The Influence of Attentional Scope on Egocentric Distance Perception and Goal-Relevant Behavior

Matthew Riccio

New York University

Given the rising obesity epidemic in America, research must explore why people are exercising insufficiently and investigate strategies to increase successful self-regulation and exercise behavior. Past research shows that spatial perception can be biased by physiological potential such that people with lower fitness levels tend to perceive distances as farther, discouraging continued movement or action in the environment. This is one reason that being out of shape is a difficult state to get out of, but what if a distance could be made to appear shorter? If a target or goal appeared closer or seemed more attainable, would this encourage goal-promoting behavior and increase the likelihood of reaching it? We tested one strategy to induce perceptions that a target is closer and asked whether perceived proximity encourages exercise goal-promoting behavior. We induced a focused attentional style and tested perceptions of egocentric distance—the distance from oneself to a target or object. In a subsequent fitness task, we examined the relationship between perceived closeness to that target and the encouragement of action that may help with the pursuit and achievement of fitness goals. These studies suggest that not only can increased attentional focus make distances seem closer and, in turn, tasks more manageable, but that doing so can also encourage goal-promoting behavior, such as faster, more intense action. Implications for self-regulation despite obstacles to goal pursuit, particularly among at-risk and overweight populations, are discussed.

Introduction

Results from the 2007–08 National Health and Nutrition Examination Survey (NHANES) indicate that two-thirds of American adults aged 20andolderaswellas53% of young people are overweight or obese (Ogden, Carroll, Curtin, McDowell, Tabak, & Flegal, 2006; Ogden, Carroll, & Flegal, 2008). In the three decades since 1980, obesity prevalence among children, adolescents, and adults has nearly tripled (Ogden & Carroll, 2010). Obesity has now become the second-leading contributor to premature death in America, contributing to 112,000 deaths each year (Flegal, Graubard, Williamson, & Gail, 2005). Moreover, the Healthy People 2010 Final Review, published by the Centers for Disease Control and Prevention, reports that no state has met the nation's Healthy People initiative goal to lower its obesity prevalence to 15%.

Among other factors, obesity comes as a result of failure to engage in sufficient exercise. In general, 73% of Americans and 80% of those who are obese fail to meet healthy exercise goals (Gallup&Newport,2009). The present research offers two explanations for these failures. First, in order to lose weight, one must engage in intense exercise; however, those who are lower in fitness tend to perceive environments in ways that discourage action. Second, those who are lower in fitness so tend to maintain lower levels of exercise selfefficacy. Self-efficacy refers to one's own belief that they can be effective or successful in a given circumstance, task, or situation (Bandura,1977), and has been found to be an important predictor of the adoption of, maintenance of, and adherence to exercise behaviors (McAuley,Lox,&Duncan,1993).Given these explanations, the present research aimed to identify a visual technique that could aid in countering these two effects, in turn promoting exercise goal-relevant action. The studies tested whether, by focusing visual attention, we can induce egocentric perceptions of proximity to a target and thereby increase subsequent exercise intensity in reaching it, even among people who believe they have difficulty meeting exercise goals.

Biased Perceptions of Visual Stimuli

Our sensory systems are constantly receiving incoming stimuli. Sights, sounds, and smells are taken in, interpreted, and pooled to construct an understanding of the world in which we live. Yet research consistently shows that the perception and processing of visual stimuli and the environment are biased by a multitude of factors intrinsic to the perceiver. For instance, motivations filter and guide attention, influencing the initial gathering and receiving of information (Balcetis, 2007).Likewise, motivated processing biases the manner in which received information is subsequently processed (Balcetis, 2007). While “bottom-up” information, composed of the fine details and basic features that our eyes take in for interpretation and processing, is undoubtedly utilized by the perceptual system, the role and influence of higher level schema, or concept driven “top-down” processing, is becoming increasingly more evident. The energy people have available for action, as well as their personal goals, emotions, and desires, have all been shown to influence distance and spatial perceptions (e.g.,Bhalla&Proffitt,1999;Witt, Proffitt, Epstein, 2004). For example, golfers who played better judge the hole to be bigger than golfers who did not play as well (Witt, Linkenauger, Bakdash, & Proffitt, 2008); participants shown ambiguous figures see the interpretation that results in a more favorable outcome (Balcetis & Dunning, 2006). Perception is a product of both the information that is actually present in the environment and the internal qualities of perceivers.

While the idea that top-down influences can filter and bias perception dates back to New Look researchers of the 1940s and 1950s (Bruner, 1957), recent research has built upon those initial concepts significantly, providing increasingly more evidence of biased perception based on internal states. Particularly, action-specific influences have been identified and shown to have a significant role in distance and spatial perception. For example, physiological resources (e.g. fitness level, age, being physically refreshed) and non-visual factors that lead to increases in metabolic demand (e.g. physicalcost, bio-energetic cost)produce action-specific influences that bias perception (Schnall, Zadra, & Proffitt, 2010). Hills appear steeper to those burdened with a heavy backpack, as well as to those less physically fit or who are fatigued (e.g.,Bhalla& Proffitt, 1999; Proffitt, Bhalla, Gossweiler, & Midgett,1995). Similarly, distance is perceived as farther if one is required to walk that distance (Witt,Proffitt,& Epstein, 2010). Perception, research shows, functions within a behavioral economy of action, where a perceiver's physical capacity and physiological resources are considered in addition to the objective features of the environment (Proffitt,2006). Consequently, if and when people have to exert more effort, particularly in cases where energy is in short supply, the environment appears more extreme.

Action-specific influences, however, are not limited to physiological resources, as recent research has also demonstrated that psychosocial resources can affect visual perception. The desirability-closeness effect in distance perception, for instance, suggests that the more wanted an object or target, the closer it seems (Alter & Balcetis, 2011; Balcetis & Dunning, 2010). Desirable objects, such as a bottle of water when thirsty, appear closer than less desired objects (Balcetis & Dunning,2010).Similarly, focused visual attention has been found to distort perception both at and away from the attentional locus (Baden, Warwick-Evans, & Lakomy, 2004; Downing, 1988; Chen, Marshall, Weidner, & Fink, 2009; Wardak, Denève, & Ben Hamed, 2011), such that target objects will appear closer if one is provided with specific attention-focusing instructions or if an observer's visual field is restricted to only the area directly around a target (Balcetis & Cole, 2011; Wu, Ooi, & He, 2004). Moreover, the manipulation of attentional focus has even been shown to bias perceptions of physical exertion and effort required (RPE) in the context of expected exercise duration (Baden, Warwick-Evans, & Lakomy, 2004). Together, all of these findings show that ac ollection of physiological and psychosocial resources, ranging from one's physical fitness level to one's locus and amount of visual attention, result in action-specific influences on egocentric distance and spatial perception (Witt&Proffitt, 2008; Witt, Proffitt & Epstein, 2005; Schnall, Harber, Stefanucci, & Proffitt, 2008; Baden et al., 2004).

Biased Perceptions of Exercise Self-Efficacy

Research shows that those lower in fitness also maintain lower levels of perceived exercise self-efficacy (Bandura, 2002; McAuley et al., 1993). Self-efficacy refers to a person's beliefs about their own capabilities to produce effects (Bandura, 1977). It has been found to influence nearly every aspect of personal change and self-regulation, from goal setting to perseverance and recovery following setbacks, as well as the maintenance of habit changes if successful (e.g., Bandura, 1989;Deci,1975;Gekas,1989;Bandura,2002).Exercise self-efficacy specifically refers to these beliefs within the domain of exercise and fitness (Bandura,2001; Fletcher & Banasik, 2001). Researchers have shown that exercisers higher in self-efficacy set more challenging goals and maintain stronger commitment to them than those low in exercise self-efficacy. Moreover, when faced with failure, those higher in exercise selfefficacy sustain their efforts and recover more quickly, whereas those lower in self-efficacy respond with lessoned efforts and are more likely give up (Bandura, 1994; Bauman, Sallis, Dzewaltowski, & Owen 2002).

Thus, any effective intervention strategy to encourage goal-relevant exercise behavior must aim to offset or overcome the effects of lower exercise self-efficacy, allowing those who believe they door will have difficulty meeting fitness goals to exercise more successfully.

Current Research

Given the prevalence and scope of the obesity epidemic in America, this research examined biased visual perception of egocentric distance in the context of exercise and fitness goals. It is clear that visual perception is and can be biased. What is less clear is the extent to which these perceptual biases can be manipulated and the effect these influences have on subsequent behavior and action. For example, while past research has demonstrated that the tendency to approach a goal and the efforts put forth to achieve that goal increase as actual distance from the goal decreases (Hull, 1932; Dollard & Miller, 1950; Kivetz, Urminsky, & Zheng 2006), research has yet to examine whether misperceived closeness to a goal leads to similar goal-pursuing behavioral effects. Accordingly, the current research aimed to examine whether, when a goal is falsely perceived as being more proximal, comparable rises in both approach tendencies and goal-pursuant effort would occur.

We demonstrate that functional perceptual biases can be induced. Particularly, we induced relative feelings of closeness to an object, known as perceived proximity, as a result of an attention-focus manipulation. Upon inducing perceived proximity, this research further examined the action specific influence this perceptual bias has on subsequent goal-relevant behavior. With this research we asked whether, by manipulating the scope of visual attention, we can induce a functional perceptual bias that could mimic the effects of actual proximity to a goal and similarly contribute to goalpromoting action.

If, as described earlier, people who are lower in physiological resources and/or less physically fit see distances as further, which is conjectured to be a signal to stop moving or acting in the environment, this research proposes one possible intervention by trying to get people to see distances as shorter. If such perceived proximity to a target can be induced, particularly by something as simple as the attention-focusing instructions provided in the current study and even among people in poor shape or low in exercise self-efficacy, this could be an effective strategy to lead them to move further or engage in more intense action than they otherwise would.

We hypothesized that perceptions of egocentric distance to a target would depend on attention style. Specifically, we predicted that the participants who assumed a focused attentional style to a target would perceive themselves as significantly closer to that target than those in an o-manipulation, control condition. We additionally hypothesized that a focused attentional style could induce perceived proximity even among people low in self-efficacy. That is, people low and high in self-efficacy would perceive distances as shorter when in the focused attention condition, compared to the control condition.

It was also predicted that task-specific perceived proximity to a target, as induced by increased attentional focus, would influence subsequent behavior in an exercise task requiring participants to reach that target, again regardless of exercise self-efficacy level. By this, we mean that our focused attention manipulation was expected to show significant effects for all participants in that condition, whether high or low in exercise self-efficacy. Finally, we hypothesized that perception of distance would significantly influence behavior, such that those perceiving the distance to the target object as shorter (as a function of focused attention on the target) would engage in more intense action, taking less time to complete the exercise performance task, while also, consistent with the findings of Baden et al., rating their own perceived feelings of exertion as less severe.

Method

Participants

Participants (n = 70) were recruited in conjunction with ongoing exercise classes occurring in Jerome S. Coles Sports Center. All interested participants were accepted and allowed to take part in the study. There were no ethnic, gender, or linguistic restrictions placed on recruitment. Participants were tested one at a time and compensated $10 for their participation.

Materials and Procedure

The present research utilized a 2 (Exercise Self Efficacy: High,Low)x2 (Attention Focus: Narrow Attention, Control) between-subjects design.

The experimenter greeted the participant, gave an overview of the procedure, explained the confidentiality policy, and stressed that participation was voluntary. Subjects then gave their informed consent and the study commenced.

Participants began by answering a series of questions about their physical fitness level and health goals. Perceived efficacy for meeting exercise goals was measured using the Exercise Self-EfficacyScale(SeeAppendixA) (Bandura,2006).Self-reported current potential, chronic fitness, and chronic fatigue levels were also measured using a set of 7-point Likert scales ranging from 1 (e.g., “At this moment I am not physically exhausted at all”;“In general, I feel extremely fit”;etc.) to 7 (e.g., “At this moment I am extremely physically exhausted”; “In general, I do not feel fit at all”; etc.). Objective measures of fitness, such as height, weight, and waist-to-hip ratio (WHR) were also collected.

Participants were then randomly assigned to an Attention Focus condition. Subjects in the focused, experimental condition (Narrow Attention)(n=34) were given instructions to narrow their focus on an assigned target object(adecorated24”trafficcone) prior to estimating the distance from themselves to their respective target. Participants in this condition were instructed to imagine that a spotlight was shining only on the target object, to focus their attention solely on that target object, and to avoid looking around while estimating the distance. Participants randomly assigned to the control condition (No Focus Manipulation)(n=35) were given instructions to attend to the environment in whatever way felt most natural. Participants in this condition were instructed to look around or take a few glances at the target while estimating the distance, attending to their environment in whatever manner they normally would.

All participants were then instructed to describe out loud what they saw. Experimenters recorded participants’ descriptions and coded for whether it was a target-related observation or an outside-environment observation. A target-related observation was defined as any description of the target object (the decorated orange street cone), while an outside-environment observation was defined as any reported sight other than the target object.

After describing aloud what they saw while using one of the two attentional strategies, all participants estimated distance in three ways. First, participants provided a verbal estimate of distance in either feet or meters (whichever they were more familiar with; all verbal distance estimates were later converted to inches). Next, participants reported how far away the target object felt, using a 7-

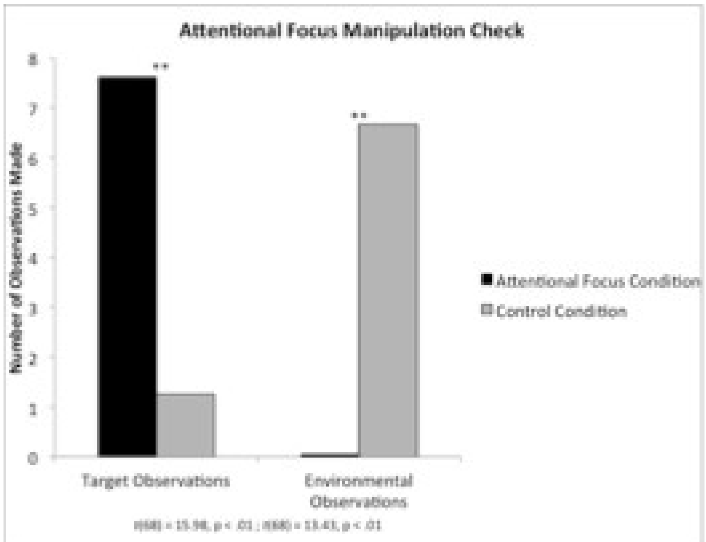
point scale (1 = feels extremelyclose;7=feels extremely far away). Third, all participants received instructions on how to provide an estimate of the distance using a visual matching measure of distance perception. For the visual matching measure of distance perception, participants were told to observe the distance to the target object. A research assistant was poised to move laterally along a plane perpendicular to the plane separating participants from the target cone. Participants then told the assistant to move closer or farther away until the assistant appeared to be equidistant to the distance they perceived. After the participant positioned the experimenter, the experimenter measured the distance on the flat ground to the participant; this distance represented the perceived distance to the cone (adapted from Stefanucci & Proffitt, 2009; Yang, Dixon, & Proffitt, 1999).

Lastly, participants completed what was described as a "physical reactiveness test." The cover story explained that the study was an investigation of a new measure of physical fitness that looks at one's wholebody response to new stressors—in this case, ankle weights. The ankle weights were weighted to 15% of the specific participant's body weight. After fitting the ankle weights to the participant, the experimenter told the participant to take a few steps in place. The experimenter then explained the manner in which participants were to complete the task. For the task, participants were instructed to walk as quickly as possible while raising each leg, one at a time, until the area from the hip to the knee was flat and horizontal. At this time, the experimenter also familiarized participants with the Borg Scale (Borg, 1992). The 15-point scale provides a rubric to report the degree to which exercise requires light, moderate, hard, or exhaustive effort. Performers' rates of perceived exertion using this scale and their heart rate, lactate levels, % VO2 max, and breathing rate have been found to be highly correlated (Chen, Fan,&Moe,2002), suggesting that reported rate of exertion is predictive of actual physiological changes in exertion. To measure goal-promoting action, participants’ speed completing the task while encumbered by the additional weights was measured. The faster participants completed the task under conditions of physical strain, the more intense the exercise and more goal-promoting their action. To measure participants’ perceived intensity of their exercise, participants provided self-reports of their Borg Rating of Perceived Exertion upon completing the task. After completing the above-described fitness task, the experimenter then debriefed the participant.

Results

Manipulation Check

Because our main interest was in examining the effects of focused attention, all participants were asked to describe aloud what they saw prior to making any estimates; this served as an attention focus check, ensuring that participants were attending to their environment according to the instructions provided by the researcher. As anticipated, participants who were provided with an attention-focus strategy (n = 35) noted significantly more target-related observations (M=7.61,SD=2.15) than participants in the control condition (n = 35) described (M = 1.25, SD = 1.02), $t(68) = 15.98$, $p < .01$. Additionally, participants in the attention-focus condition reported significantly fewer outside-environment observations (M = .06, SD = .24) than those in the control condition (M = 6.67, SD = 3.04), $t(68) = 13.43$, p < .01.

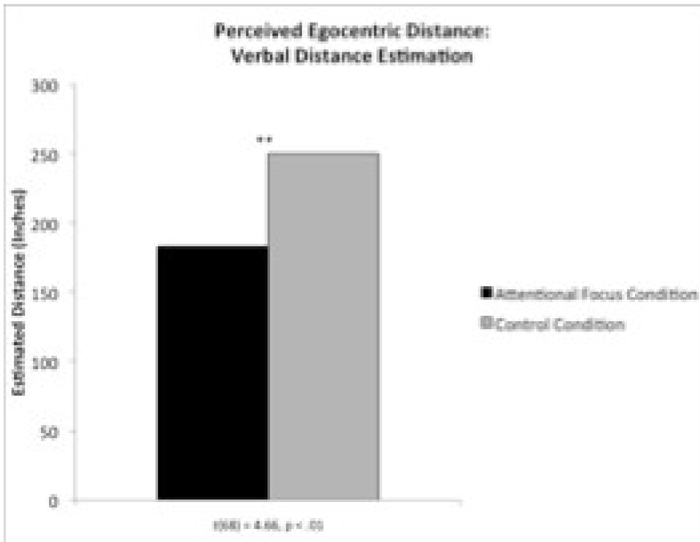


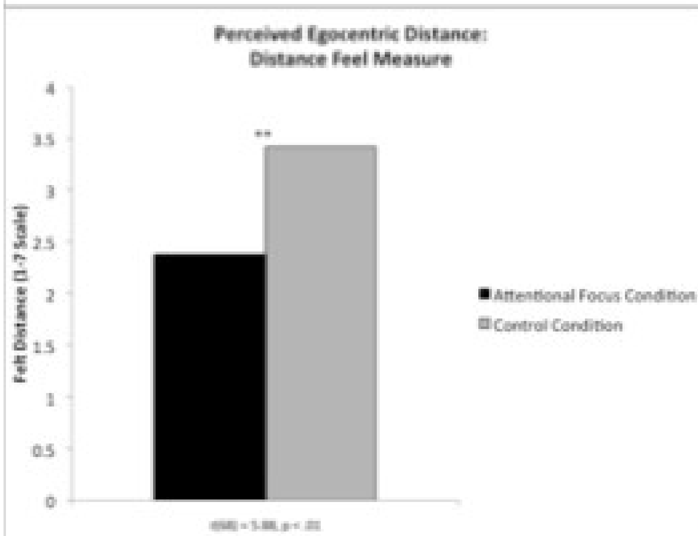
20

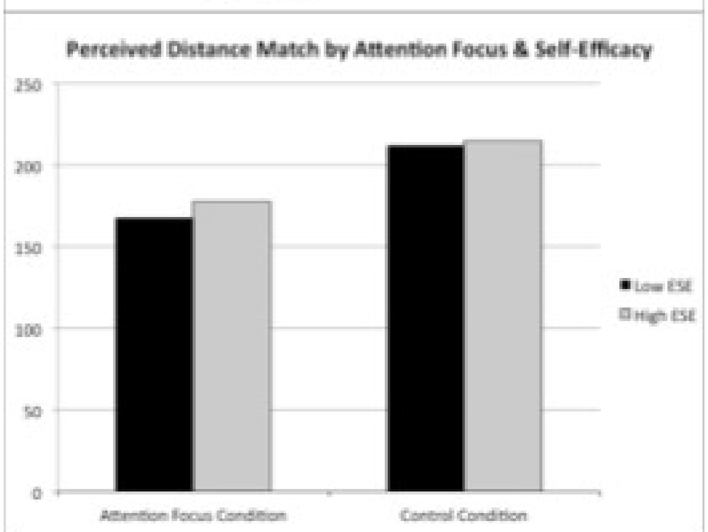
Scope of Attention & Perceived Distance

Differences in participants' perceived egocentric distance from the target object between those in the attention focus condition and those in the control condition were examined. As hypothesized, a significant main effect of attentional focus was found such that participants' perceived distance from the target object in the attention focus condition was significantly different than perceived distance from the target object in the control condition. Specifically, as we expected, those in the attention focus condition verbally estimated themselves to be closer to the target object (M = 182.83,SD=33.95) than those in the control condition (M = 249.92, SD = 78.27), $t(68) = 4.66$, $p < .01$.

Those in the focus condition also reported feeling significantly closer to the target object (M=2.38,SD = .60) than those in the control condition (M = 3.42, SD = .85), $t(68) = 5.88$, $p < .01$.

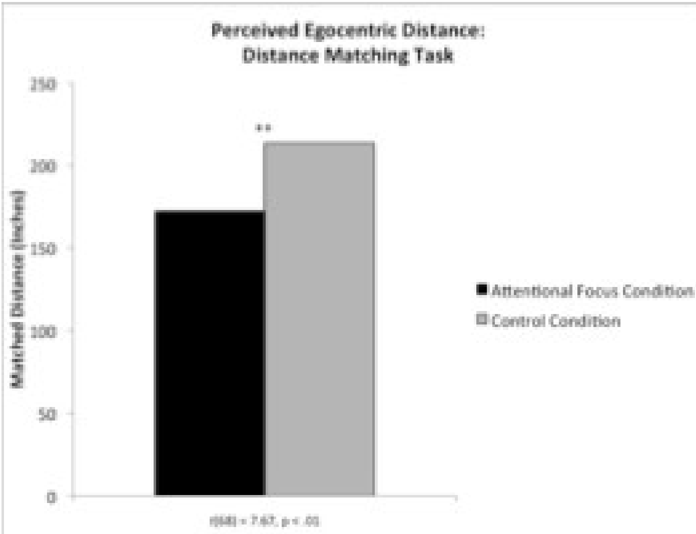






Finally, those in the focus condition positioned the experimenter significantly nearer in the distanc ematching task (*M* = 172.24, *SD*

= 21.65) than those in the control condition (*M* = 213.41, *SD* = 31.01), $t(68) = 7.67$, $p < .01$.



21

Self-Efficacy and Perceived Distance

To test whether the effects of attentional focus were moderated by participants' prior feelings of selfefficacy, we ran a regression. We included the attention condition (dummy coding focus condition as 2, control condition as 1), self-efficacy scores, and the interaction as variables predicting each distance estimate. When predicting verbal distance estimates, the overall model was significant, $R^2 = .24$, $F(3, 66) = 7.00$, $p < .001$. However, this model was driven only by the significant main effect of attentional focus condition, ? = -.49, $t(68) = -4.55$, $p < .001$. The main effect of efficacy was not significant, ? = -.04, $t(68) = -0.12$, $p = .91$, nor was the interaction, ? = .09, $t(68) = 0.27$, $p = .79$.

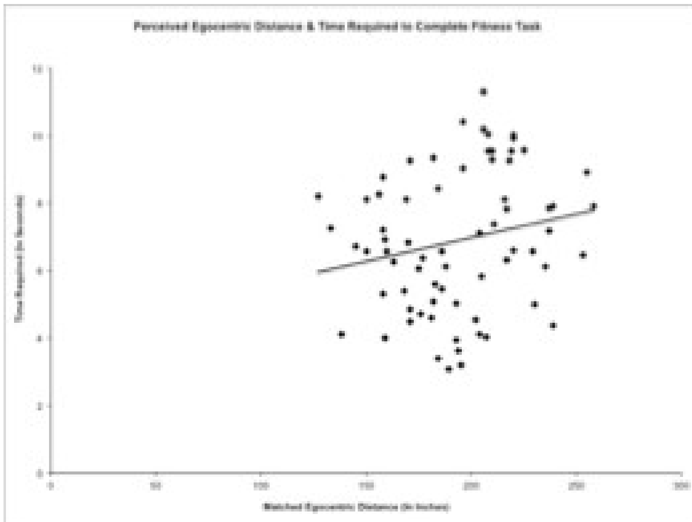
When predicting felt distance to the target, the overall model was also significant, $R^2 = .35$, $F(3, 66) = 13.03$, $p < .001$. However, this model was also driven only by the significant main effect of attentional focus condition, ? = -.58, $t(68) = -5.96$, $p < .001$. The main effect of efficacy was not significant, ? = -.39, $t(68) = -1.36$, $p = .21$, nor was the interaction, ? = .23, $t(68) = 0.73$, $p = .47$.

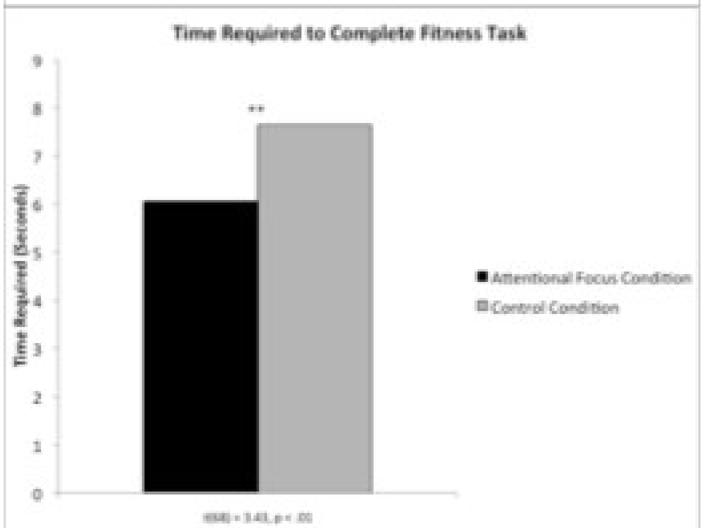
Finally, when predicting the distance matching measure, the overall model was again significant, $R^2 = .44$, $F(3, 66) = 16.82$, $p < .001$. However, this model was again driven only by the significant main effect of attentional focus condition, ? = -.65, $t(68) = -6.99$, $p < .001$. The main effect of efficacy was not significant, ? = .25, $t(68) = 0.87$, $p = .39$, nor was the interaction, ? = -.16, $t(68) = -0.56$, $p = .58$. Because exercise selfefficacy did not predict distance estimates, we did not include it in further analyses.

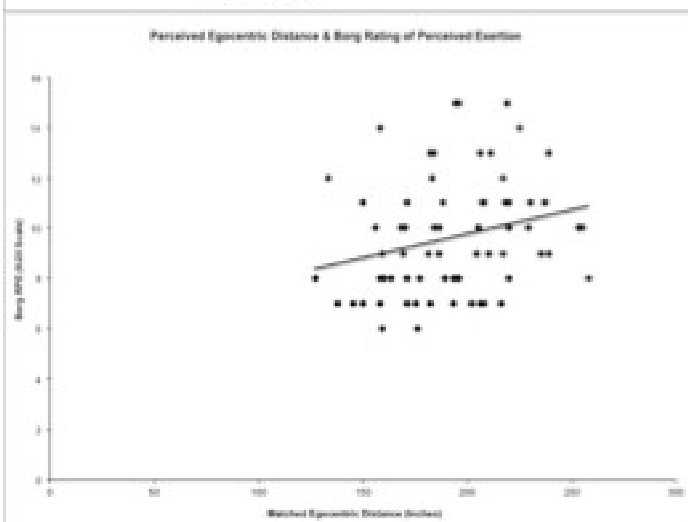
There was no significant difference between those low or high in exercise self-efficacy in either condition for the distance matching task (represented above), nor was there a significant difference between those low or high in ESE for any of our other measures. All significant models were driven only by the significant main effect of attentional focus condition.

Task Performance

Lastly, the relationship between induced perceived proximity as a result of attentional focus and subsequent goal-relevant behavior was examined. Participants in the attention-focus condition required significantly less time to complete the exercise performance task (M = 6.06, SD = 1.88) than those participants in the control condition (M = 7.73, SD = 2.06), $t(68) = 3.51$, p < .01.







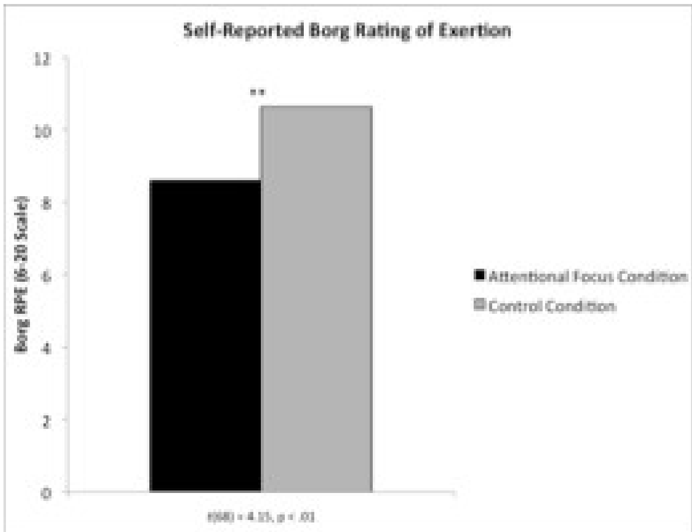
Borg Ratings of Perceived Exertion, an indicator of perceived task difficulty and effort required, also differed among these groups as hypothesized, with those in the attention-focus condition reporting significantly less perceived exertion ($M = 8.59$, $SD = 1.84$) than those participants in the control condition ($M = 10.69$, $SD = 2.30$), $t(68) = 4.17$, $p < .01$.

Ratings of perceived exertion were also significantly correlated to perceived distance from the target in the distance-matching task, $r(68) = .251$, $p < .05$.

Discussion

We tested whether attentional style biased egocentric distance perception to a goal-relevant target. As previously mentioned, people lower in physiological potential tend to see distances as further (e.g., Bhalla & Proffitt, 1999; Proffitt, Bhalla, Gossweiler, & Midgett, 1995). We suggest that this is one important reason why those who are overweight or out of shape struggle and fail to engage in enough exercise. When distances appear far, people do not act. This is particularly true, we propose, for people who do not believe that they can produce effects or successfully perform a given activity—such as those people lower in perceived self-efficacy.

Yet just as perceiving distances as farther and interpreting one's environment as more extreme discourages action, it is reciprocally true that more effort is expended as one actually approaches a goal or reward (Hull,1932).Accordingly, the present research aimed to and succeeded in identifying a visual technique that



The amount of time required to complete the exercise task was significantly correlated to perceived distance from the target in the distance matching task, $r(68) = .206$, $p < .05$. not only counteracted those biases that tend to induce more extreme negative perceptions but also mimicked and promoted the positive effects of actual proximity on goal-relevant behavior. We showed that while actual distance influences behavior, so too does perceived, or *mis*perceived, distance.

Our findings demonstrate that narrowing one's scope of attention to a target can induce perceived proximity to that target. While our manipulation check confirmed that the attention-focusing strategy provided was, in fact, leading participants in that condition to observe different elements of the environment than those in the control condition, and particularly to make more observations about the target cone and less observations about their environment, our three distance measures showed the effect this differing scope of attention had on spatial perception. Participants in the attentional focus condition not only verbally estimated themselves to be closer to the target but also reported feeling significantly closer. Furthermore, when moving a confederate researcher (meant to be positioned the same distance away from the masthecone), participants in this condition positioned that researcher nearer, again indicating feelings of proximity to the target. In all three measures, by increasing one's level of focus on a target object, egocentric perception of distance was biased such that the target object was perceived as closer.

Perhaps even more notably, these studies illustrate an important subsequent behavioral effect of biased distance perception. Our findings suggest that as perceived egocentric distance to a target is closer, goalpursuant behavior to reach that target, such as faster, more intense action, is encouraged. Participants in the attention focus condition, those who reported significantly increased feelings of perceived proximity to the target in all three go centric distance measures, tended to walk at a faster pace and reached that targets insignificantly faster than those participants in our control condition. Furthermore, despite walking at a more vigorous pace throughout the exercise task, these participants reported the task as being more manage able and as requiring significantly less physical exertion than those in the control condition. Thus, just as the idea of economy of action suggests that vision may be biased to discourage action in favor of the conservation of energy, our findings suggest that it can also be biased to assist in the expenditure of energy in order to attain goals perceived as close (and may even influence how we consequently judge that energy expenditure post-action).

Future Research and Implications for (Induced) Misperception and Action

Given the prevalence and scope of the obesity epidemic in America, perhaps the most significant contribution made by this study is in regards to research on factors related to self-regulatory success and failure within health goals related to weight loss. This research identifies a potential solution to overcoming obstacles that threaten goal-pursuit. Crucially, this intervention significantly influenced behavior for both participants high in exercise self-efficacy and the more at risk participants, low in exercise self-efficacy. Thus, this research, and the adoption of such focus when pursuing exercise and fitness goals, could help to increase the likelihood of success for this vulnerable population in the fight against obesity.

Additionally, this strategy is cheap, easy, and efficient. Increasing one's attentional focus on a target can be done independently, free of charge, and, as illustrated by our studies, quickly and with relatively little effort or training required. Such simplicity and convenience can only aid in the intervention strategy's adoption and success.

The current studies may also have implications for research examining the function and consequences of perceptual biases. It confirms past findings on the induction of visual perceptual bias and perceived proximity. Furthermore, our findings suggest that attention manipulation, specifically increased attentional focus, is one effective means through which these perceptual biases can be induced. Research on the effects of attentional focus is sparse, so the current study could provide a framework for future research.

Likewise, these studies demonstrate the potential subsequent action-specific behavioral effects of increased attentional focus. If, as we suggest, the perceived proximity induced by focusing one's attention leads to similar behavioral consequences as actual proximity to a goal (Hull, 1932), attention focus manipulation and induced perceived proximity could prove to be valuable tools in goal pursuit and goal research. Future research, for example, could examine the influence of increased attentional focus on an arrowed, more specific goal, such as losing five pounds or dropping one pant size, rather than broader, more expansive goals or levels of focus, such as the general aim to lose weight.

Moreover, though this study focuses on the domain of health and fitness, our findings are likely generalizable and relevant to many other domains of research, including areas of psychobiology, social and cognitive psychology, and vision science. For example, while we know this strategy works for people low in efficacy, it may also work for those people lower in physiological potential, current or chronic. Future research could examine whether narrowed attentional focus increases goal relevant behavior for those with higher body mass indexes (BMI) or waist-to-hip ratios (WHR)—both of which indicators of poorer health and increased risk of developing serious health conditions. Future studies could also look at whether this strategy is effective for those lower in blood glucose levels, or for those who have already physically exerted themselves, as a tool to combat fatigue.

It is also important to note limits to the generalizability of this research. Given that this study was run in collaboration with a sports complex, it is possible that this strategy may only work for people who already know that they need to exercise and are trying to take action. Despite the fact that all willing participants were accepted into the study, it is possible that our sample population, having been recruited from an exercise complex, is not completely representative of the greater U.S. population. Accordingly, future research may look to increase the generalizability of this research by recruiting participants unaware of this need or not actively pursuing exercise or fitness goals.

Finally, and potentially most important for future research, while this study aimed to and succeeded in demonstrating the effect of increased focus and attention on a target, we did not examine the mechanisms involved or look into more underlying explanations for our discovered effects. Follow-up research could more deeply explore these specifics with regards to perceived proximity and its subsequent behavioral effects, adding further to the findings of this study.

Concluding Remarks

In spite of the aforementioned limitations, the current research successfully identified a visual technique that will aid in promoting goal-relevant action, even among people low in exercise self-efficacy and who believe that they have difficulty meeting exercise goals. Results suggest that the focusing of one's attention on a target object or goal leads to that target object appearing closer. Moreover, this perceived proximity increases goal-relevant behavior, and increases self-reported ease in reaching that target. Exercise self-efficacy was measured in order to ensure that the effects of attentional focus were universal and not limited to only those high or low in exercise self-efficacy. As hypothesized, exercise self-efficacy had no significant main or interactive effect, meaning that increased attentional focus, regardless of exercise self-efficacy level, is a successful strategy for inducing perceived proximity and encouraging subsequent goal promoting behavior. Furthermore, this strategy appears to be successful both in terms of improving performance (e.g.,faster walking) and with respect to perceived difficulty in successfully engaging in the task (e.g., lower ratings of perceived exertion), irrespective of exercise self-efficacy level. Given that action and exercise are necessary components in the fight against obesity, this research offers a promising potential intervention strategy in the form of a perceptual bias that can aid against the effects of lower exercise self-efficacy and discouraging perceptions of the environment.

Acknowledgements

I would like to thank Professor Emily Balcetis, Shana Cole, and the members of the Social Perception Action and Motivation (SPAM) Laboratory. Without their guidance and aid, this research would not have been possible. I would also like to thank the College of Arts and Science's Dean's Undergraduate Research Fund for its financial assistance with this project. Finally, I would like to acknowledge the Jerome S. Coles Sports Center for allowing this study to be conducted within the facility's gymnasium.