, intelligent) on a 10-point scale ranging from 1 (*I am not feeling that way*) to 10 (*I am feeling that way*). All health-relevant items were averaged to create one measure of fit body image (α = .90). Participants then completed a four-item fitness goal scale (α = .70) with statements such as "I have strong goals to be fit," which were rated on a 5-point scale from 1 (*strongly disagree*) to 5 (*strongly agree*). Finally, participants reported their gender and age, and researchers measured their waists and hips. Participants were then thanked and debriefed.

Results

Baseline scores. Because we wanted to test the effects of behaving in a goal-consistent way, we set an a priori criterion to exclude participants who reported less than a 3 (the midpoint) on the fitness goal scale. All participants across both conditions indicated they had at least moderate fitness goals (M = 4.51, SD = .49), so no participants were excluded from analyses.[2]

Next, we compared waist-to-hip ratios (WHRs) between groups. WHR is an indicator of health based on the ratio of waist size to hip size (Pischon et al., 2008). We found participants leaving the gym had smaller WHRs (M =

[1] Results of exploratory analyses with these variables can be found in the online supplemental materials.

[2] Fitness goal strength did not differ significantly between conditions, $t(97)$ = 1.62, p = .11. Moreover controlling for goal strength in subsequent analyses did not affect conclusions drawn from the results.

.76, $SD = .05$) than did those in the control group ($M = .80$, $SD = .12$), $t(98) = -2.29$, $p = .024$, $d = .46$, 95% confidence interval [CI: .06, .85]. Because of these baseline differences in body size, we ran relevant subsequent analyses controlling for WHR.

Self-perceptions. To test our primary hypothesis, we examined whether participants perceptually represented their bodies differently depending on whether they had just exercised. Two participants were more than 3 *SD*s above the mean on hip estimates and were excluded from analyses. Participants leaving the gym perceived their hips as smaller ($M = 40.27$, $SD = 8.98$) than did those in the control condition ($M = 45.30$, $SD = 9.82$), $F(1, 95) = 6.77$, $p = .011$, $\eta^2 = .07$, 95% CI [.004, .178] (see Figure 1). That is, participants who had just engaged in goal-consistent behavior estimated their hips to be about 5 in. smaller than did participants who had not. One participant was more than 3 *SD*s above the mean on waist estimates and was excluded from analyses. Although the pattern was in the expected direction, the difference between the groups on estimations of waist size did not reach significance, $F(1, 95) = 2.47$, $p = .120$ (see Figure 1).

We next examined whether exercise influenced the size of the body silhouettes participants drew. To quantify participants' perceptual representations of the area their bodies took up in the mirror, a research assistant blind to condition and experimental hypothesis carefully shaded in the silhouettes. We then scanned the drawings to create digital images. We used a MATLAB (2017, version 9.3) program and a search algorithm to count pixels and determine the percentage of black pixels compared to white pixels within the mirror area. Thus, for each participant, we were able to calculate the area participants believed their bodies occupied out of the total mirror area. Individuals leaving the gym represented themselves as significantly smaller ($M = 36.83$, $SD = 7.32$) than did those in the control condition ($M = 40.32$, $SD = 8.23$), $F(1, 97) = 5.39$, $p = .022$, $\eta^2 = .05$, 95% CI [.0004, .1575]. Participants who had just behaved in a health goal−consistent way perceived themselves as approximately 4% smaller, on average, than did participants who did not.

Self-evaluations. Finally, we analyzed whether participating in goal-consistent behavior influenced self-reported body evaluations. Participants who had just exercised reported a more favorable body image ($M = 6.06$, $SD = 1.81$) than did those in the control condition ($M = 4.85$, $SD = 1.96$), $F(1, 94) = 7.18$, $p = .009$, $\eta^2 = .07$, 95% CI [.005, .185]. The groups did not vary on other positive non-body-related characteristics (*p*s > .420).

Study 2

In Study 1, participants who had just exercised perceived themselves as more fit (e.g., thinner, smaller) than did participants who had not exercised. Study 2 had two primary aims. First, we sought to determine whether individuals who behaved in a goal-*inconsistent* way would exhibit biased visual self-perceptions that reflected their goal-inconsistent behavior. We predicted individuals with healthy eating goals would visually perceive

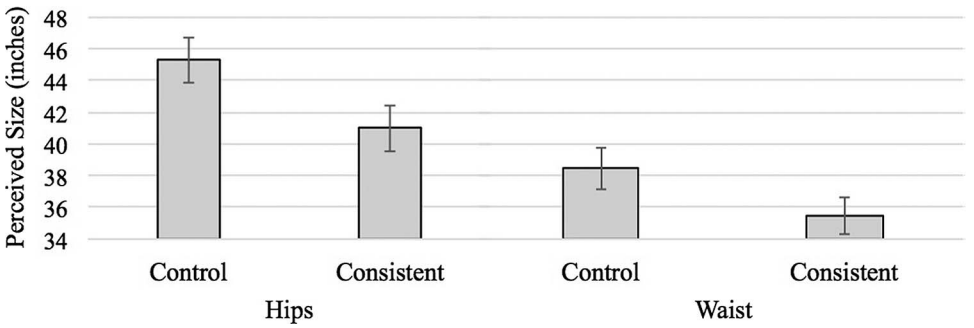

Figure 1. Participants in the goal-consistent condition perceived themselves as smaller than did participants in the control condition. Error bars represent standard error.

themselves as less fit after eating an unhealthy meal compared to individuals in a control condition. Second, we sought to link self-perceptions to evaluations of goal progress. We predicted negative self-perceptions would function as goal feedback, decreasing evaluations of goal progress.

Method

In exchange for a $5 gift card, 101 women were recruited from an outdoor shopping center (M_{age} = 30.97, SD = 11.34). Three participants were excluded from analyses for failing to follow instructions (e.g., they placed the string around their body during the estimation task), resulting in a final sample of 98 participants. Researchers recruited participants from either a discount retail store (control condition; n = 48) or a hamburger fast food restaurant (goal-inconsistent condition; n = 50). We again aimed to recruit 50 participants per condition due to an unknown effect size; however, based on the smallest effect size from Study 1 (d = .55), we would obtain 80% power with 42 participants per condition.

Participants first reported the last store they visited and what they did there. Participants then stood 35-in. away from a full-length mirror (12 in. wide × 48 in. high). We were interested in how participants would perceive their stomachs. As in Study 1, participants engaged in two perceptual tasks. While looking in the mirror, participants used string to indicate the perceived circumference of their stomachs. Participants also completed a mirror silhouette task similar to that used in Study 1. However, in the present study, participants were asked to turn to the side so that their backs aligned with one edge of the mirror and to draw a sideways silhouette of their bodies. Unexpectedly, participants varied widely in their interpretation of the instructions, resulting in considerable (>50%) unusable data for the mirror task. For example, some participants drew silhouettes facing forward rather than to the side, others drew only portions of their bodies, and some drew themselves in the middle of the mirror rather than along the edge. Due to the flawed nature of this task, we were unable to use the data for analysis (see the Materials document at https://osf.io/fzq24/ for additional task details and example silhouettes).

Following the perceptual task, participants reported their state subjective body image across six items (e.g., thin, chubby, bloated) on a 10-point scale from 1 (*I do not see myself this way*) to 10 (*I do see myself this way*). The healthy items were reverse-coded, and all items were averaged to create one measure of unfit body image (α = .80).

Participants then reported their progress toward achieving their ideal body size on a 10-point scale from 0 (*very far*) to 10 (*currently at*). Next, participants reported whether it would be difficult for them to achieve their ideal body size on a 6-point scale from 0 (*not at all true for me*) to 5 (*completely true for me*).[3]

Finally, participants reported their age and gender. Upon completion of the survey, researchers measured the actual circumference of participants' stomachs as well as participants' height and weight. Participants were then debriefed, paid, and thanked.

Results

Baseline scores. To ensure participants in the inconsistent condition consumed unhealthy food options, we content-analyzed responses to what participants did in the last store they visited. The majority (92%) of participants in the inconsistent condition reported consuming burgers, fries, and/or milkshakes from the restaurant. The remaining 8% either misinterpreted the question or did not provide details about what they ate (e.g., "ate lunch"). Because we wanted to test the effects of behaving in a goal-inconsistent way, we set an a priori criterion to exclude participants who reported being at their ideal body size. Six participants total, three in the inconsistent condition and three in the control condition, indicated they were already at their ideal body size and were excluded from analyses.

We compared body mass indices (BMIs) and participants' actual stomach sizes between groups. One participant's BMI and actual stomach size was over 3 *SD*s from the mean and thus was excluded from analyses. There was no sig-

[3] For mediation analyses testing self-perception as a mediator of the relationship between condition and estimates of goal difficulty, please see the online supplemental materials.

nificant difference in BMI, $t(89) = -.24$, $p = .808$, or actual stomach size, $t(89) = -.27$, $p = .791$, between conditions.

Self-perception. We next assessed whether participants in the goal-inconsistent condition perceived themselves as larger than did participants in the control condition by comparing the estimated circumference of participants' stomachs between conditions. One participant's estimation was over 3 *SD*s from the mean and thus was excluded from analyses. There was a significant difference in estimated stomach circumference between the conditions, $t(89) = -2.09$, $p = .040$, $d = .44$, 95% CI [.02, .85]. Participants in the goal-inconsistent condition ($M = 46.17$, $SD = 14.82$) represented their stomachs as larger than did participants in the control condition ($M = 40.69$, $SD = 9.45$). On average, participants who had just eaten an unhealthy meal perceived their stomachs to be about 6 in. bigger than did participants who had not.

Self-evaluations. We next examined whether participants differed in their self-reported body evaluations. Contrary to the results in Study 1, there was no difference in participants' subjective body image evaluations between conditions, $t(81) = -.09$, $p = .927$.

Self-perception and regulatory outcomes. To test whether self-perception influences goal progress, we first conducted partial correlations to test the overall relationship between self-perceptions and estimates of goal progress, controlling for condition. There was a significant negative correlation between self-perceptions and estimates of goal progress, $r(88) = -.29$, $p = .005$. The larger participants perceived their stomach size, the further they believed they were from their ideal body.

We next used the PROCESS macro (Hayes, 2012) to test whether goal-inconsistent behaviors shift self-perceptions, which, in turn, affect estimations of goal progress (see Figure 2). We tested the significance of the indirect effect using bootstrapping procedures in which the unstandardized indirect effect was computed for each of 10,000 bootstrapped samples. The indirect effect was significant (95% CI [−.29, −.01]). Compared to participants in the control condition, participants in the goal-inconsistent condition perceived their stomachs as larger, which made them feel further from their ideal body size.

Study 3

In Studies 1 and 2 we tested self-perceptions in an ecologically valid setting where participants had chosen to engage in goal-consistent or -inconsistent behavior in their daily lives. However, due to the quasi-experimental nature of the designs, it is difficult to assess causality between behavior and subsequent self-perceptions. To rule out that our effects could be the result of additional untested differences between groups, in Study 3 we utilized a controlled experimental design to test the causal relationship between engaging in goal-consistent behavior and self-perceptions. In addition, in Study 2, negative self-perceptions resulting from goal-inconsistent behavior had downstream consequences for people's estimations of goal progress. In Study 3, we tested whether self-perceptions resulting from goal-*consistent* behavior would also affect estimation of goal progress.

In Study 3, participants were randomly assigned to complete an exercise video workout or watch neutral videos. Research assistants blind to hypotheses piloted the exercise video in the lab and evaluated the intensity of the exercise on a 7-point scale from 1 (*easy*) to 7 (*difficult*). Evaluations of workout intensity ($M = 4.54$, $SD = 1.20$) did not significantly differ from the midpoint of the scale, $t(12) = 1.62$, $p = .131$.

Method

In exchange for course credit, undergraduate women prescreened to have fitness goals ($N = 214$) came into the lab to participate in a study regarding goals. We aimed to recruit approximately 200 participants to obtain 80% power

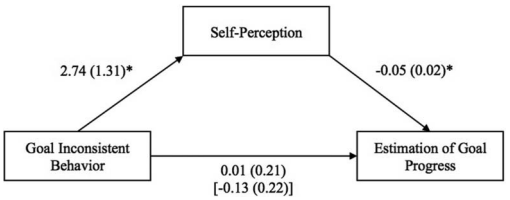

Figure 2. Unstandardized regression coefficients (and standard errors) from the mediation model in which goal-inconsistent behavior (coded as 1) predicted the estimations of goal progress. Values in brackets represent the direct associations; values without brackets represent associations when all variables are included in the model. * $p < .05$.

using the smallest observed effect size from Study 1 ($\eta^2 = .05$). Seven participants were excluded from analyses: six for failure to follow instructions and one who was unable to physically follow the protocol. The final sample included 207 individuals ($M_{age} = 19.14$, $SD = 2.79$).

To prime the importance of health and fitness, we instructed participants to first spend 2 min writing about why health and fitness are important to them. Then participants were randomly assigned to either an exercise ($n = 106$) or control ($n = 102$) condition. Participants in the exercise condition completed a 15-min workout that included 5 min of warm-up and 10 min of moderate-intensity exercise (e.g., jumping jacks, sit-ups), which was followed by 5 min of cool-down time and stretching. Participants in the control condition watched two 5-min videos and one 10-min video about neutral topics such as discovering new species, Antarctica, and how to make a guitar.

As the measure of self-perception, participants viewed themselves in a full-length door mirror (12 in. wide × 48 in. high). While referencing their reflections, participants used a body visualizer program on a portable tablet to adjust an avatar until it most closely resembled how they believed they looked in the mirror (see Figure 3 for examples from each condition). Participants could adjust the avatars' weight, chest, waist, hips, inseam, and muscle mass.

Participants then reported their state subjective body image via the same self-report measure described in Study 1 ($\alpha = .85$). Next, they reported goal progress via a six-item goal-progress scale ($\alpha = .81$) with statements such as "I am happy with my body size," which was rated on a 5-point scale from 1 (*strongly disagree*) to 5 (*strongly agree*).

Researchers measured participants' actual waist and hip size. Finally, participants reported their gender and age. Participants completed a funneled debriefing questionnaire before being thanked and informed about the true purpose of the study. In the funneled debriefing, no participant identified the study's hypothesis.

To assess participants' visual self-perceptions, we recruited a separate sample of Amazon Mechanical Turk (MTurk) workers ($N = 466$; $M_{age} = 36.37$; 56.2% female) to evaluate the avatars created by participants. Each coder evaluated 14 different avatars. Half of the avatars assigned to each coder were randomly selected from the exercise condition, and half were randomly selected from the control condition. The coders did not see actual images of the participants and did not learn any information about the conditions under which the avatars were created. MTurk workers viewed each avatar and rated it across four attributes (e.g., in shape, healthy) on a 101-point scale from 0 (*not at all*) to 100 (*extremely*). The attributes were highly correlated ($\alpha = .90$), so we averaged these attributes to create one measure of fitness.

Results

Baseline scores. We compared WHRs between groups. There was no significant difference in WHR between conditions, $t(205) = -.25$, $p = .807$.

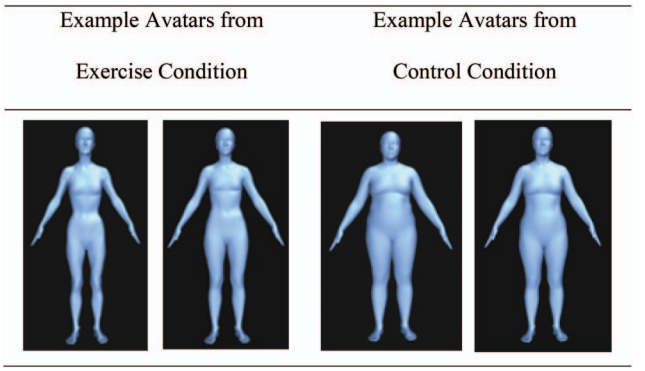

Figure 3. Example avatars created by participants in the exercise condition and in the control condition. See the online article for the color version of this figure.

Self-perception. To test our hypothesis that exercising would lead participants to perceive themselves as more fit, we conducted a linear mixed model with condition as a fixed effect and coder as a random effect to account for the nested nature of the evaluations. Coders evaluated the avatars created in the exercise condition as having more fit body shapes (M = 54.51, SE = .53) than did the avatars created in the control condition (M = 51.02, SE = 1.53; b = −3.49, SE = .49), $t(5871.08) = -7.12$, $p < .001$, d = .32, 95% CI [.24 to .43].

Self-evaluations. We next examined whether participants differed in their self-reported body evaluations between conditions. There was no significant difference in participants' self-reported evaluations between conditions, $t(205) = -1.12$, $p = .264$. The groups also did not vary on other positive non-body-related characteristics ($ps > .28$).

Self-perception and regulatory outcomes. To test whether self-perception influenced regulatory outcomes, we first conducted partial correlations to test the relationship between self-perceptions and estimates of goal progress, controlling for condition. There was a significant positive correlation between self-perceptions and estimates of goal progress, $r(204) = .31$, $p < .001$, indicating the more fit participants perceived themselves to be, the closer they believed they were to their ideal body size.

We next used PROCESS to test whether goal-consistent behaviors shift self-perceptions, which, in turn, affect estimations of goal progress (see Figure 4). We tested the significance of the indirect effect using bootstrapping procedures in which the unstandardized indirect effect was computed for each of 10,000 bootstrapped samples. The indirect effect was significant (95% CI [.0004, .0787]). Compared to participants in the control condition, participants in the exercise condition perceived themselves as more fit, which was associated with estimates of being closer to their ideal body size.

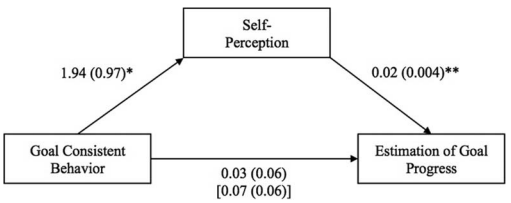

Figure 4. Unstandardized regression coefficients (and standard errors) from the mediation model in which goal-consistent behavior (coded as 1) predicted estimations of goal progress. Values in brackets represent the direct associations; values without brackets represent associations when all variables are included in the model. * $p < .05$. ** $p < .001$.

Discussion

Across three studies, results suggest that behaving in goal-consistent or -inconsistent ways influences self-perceptions. People who behaved in line with a health goal perceived themselves as having a healthier body compared to those who did not (Studies 1 and 3). Additionally, individuals who behaved in a health goal−inconsistent way perceived themselves as less healthy compared to those who did not (Study 2). Further, Studies 2 and 3 suggested self-perceptions predict self-regulatory outcomes. Participants' self-perceptions were associated with their estimations of progress toward their health goal. Goal-relevant behaviors predicted self-perceptions both in the field (Studies 1 and 2) and in a controlled lab setting (Study 3). Further, differences in self-perceptions between conditions emerged even when self-reported evaluations did not (Studies 2 and 3), signifying the unique role of visual self-perception in goal pursuit. To provide further support for the robustness of the effects, a meta-analysis across self-perception main effects suggests self-perceptions significantly differed between conditions across studies. Further, a p-curve analysis indicates the data show evidential value (see the online supplemental materials for analyses).

Goal-Congruent Self-Perceptions and Generalizability

More research is needed to further hone in on the specificity of goal-directed self-perceptions. In general, we predict goal-consistent behavior will elicit self-perceptions aligned with that particular goal. For example, in the present studies we found that women who had just exercised perceived themselves as slimmer. Whereas many women have a goal to lose weight (Brown, 2013), many men exercise with the intention of enhancing their physical bulk (McCreary et al., 2007). As such, men (or women)

with goals to gain muscle may actually perceive themselves as larger after exercise. Future research could more systematically link underlying goals to specific self-perceptions to provide additional evidence that self-perceptions are goal-congruent.

Indeed, we also predict self-perceptions of the body as healthier and leaner will not result from *any* behavior that positively influences self-esteem (e.g., acing a test) but rather believe they specifically reflect having acted in a health goal−consistent way. Indeed, in the present work, we found no evidence for a relationship between general self-esteem and participants' self-perceptions (see the online supplemental materials for exploratory analyses). Moreover, we predict goals will influence goal-relevant perceptual dimensions but not irrelevant ones. In Study 1, we found that acting in a health goal−consistent way influenced participants' feelings about their body size but not about other positive characteristics unrelated to body size (e.g., intelligence, friendliness). However, more work could be done to specifically test the relationship between the goal-(in)congruent behavior and the perceptual dimension being evaluated. For instance, in future work participants could engage in a health goal−consistent behavior and evaluate dimensions of the body not expected to be influenced by exercise (e.g., hands, feet, or head size). Indeed, other work in the motivated perception literature has found evidence of this type of goal congruency. Hungry participants entering a restaurant perceived a slice of pizza that could satisfy their hunger as physically closer than was an empty stack of plastic cups that could not, but sated participants leaving a restaurant perceived the pizza and the cups as equally far away (Balcetis, 2006). Our theory predicts that for a visual bias to be one that serves self-regulation, it should be discerning; that is, it should occur only when necessary and appropriate to aid goal pursuit.

Moreover, we have no a priori reason to suspect the effects found in the present work are specific to health goals or body image. Rather, many different types of goals may elicit goal-relevant perceptual biases. For example, individuals with a motivation to respond without prejudice may perceive their own faces as friendlier while engaging in an interaction with a member of a minority group, or people who have successfully completed an academic task may perceive their faces as more competent. Future work should explore the relationship between specific goals and different types of self-perceptions across goal domains.

Self-Evaluations Versus Self-Perceptions

We found participants' self-evaluations and their visual self-perceptions moderately correlated across studies (rs = .29−.53), but though their self-perceptions differed between conditions, their self-evaluations did not reliably differ (see the online supplemental materials for a meta-analysis across studies). Although this was an unexpected finding, it is consistent with results of some past work that suggested evaluations and perceptions do not always predict the same outcomes (e.g., Mallinas, Crawford, & Cole, 2018). There could be several reasons for the discrepancy in the current studies. For example, self-evaluations may be more influenced by explicit impression management concerns or psychological reactivity, whereas self-perceptions may function as a more implicit measure. Participants may be able to actively adjust their self-reports of body size to meet their own beliefs or preferences but may not be as easily able to adjust their visual perceptions. Moreover, the two types of evaluations differed in their level of specificity. Self-evaluations asked for more global assessments of body size paired with evaluative labels (e.g., *thin, chubby*), whereas the perceptual measures required participants to focus on one specific area of their body at a time. Future work should continue to test under what conditions similarities and differences between evaluations and perceptions emerge.

Self-Perceptions and Self-Regulatory Outcomes

The present work suggests goal-related self-perceptions influence estimations of goal progress. Yet it is unclear how estimates of progress may subsequently affect goal-directed behavior. Some work has suggested people expend more effort toward their goal as they make progress toward it (Epstein & Fenz, 1962; Miller, 1959; Kivetz, Urminsky, & Zheng, 2006). In this case, goal-consistent self-perceptions may lead individuals to feel they are closer to obtaining their goal and thus elicit more effort toward goal-consistent behaviors. Alternatively, other work

has suggested the link between goal progress and effort may depend on how close individuals are to meeting a goal; although attention to progress is motivating for individuals early in goal pursuit, attention to goal progress lessens goal adherence for individuals who are close to obtaining a goal (Koo & Fishbach, 2012). In this case, for individuals close to achieving their goals, goal-consistent self-perceptions and subsequent estimations of progress may be demotivating for future goal-consistent action. Future work should test the relationship between self-perceptions, progress, and behavior as well as consider the role of current progress toward achieving a goal.

People often engage in goal-consistent behaviors (e.g., exercise) to receive delayed long-term rewards (e.g., improved health, weight loss; Wilkowski & Ferguson, 2016). Biased self-perceptions may be functional for goal pursuit by providing individuals with an immediate reward for behaving in a goal-consistent way, which may motivate continued engagement. Indeed, immediate rewards predict persistence of goal-consistent behaviors (Woolley & Fishbach, 2017). Goal-consistent self-perceptions may be functional for goal pursuit by providing an immediate reward for a long-term goal.

Concluding Remarks

Across three studies, individuals' self-perceptions varied as a function of their goal-consistent or -inconsistent behaviors. Further, self-perceptions contributed to estimations of goal progress. Taken together, this work suggests that what people see when they look in the mirror after engaging in exercise or indulging may play an important role in the maintenance of long-term goals.

References

Andrade, E. B. (2011). Excessive confidence in visually-based estimates. *Organizational Behavior and Human Decision Processes, 116,* 252–261. http://dx.doi.org/10.1016/j.obhdp.2011.07.002

Balcetis, E. (2006). Motivated visual perception: How we see what we want to see. *Dissertation Abstracts International: Section B,* The Sciences and Engineering, *67,* 4153.

Balcetis, E., Cole, S., & Bisi, A. (2015). Near and nothing to it: Perceived proximity improves exercise by increasing feasibility. *Motivation Science, 1,* 203–218. http://dx.doi.org/10.1037/mot0000023

Balcetis, E., & Dunning, D. (2010). Wishful seeing: More desired objects are seen as closer. *Psychological Science, 21,* 147–152. http://dx.doi.org/10.1177/0956797609356283

Bongers, K. C. A., Dijksterhuis, A. P., & Spears, R. (2009). Self-esteem regulation after success and failure to attain unconsciously activated goals. *Journal of Experimental Social Psychology, 45,* 468–477. http://dx.doi.org/10.1016/j.jesp.2008.12.007

Bradley, M. M., & Lang, P. J. (1994). Measuring emotion: The Self-Assessment Manikin and the semantic differential. *Journal of Behavior Therapy and Experimental Psychiatry, 25,* 49–59. http://dx.doi.org/10.1016/0005-7916(94)90063-9

Brown, A. (2013). *Americans' desire to shed pounds outweighs effort: Majority exceed ideal weight, 18% are at ideal weight*. Retrieved from http://news.gallup.com/poll/166082/americans-desire-shed-pounds-outweighs-effort.aspx

Brown, A. L., & Lahey, J. N. (2015). Small victories: Creating intrinsic motivation in task completion and debt repayment. *Journal of Marketing Research, 52,* 768–783. http://dx.doi.org/10.1509/jmr.14.0281

Bruner, J. S., & Goodman, C. C. (1947). Value and need as organizing factors in perception. *Journal of Abnormal and Social Psychology, 42,* 33–44. http://dx.doi.org/10.1037/h0058484

Cheema, A., & Bagchi, R. (2011). The effect of goal visualization on goal pursuit: Implications for consumers and managers. *Journal of Marketing, 75,* 109–123. http://dx.doi.org/10.1509/jmkg.75.2.109

Cole, S., Trope, Y., & Balcetis, E. (2016). In the eye of the betrothed: Perceptual downgrading of attractive alternative romantic partners. *Personality and Social Psychology Bulletin, 42,* 879–892. http://dx.doi.org/10.1177/0146167216646546

Dunning, D., & Balcetis, E. (2013). Wishful seeing: How preferences shape visual perception. *Current Directions in Psychological Science, 22,* 33–37. http://dx.doi.org/10.1177/0963721412463693

Epley, N., & Whitchurch, E. (2008). Mirror, mirror on the wall: Enhancement in self-recognition. *Personality and Social Psychology Bulletin, 34,* 1159–1170. http://dx.doi.org/10.1177/0146167208318601

Epstein, S., & Fenz, W. D. (1962). Theory and experiment on the measurement of approach-avoidance conflict. *Journal of Abnormal and Social Psychology, 64,* 97–112. http://dx.doi.org/10.1037/h0046187

Förster, J., & Liberman, N. (2009). Goal gradients: Challenges to a basic principle of motivation. In J. P. Förster, R. F. Baumeister, & D. M. Tice (Eds.), *Psychology of self-regulation: Cognitive,*

affective, and motivational processes (pp. 147–162). New York, NY: Psychology Press.

Goh, J. X., Hall, J. A., & Rosenthal, R. (2016). Mini meta-analysis of your own studies: Some arguments on why and a primer on how. *Social and Personality Psychology Compass, 10,* 535–549. http://dx.doi.org/10.1111/spc3.12267

Harkin, B., Webb, T. L., Chang, B. P. I., Prestwich, A., Conner, M., Kellar, I., . . . Sheeran, P. (2016). Does monitoring goal progress promote goal attainment? A meta-analysis of the experimental evidence. *Psychological Bulletin, 142,* 198–229. http://dx.doi.org/10.1037/bul0000025

Hayes, A. F. (2012). *PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling* [White paper]. Retrieved from http://www.afhayes.com/public/process2012.pdf

Heatherton, T. F., & Polivy, J. (1991). Development and validation of a scale for measuring state self-esteem. *Journal of Personality and Social Psychology, 60,* 895–910. http://dx.doi.org/10.1037/0022-3514.60.6.895

Kivetz, R., Urminsky, O., & Zheng, Y. (2006). The goal-gradient hypothesis resurrected: Purchase acceleration, illusionary goal progress, and customer retention. *Journal of Marketing Research, 43,* 39–58. http://dx.doi.org/10.1509/jmkr.43.1.39

Koo, M., & Fishbach, A. (2012). The small-area hypothesis: Effects of progress monitoring on goal adherence. *Journal of Consumer Research, 39,* 493–509. http://dx.doi.org/10.1086/663827

Lehar, S. (2003). Gestalt isomorphism and the primacy of subjective conscious experience: A gestalt bubble model. *Behavioral and Brain Sciences, 26,* 375–408. http://dx.doi.org/10.1017/S0140525X03000098

Locke, E. A., & Latham, G. P. (1990). *A theory of goal setting and task performance*. Englewood Cliffs, NJ: Prentice Hall.

Mallinas, S. R., Crawford, J. T., & Cole, S. (2018). Political opposites do not attract: The effects of ideological dissimilarity on impression formation. *Journal of Social and Political Psychology, 6,* 49–75. http://dx.doi.org/10.5964/jspp.v6i1.747

MATLAB. (2017). Version 9.3 [Computer software]. Natick, MA: MathWorks. Available at https://www.mathworks.com/products/matlab.html

McCreary, D. R., Hildebrandt, T. B., Heinberg, L. J., Boroughs, M., & Thompson, J. K. (2007). A review of body image influences on men's fitness goals and supplement use. *American Journal of Men's Health, 1,* 307–316. http://dx.doi.org/10.1177/1557988306309408

Miller, N. E. (1959). Liberalization of basic S-R concepts: Extensions to conflict behavior motivation and social learning. In S. Koch (Ed.), *Psychology: A study of a science* (Vol. 2, pp. 196–202). New York, NY: McGraw-Hill.

Mirams, L., Poliakoff, E., Zandstra, E. H., Hoeksma, M., Thomas, A., & El-Deredy, W. (2014). Feeling bad and looking worse: Negative affect is associated with reduced perceptions of face-healthiness. *PLoS ONE, 9*(9), e107912. http://dx.doi.org/10.1371/journal.pone.0107912

Pischon, T., Boeing, H., Hoffmann, K., Bergmann, M., Schulze, M. B., Overvad, K., . . . Riboli, E. (2008). General and abdominal adiposity and risk of death in Europe. *New England Journal of Medicine, 359,* 2105–2120.

Riccio, M., Cole, S., & Balcetis, E. (2013). Seeing the expected, the desired, and the feared: Influences on perceptual interpretation and directed attention. *Social and Personality Psychology Compass, 7,* 401–414. http://dx.doi.org/10.1111/spc3.12028

Rosenberg, M. (1979). *Conceiving the self*. New York, NY: Basic Books.

Ross, L. D., & Ward, A. (1995). The psychological barriers to dispute resolution. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 27, pp. 255–304). San Diego, CA: Academic Press.

Ross, L. D., & Ward, A. (1996). Naïve realism in everyday life: Implications for social conflict and misunderstanding. In T. Brown, E. Reed, & E. Turiel (Eds.), *Values and knowledge* (pp. 103–135). Hillsdale, NJ: Erlbaum.

Salci, L. E., & Martin Ginis, K. A. (2017). Acute effects of exercise on women with pre-existing body image concerns: A test of potential mediators. *Psychology of Sport and Exercise, 31,* 113–122. http://dx.doi.org/10.1016/j.psychsport.2017.04.001

Schwartz, M. B., & Brownell, K. D. (2004). Obesity and body image. *Body Image, 1,* 43–56. http://dx.doi.org/10.1016/S1740-1445(03)00007-X

Shapira, Z. (1989). Task choice and assigned goals as determinants of task motivation and performance. *Organizational Behavior and Human Decision Processes, 44,* 141–165. http://dx.doi.org/10.1016/0749-5978(89)90023-X

Simmons, J. P., Nelson, L. D., & Simonsohn, U. (2013). Life after *P*-hacking. In S. Botti & A. Labroo (Eds.), *Advances in consumer research* (Vol. 41, p. 775). Duluth, MN: Association for Consumer Research.

Simonsohn, U., Simmons, J. P., & Nelson, L. D. (2015). Better *P*-curves: Making *P*-curve analysis more robust to errors, fraud, and ambitious *P*-hacking, a reply to Ulrich and Miller (2015). *Journal of Experimental Psychology: General, 144,* 1146–1152. http://dx.doi.org/10.1037/xge0000104

Tovée, M. J., Benson, P. J., Emery, J. L., Mason, S. M., & Cohen-Tovée, E. M. (2003). Measurement of body size and shape perception in eating-disordered and control observers using body-shape software. *British*

Journal of Psychology, 94, 501–516. http://dx.doi.org/10.1348/000712603322503060

Uetake, K., & Yang, N. (2017). *Success breeds success: Weight loss dynamics in the presence of short-term and long-term goals* (Working Paper No. 170002). Toronto, Ontario: Canadian Centre for Health Economics.

Wilkowski, B. M., & Ferguson, E. L. (2016). The steps that can take us miles: Examining the short-term dynamics of long-term daily goal pursuit. *Journal of Experimental Psychology: General, 145,* 516–529. http://dx.doi.org/10.1037/xge0000150

Woolley, K., & Fishbach, A. (2017). Immediate rewards predict adherence to long-term goals. *Personality and Social Psychology Bulletin, 43,* 151–162. http://dx.doi.org/10.1177/0146167216676480

Zell, E., & Balcetis, E. (2012). The influence of social comparison on visual representation of one's face. *PLoS ONE, 7*(5), e36742. http://dx.doi.org/10.1371/journal.pone.0036742

Received July 2, 2018
Revision received September 26, 2018
Accepted September 27, 2018 ■