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ORIGINAL RESEARCH

Regulatory Fit Improves Fitness for People With Low Exercise Experience

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Considering only 20.8% of American adults meet current physical activity recommendations, it is important to examine the psychological processes that affect exercise motivation and behavior. Drawing from regulatory fit theory, this study examined how manipulating regulatory focus and reward structures would affect exercise performance, with a specific interest in investigating whether exercise experience would moderate regulatory fit effects. We predicted that regulatory fit effects would appear only for participants with low exercise experience. One hundred and sixty-five young adults completed strength training exercise tasks (i.e., sit-ups, squats, plank, and wall-sit) in regulatory match or mismatch conditions. Consistent with predictions, only participants low in experience in regulatory match conditions exercised more compared with those in regulatory mismatch conditions. Although this is the first study manipulating regulatory fit in a controlled setting to examine exercise behavior, findings suggest that generating regulatory fit could positively influence those low in exercise experience.

Keywords: exercise, experience, regulatory fit, regulatory focus

In the United States, the current physical activity guidelines for Americans suggests 2 hr 30 min of moderate aerobic activity combined with 2 days of strength training per week to improve health (U.S. Department of Health and Human Services, 2008). However, only 20.8% of American adults meet this recommendation (Ward, Schiller, Freeman, & Peregoy, 2013). Considering the population's lack of aerobic activity and strength training, it is important to examine the psychological processes that affect physical activity motivation and exercise performance. The solution we propose is tailoring exercise environments (i.e., reward structure) to match motivational orientations. We examine this idea using strength training exercise tasks.

Regulatory Focus Theory

Regulatory focus theory suggests that there are two different goal-seeking orientations with different motivational consequences (Higgins, 1997). On one hand, a desired end-state may be represented as an *ideal*, such as a hope, wish, or aspiration. Conversely, it may be represented as an *ought*, such as a duty, obligation, or responsibility. Regulatory focus theory proposes that ideal self-regulation is characterized by a *promotion focus*, while ought self-regulation is characterized by a *prevention focus* (Higgins, 1997). For example, an individual with a *promotion orientation* would eagerly approach exercise sessions and focus on the benefits of exercise (e.g., optimized heart and lung function). Meanwhile, an individual with a *prevention orientation* would be vigilant not to miss exercise sessions due to fear of the risks associated with a lack of exercise (e.g., protecting against heart and lung disease). People tend to experience one regulatory focus, known as *chronic focus*, but a particular focus can be temporarily induced based on situational cues or experimental manipulations (Shah, Higgins, & Friedman, 1998).

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Regulatory Fit Theory

Regulatory focus attunes one to gains or losses in their environment (Higgins, 1997). Regulatory fit theory proposes that when an individual's regulatory focus (i.e., promotion or prevention) matches a task's reward structure (i.e., maximizing gains or minimizing losses), an advantageous state called *regulatory fit* is created (Higgins, 2000). This regulatory *fit* state, also known as a regulatory *match*, occurs when promotion is paired with gain-framed tasks or when prevention is paired with loss-framed tasks; opposing pairing are known as a *misfit* or *mismatch*. By simply manipulating the reward structure of a task (e.g., framing tasks as gaining points or avoiding the loss of points) to match one's chronic or momentarily induced regulatory focus, regulatory fit states can be created. When people experience fit, tasks seem to "feel right," which leads to stronger task engagement and motivation (Higgins, 2000, 2005), which has effects on subsequent behavior and performance (Spiegel, Grant-Pillow, & Higgins, 2004). There is also evidence that regulatory fit states affect information processing by improving cognitive flexibility, which refers to one's ability or willingness to try different strategies to attain a goal (Grimm, Markman, Maddox, & Baldwin, 2008; Maddox, Baldwin, & Markman, 2006). The benefit of fit has been demonstrated in a wide variety of areas, such as standardized testing (Grimm, Markman, Maddox, & Baldwin, 2009), leadership styles of supervisors (Kruglanski, Pierro, & Higgins, 2007), and persuasion using nonverbal cues (Cesario & Higgins, 2008).

Despite this evidence, there has been considerably little research examining fit effects on health and exercise behaviors. Some existing work has found fit effects for improving physical endurance using a handgrip test, choosing a healthy snack over an indulgent snack, and reporting higher intention to get tested for hepatitis (Hong & Lee, 2008). Similarly, health messages congruent to one's chronic regulatory focus led to more fruit and vegetable intake (Latimer, Williams-Piehota, et al., 2008; Spiegel et al., 2004). Fit effects also result in better performance in soccer penalty shooting (Plessner, Unkelbach, Memmert, Baltes, & Kolb, 2009; Vogel & Genschow, 2013) and 3-point basketball shots (Unkelbach, Plessner, & Memmert, 2009).

Regarding regulatory fit and exercise, most existing research has focused on effects of fit on behavioral intention (e.g., Kees, Burton, & Tangari, 2010; Pfeffer, 2013). While intentions are absolutely important to success, intentions do not always translate to behavioral outcomes (Ajzen, 1991), especially when it comes to exercise (Marlatt & Kaplan, 1972). Only four published studies have examined outcomes of fit on real-life frequency of exercise participation, and results are mixed (for a full review of regulatory fit effects on health communication, see Ludolph & Schulz, 2015). One study found that promotion messages, compared with prevention messages, led to greater exercise intentions but not higher exercise behavior (Martinez, Duncan, Rivers, Latimer, & Salovey, 2013). Similarly, emphasizing benefits of physical activity compared with emphasizing the costs of inactivity was found to be more effective in physical activity participation over a 9-week period of time (Latimer, Rivers, et al., 2008). Meanwhile, participants in regulatory match conditions in a gym loyalty rewards program reported greater exercise in number of minutes exercising, but not frequency of gym visits, over a 4-week period (Daryanto, de Ruyter, Wetzels, & Patterson, 2010). Lastly, one study found that gains-framed messages paired with intrinsic exercise outcomes and losses-framed messages paired with extrinsic exercise outcomes led to marginally greater exercise behavior, but only for those with high need for cognition (Gallagher & Updegraff, 2011). However, all of these studies relied on self-reported data, which introduce potential for problems of accuracy, such as memory error, bias, and exaggeration. To date, no studies have investigated fit outcomes on objective performance using specific exercise tasks in a controlled setting.

The limited amount of research on regulatory fit in regard to exercise behavior is an important oversight, as regulatory fit could be an actionable tool for people to apply in order to improve their health outcomes. The present study has the potential to advance understanding of the effect of regulatory fit on exercise behavior by determining ways to improve exercise performance. Moreover, because fit states are relatively easy to create (e.g., Plessner et al., 2009; Shah et al., 1998), the present research demonstrates a simple solution to a serious real-world problem.

The Present Study

The current study aims to extend prior research to determine whether regulatory fit can improve exercise performance, specifically in regard to the strength training exercises of sit-ups, squats, plank, and wall-sit. We examine the effects of inducing a promotion focus (e.g., exercising to be healthy) or a prevention focus (e.g., exercising to avoid being unhealthy) and creating an environment that emphasizes gains (i.e., counting up completed repetitions/time) or losses (i.e., counting down remaining repetitions/time). We suggest that counting down represents a loss emphasis in that a goal is given with a continual focus on how much exercise is remaining. In this situation, decreases cannot be stopped unless the objective is reached, and quitting early reminds participants that they did not reach their goal. Prior research suggests that participants should perform better in a matching compared with a mismatching environment.

Beyond examining the basic fit effect, we are interested in whether amount of experience would moderate one's susceptibility to fit effects. Domain experts have a high amount of domain-specific and procedural knowledge that they access outside of conscious awareness (Ericsson & Charness, 1994). Research suggests that when individuals are well practiced in a task, they do not need to consciously guide their actions (Wood, Quinn, & Kashy, 2002) and use few attentional resources (Kanfer & Ackerman, 1989). Instead, only minimal, sporadic thought is necessary for actions that have been repeated previously in stable contexts (Wood et al., 2002). For people who are well practiced in particular exercises, it should be difficult to influence the associated physical behavior due to habit. This should reduce susceptibility to situational manipulations of performance. Conversely, people with less exercise experience should be more likely to benefit from regulatory fit.

One existing study found that lower-league basketball players, but not professionals, benefited from regulatory fit in taking 3-point basketball shots (Memmert, Plessner, & Maaßmann, 2009). Conversely, one recent study found that regulatory fit improved putting performance among top German golfers (Kutzner, Förderer, & Plessner, 2013), while another study found regulatory fit improvements for novice golfers (Grimm, Lewis, Maddox, & Markman, 2016). Given this discrepancy, the current study examines the influence of experience on regulatory fit effects in a controlled setting.

Relying on the cognitive differences in experience, we hypothesized that experience will moderate the effect of regulatory fit. We predicted people with high amounts of exercise experience are unlikely to show regulatory fit effects, while participants with low exercise experience will benefit from fit. More specifically, individuals focused on exercising to be healthy (i.e., a promotion focus) should exercise more/longer when counting up (i.e., gains environment), while individuals focused on exercising not to be unhealthy (i.e., a prevention focus) should exercise more/longer when counting down (i.e., losses environment).

Method

Participants

One hundred and sixty-five undergraduates (51.5% female, 71.5% White, median age = 19 years) from a midsized eastern U.S. academic institution were recruited for partial course credit or extra credit, or received $8 for 1 hr of participation. Participants were randomly assigned to conditions for two independent variables, each with two levels (induced focus: promotion or prevention; reward structure: gains or losses); promotion focus with gains reward ($N = 44$), promotion focus with losses reward ($N = 41$), prevention focus with gains reward ($N = 40$), or prevention focus with losses reward ($N = 40$). In addition to these two predictors, level of experience was used as a third predictor. A priori power was calculated using $G \times$ Power (Faul, Erdfelder, Buchner, & Lang, 2009) with the following specified parameters: $\alpha = .05$, power = .95, number of predictors = 3, and effect size $f^2 = .15$ (a moderate effect size). For these parameters, a total sample size of 119 was found to be required, and so we had enough participants to find our effect of interest. Moreover, if we calculate power using seven predictors (to account for our more complicated analyses), a total sample size of 153 was found to be required, which is still less than the number of participants in our sample.

Because of the institutional review board's concerns for physical strain and possible injury, participation was restricted to individuals between the ages of 18 and 25 who were in good physical health (e.g., comfortable with exercising with all parts of body, no chronic or temporary health conditions [cardiovascular, respiratory, or muscular–skeletal] and typically engaged in at least 2 hr 30 min per week of moderate-intensity physical activity or 1 hr 15 min per week of vigorous-intensity aerobic physical activity); all other participants were excluded.

Materials

Regulatory focus. Students responded to standard regulatory chronic focus questionnaires to verify that chronic focus did not influence effects, using the 11-item regulatory focus questionnaire (RFQ; Higgins et al., 2001), the 18-item Lockwood scale (Lockwood, Jordan, & Kunda, 2002), and the 14-item Roese scale (Roese, Hur, & Pennington, 1999). These three self-report scales assess individuals' orientations to their goals, such as hope and accomplishments (promotion) versus safety and responsibility (prevention). The RFQ asks questions such as "Do you often do well at different things that you try?" (promotion) as well as several questions regarding one's childhood such as "How often did you obey rules and regulations that were established by your parents?" (prevention). The Lockwood scale is more focused on one's personal outlook, such as "I frequently imagine how I will achieve my hopes and aspirations" (promotion) compared with "I often think about the person I am afraid I might become in the future" (prevention). The Roese scale asks participants to respond on how important various outcomes are, such as "Making new friends" (promotion) and "Not making enemies" (prevention). These three scales have been used in existing regulatory fit research, but may load differently to motivational or affective components (Summerville & Roese, 2008). Therefore, we included all three. However, there was a range of reliabilities for these scales. Cronbach's α for the RFQ was .63 for promotion and .82 for prevention. For the Lockwood scale, α was .80 for promotion and .78 for prevention. The Roese scale showed the lowest reliabilities, with α of .55 for promotion and .52 for prevention. To induce focus, participants were randomly assigned to either the promotion focus condition (i.e., aspiring to promote their healthiness) or the prevention focus condition (i.e., obligated to prevent their unhealthiness). In each condition, participants were read an exercise message about how regularly exercising can improve their health (i.e., promotion) or avoid health deterioration (i.e., prevention; see online Supplement for messages modeled after Latimer, Rivers, et al., 2008).

Before starting each exercise task, participants were asked to repeat a mantra of "I aspire to promote my healthiness" (promotion condition) or "I am obligated to prevent my unhealthiness" (prevention condition). They also listened to a recording of this mantra on repeat (average rate of 7.5 repetitions per minute) while exercising during the experiment; the recorded voice's gender matched the participant's gender. Consistent with the induced focus condition, participants were told they were able to earn (promotion condition) or avoid losing (prevention condition) a pedometer (monetary value of approximately $1) if they succeeded in a randomly selected exercise task, to be chosen at the end of the study. This was done as an incentive to motivate the participants throughout the experiment.

Gains and losses reward structure. As noted previously, participants were assigned to a gains condition or a losses condition, which was related to tracking exercise progress. Both conditions had the same exercise objective. In the gains condition, researchers counted up the number of repetitions completed by ones (1, 2, 3, etc.) and time completed in seconds by twos (2, 4, 6 s, etc.) out loud. In the losses condition, researchers counted down the number of repetitions remaining by ones (80, 79, 78, etc.) and time remaining in seconds by twos (2:00, 1:58, 1:56, etc.) out loud.

Exercise questionnaires. Participants completed the Global Physical Activity Questionnaire (GPAQ; Armstrong & Bull, 2006) to determine weekly exercise patterns. This measure has been shown to have good test–retest reliability (85.6–92.1% for leisure time physical activity) and fair criterion validity ($r = .31$ with pedometer data) among nine countries (Bull, Maslin, & Armstrong, 2009). Participants reported on 6-point scales whether they considered themselves to be an exercise expert and how experienced they were using proper form for each exercise (1 = *not at all* and 6 = *definitely*).

Message and goal assessment. To ensure that participants found the regulatory focus–inducing statements believable, participants were asked to rate how believable, informative, and interesting they found the exercise message (1 = *not at all* and 5 = *extremely*). These items have been used widely in message framing research (Latimer, Rench, et al., 2008). Additionally, participants rated how helpful and annoying they found the exercise mantra (1 = *not at all* and 5 = *extremely*). To ensure that the exercise goals were reasonable, participants reported their expectations of succeeding in the specific exercise task (1 = *not at all* and 5 = *definitely*) and rated commitment to the exercise objective using the 5-item goal commitment scale (1 = *strongly disagree* and 5 = *strongly agree*; Hollenbeck, Williams, & Klein, 1989; Klein, Wesson, Hollenbeck, Wright, & DeShon, 2001) before each exercise task. Reliabilities for goal commitment, broken down by exercise type, showed α ranging from .77 to .84.

Procedure

First, participants were screened for eligibility and asked whether they met the criteria to participate described previously. After providing informed consent, participants filled out the RFQ, Lockwood scale, Roese scale, GPAQ, and exercise questions. After completing these surveys, participants were read a promotion focus or a prevention focus exercise message based on their assigned condition and signed their initials to indicate understanding of the message.

Next, participants were asked to complete four exercise tasks in either a gains or a losses framing. Exercise tasks of sit-ups, squats, plank, and wall-sit were completed in a random order, counterbalanced across participants. Based on pilot data, the objectives determined were 80 sit-ups, 80 squats, 2-min plank, and 2-min wall-sit for both male and female participants. Before each exercise, participants reported their expectations of succeeding in the specific exercise task and commitment to the exercise objective.

Next, the researcher demonstrated the exercise, asked the participant to repeat the exercise mantra, played the sound clip when the participant began exercising, and counted repetitions or time completed/remaining aloud. Participants were told that if they heard a beep, it meant the researcher had noticed they were not using proper form and the need to fix it. Although there were three auditory cues that could be present, each cue was distinct and not often overlapping. Participants were told they could stop exercising when they felt too tired to continue and were offered brief water breaks in between exercise sets. The experimenter recorded total time exercising for all exercises and number of repetitions if applicable. This same procedure was repeated for subsequent exercises.

After all exercises were completed, participants responded to a final questionnaire including message assessments and demographics. Finally, an exercise was picked at random to determine whether the participant would take home a pedometer and participants were debriefed.

Analytic Strategy

Regulatory fit theory posits an interaction between regulatory focus and reward. The current study hypothesized that experience would moderate the interaction between focus and reward on exercise performance, such that there would be regulatory fit effects for those low in experience but not for those high in experience. Thus, a three-way interaction was predicted between focus, reward, and experience. Hayes' PROCESS (Hayes, 2013) was used to analyze the data using moderated multiple regression (Aiken & West, 1991). In line with Aiken and West's (1991) specifications for moderated regression, variables of interest were standardized and coded as focus (prevention = −1 and promotion = 1) and reward (losses = −1 and gains = 1). These were input as independent variables, while experience score was input as a moderator. As appropriate, we used the overall error term and degrees of freedom in post hoc analyses.

Results

Prior to any analyses, a standardized experience variable was created by running an exploratory factor analysis with varimax rotation using responses regarding experience and the GPAQ. This was done because the GPAQ was created by the World Health Organization to assess physical activity at a population level and therefore simply created a single overall score to assess physical activity among people in various countries. We were more interested in the finer distinctions of each individuals' amount of exercise. Based on the exploratory factor analysis, two factors were created: the first relating to self-reported experience and the second relating to exercise frequency. Factor loadings of rotated solutions, eigenvalues, proportion of variance accounted for, and descriptive statistics are reported in Table 1. Considering

Table 1 Summary of Exploratory Factor Analysis Results for Expertise Measure Using Principal Axis Factoring With Varimax Rotation ($N = 165$)

Item	Factor Loadings: Self-Reported Expertise	Factor Loadings: Exercise Frequency	Descriptive Statistics: *M*	Descriptive Statistics: *SD*
I am well experienced in performing sit-ups with proper form	**.50**	−.02	4.79	1.35
I am well experienced in performing squats with proper form	**.62**	.11	5.10	1.13
I am well experienced in performing the plank with proper form	**.76**	.08	5.08	1.08
I am well experienced in performing the wall-sit with proper form	**.61**	.08	4.80	1.31
GPAQ total amount of moderate exercise completed during the week (minutes)	.01	**.79**	259.09	574.75
GPAQ total amount of vigorous exercise completed during the week (minutes)	.23	**.96**	406.27	629.34
Do you consider yourself to be an exercise expert?	**.50**	.14	3.52	1.37
Eigenvalues	2.70	1.57		
% of variance	38.53	22.39		

Note. Factor loadings over .45 appear in bold. GPAQ = Global Physical Activity Questionnaire.

that the first factor accounted for the majority of the variance, this factor was used in the analyses (Byrne, 2006; DiStefano, Zhu, & Mîndrilă, 2009).

Because there were multiple dependent variables (four exercises of amount of time exercising, two of which also had number of repetitions), standardized scores were created for each dependent variable. These Z-scores were averaged (e.g., sit-up repetitions score and sit-up time score averaged together) to appropriately create performance scores for each exercise.

Preliminary Analyses

The impact of researcher gender was tested by considering whether it interacted with participant gender in the model. It was nonsignificant, $F(1,\ 159) = 1.64$, $MSE =$ .31, $p = .202$. The effect of order was tested by inputting the order of each exercise to predict exercise performance, resulting in one test per exercise. There were no order effects for sit-ups, $F(1, 161) = .22$, $MSE = .89$, $p = .885$, or squats, $F(1,\ 161) = .64$, $MSE = .75$, $p = .591$. However, there were significant order effects for the plank, $F(1,\ 160) = .22$, $MSE = 8.65$, $p < .001$, and the wall-sit, $F(1,\ 159) = 4.52$, $MSE = .94$, $p = .005$, with participants performing worse if these exercises were in the second half of the experiment. Order effects were considered, but they did not impact results.

Participants expected to be able to meet the exercise objectives ($M = 3.55$, $SE = .06$) and were committed to them ($M = 3.93$, $SE = .04$). The only significant difference between groups in these measures was a main effect of experience for expectations, $\beta = .36$, $p < .001$, and commitment, $\beta = .21$, $p < .001$. There was a positive linear relationship between experience and overall goal commitment, as well as overall expectations, such that those high in experience gave higher expectations and commitment ratings.

Hypothesized Interaction of Focus, Reward, and Experience

Using the aggregate performance score as the dependent variable of interest, the overall model was significant, $R^2 = .15$, $F(7,\ 154) = 3.84$, $MSE = .28$, $p < .001$. Unsurprisingly, there was a main effect of experience ($\beta = .20$, $p < .001$), with performance linearly increasing with experience. There were no other significant main effects or two-way interactions. As expected, there was a significant three-way interaction, $\Delta R^2 = .05$, $F(1,\ 154) = 8.18$, $\beta = -.14$, $SE = .05$, $p = .005$.[1] There was an interaction of focus and reward for low-experience participants ($\beta = .16$, $p = .010$), but not for mean ($\beta = .04$, $p = .414$) or high-experience ($\beta = -.09$, $p = .145$; also see Figure 1); only low-experience participants exhibited the regulatory fit interaction: participants in regulatory match conditions performed better than those in mismatched conditions in losses ($\beta = -.17$, $p = .043$) and in gains ($\beta = .15$, $p = .097$). Additional analyses were run to examine the role of the components of the experience factor: experience for specific exercises and global experience exercise measures. The results were not significant, showing that neither specific nor global measures of experience were driving the overall effect.

Possible Covariates

Additionally, we verified that chronic regulatory focus could not account for the effects of interest by adding chronic focus measures as covariates in our three-way interaction. Because previous research has shown that induced focus often overrides chronic focus (Grimm et al., 2008), effects of chronic focus were not anticipated. The only significant correlates with the dependent variable were the Roese Prevention scale ($r = .20$, $p = .010$) and the RFQ Promotion scale ($r = .17$,

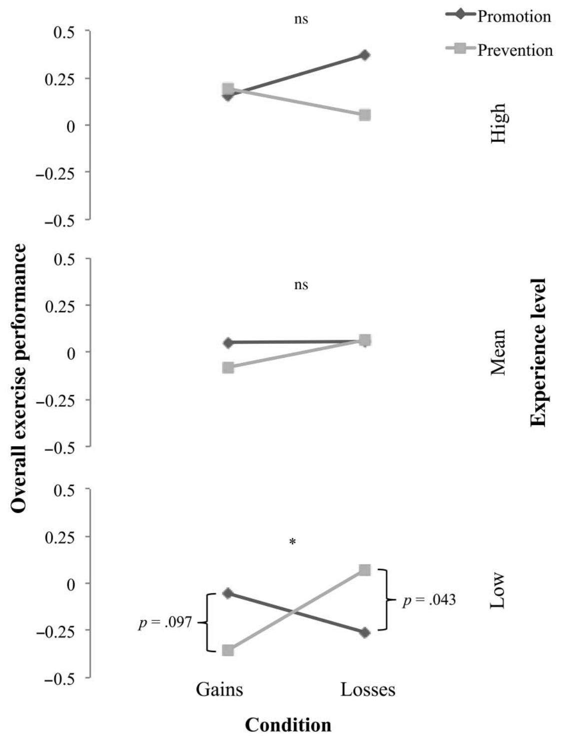

Figure 1 — Three-way interaction of experience, focus, and reward predicting overall exercise performance. 100 × 133 mm (600 × 600 DPI).

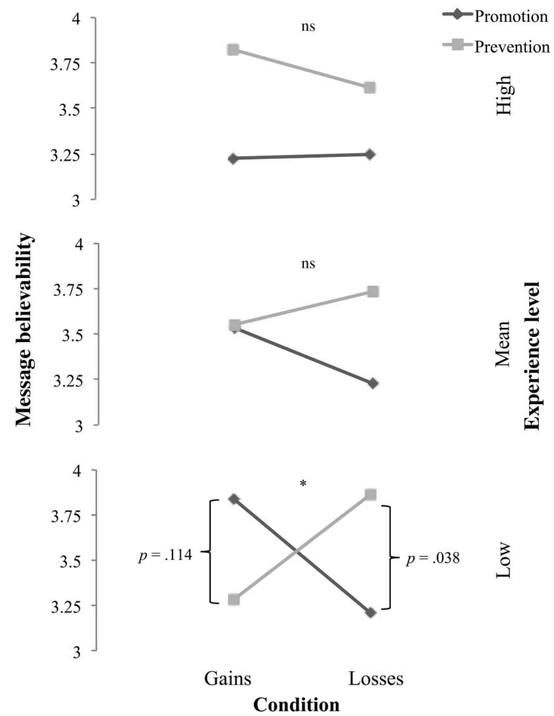

Figure 2 — Three-way interaction of experience, focus, and reward predicting message believability. 97 × 124 mm (600 × 600 DPI).

$p = .026$). When including all regulatory focus measures as covariates, there was still a significant Focus × Reward × Experience interaction, $\Delta R^2 = .05$, $F(1, 148) = 8.84$, $\beta = -.15$, $SE = .05$, $p = .003$. Further, only the promotion subscale of the RFQ correlated with experience ($r = .34$, $p < .001$). When considering a Focus × Reward × RFQ promotion interaction, there was not a significant three-way interaction, $\Delta R^2 = .01$, $F(1, 155) = .86$, $\beta = -.01$, $SE = .02$, $p = .354$.

Descriptive statistics of the message assessments showed participants found the exercise messages were reasonably believable ($M = 3.49$, $SE = .08$), informative ($M = 3.26$, $SE = .08$), and interesting ($M = 3.25$, $SE = .09$). The mantra was rated as slightly distracting ($M = 2.15$, $SE = .10$) and somewhat helpful ($M = 2.84$, $SE = .09$). When testing the interaction of focus, reward, and expertise on these outcomes, we found the hypothesized three-way interaction on believability, $\Delta R^2 = .03$, $F(1, 156) = 4.66$, $\beta = -.20$, $SE = .09$, $p = .033$. Figure 2 displays the pattern of results, which indicates a regulatory fit effect only for those with low experience level ($\beta = .30$, $p = .011$), but not for mean- ($\beta = .12$, $p = .136$) or high-experience participants ($\beta = -.06$, $p = .627$). In the losses condition, low-experience participants in prevention performed better than those in promotion ($\beta = -.32$, $p = .038$). The effect in gains was in the correct direction but not significant ($\beta = .28$, $p = .114$). We also found an interaction between focus and reward predicting interest, $\beta = .19$, $SE = .09$, $p = .032$, with those in promotion, gains ($M = 3.48$, $SE = .15$) showing higher interest than those in promotion, losses ($M = 2.88$, $SE = .17$), $t(161) = 6.73$, $SE = .089$, $p < .001$. However, those in prevention, losses ($M = 3.33$, $SE = .18$) showed about the same interest than those in prevention, gains ($M = 3.30$, $SE = .19$), $t(161) = .34$, $SE = .089$, $p = .736$. Lastly, for mantra distraction, there was a main effect of experience, $\beta = -.25$, $p = .037$, and a reward by experience interaction, $\beta = -.28$, $SE = .12$, $p = .018$. The means show that in the gains condition, experience is negatively related to distraction; those with low experience are most distracted by the mantra ($M = 2.73$, $SE = .22$), followed by those with mean experience ($M = 2.26$, $SE = .14$) and high experience ($M = 1.80$, $SE = .19$). Meanwhile, distraction is about equal in the losses condition (low: $M = 2.04$, $SE = .19$, mean: $M = 2.07$, $SE = .15$, and high: $M = 2.10$, $SE = .22$). However, it is important to note that there was only one significant correlation between these measures and our aggregate performance score, which was for mantra distraction ($r = -.18$, $p = .023$).

Further Analyses

The data were then separated based on the four exercises and explored for a similar three-way hypothesized interaction.

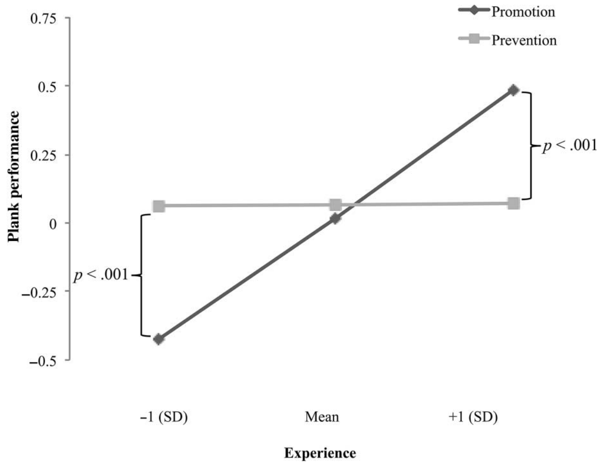

Figure 3 — Interaction of experience and focus predicting plank performance. 72 × 59 mm (600 × 600 DPI).

Sit-ups. The overall model was significant for sit-up performance, $R^2 = .10$, $F(7, 156) = 2.47$, $MSE = .83$, $p = .020$, and there was a significant three-way interaction between focus, reward, and experience, $\Delta R^2 = .03$, $F(1, 156) = 5.61$, $\beta = -.20$, $SE = .09$, $p = .019$. Means were in the hypothesized direction, with regulatory fit effects for participants only in low experience ($\beta = .25$, $p = .019$). Other than a main effect of experience ($\beta = .24$, $p = .006$), there were no other significant main effects or two-way interactions.

Squats. The overall model was not significant for squat performance, $R^2 = .06$, $F(7, 156) = 1.33$, $MSE = .74$, $p = .239$. However, there was a significant three-way interaction between focus, reward, and experience as expected, $\Delta R^2 = .03$, $F(1, 156) = 4.61$, $\beta = -.17$, $SE = .08$, $p = .033$. Similar to sit-ups, means were in the hypothesized direction, with regulatory fit effects for participants only in low experience ($\beta = .24$, $p = .017$).

Plank. The overall model was significant, $R^2 = .13$, $F(7, 155) = 3.25$, $MSE = .91$, $p = .003$. Similar to the overall analyses, there was a main effect of experience ($\beta = .26$, $p = .004$) with performance increasing with amount of experience. There was an unexpected interaction between focus and experience ($\beta = .26$, $p = .004$), displayed in Figure 3. Those low in experience performed better in prevention ($M = .06$) than promotion ($M = -.42$), $t(161) = 5.40$, $SE = .089$, $p < .001$, but there was a reverse effect for those high in experience, performing better in promotion ($M = .49$) than prevention ($M = .07$), $t(161) = 4.72$, $SE = .089$, $p < .001$. There was no difference in performance based on focus for those at mean experience.

Wall-sit. Analyses for the wall-sit showed a nonsignificant overall model, $R^2 = .05$, $F(7, 154) = 1.23$, $MSE = .99$, $p = .292$. The only significant finding was a main effect of experience ($\beta = .23$, $p = .016$), with means in the same direction as other tests.

Discussion

The present study examined how inducing regulatory focus (promotion vs. prevention) and direction of counting repetition (up vs. down) affects sit-up, squat, plank, and wall-sit performance in a laboratory setting. Further, we investigated how experience may moderate the effects of regulatory fit, suggesting that participants with low exercise experience in regulatory fit states would exercise more than those in regulatory mismatch states. Results show an interaction of focus and reward for participants with low, but not average or high, experience. Those with low exercise experience in regulatory match conditions (promotion/gains and prevention/losses) endured longer, exercising for a longer period of time, than participants in mismatch conditions (promotion/losses and prevention/gains). These findings are in line with existing research that lower-league basketball players, but not professionals, benefited from regulatory fit in taking 3-point basketball shots (Memmert et al., 2009) and that novice golfers benefited from regulatory fit (Grimm et al., 2016), but contradictory to a study finding that regulatory fit improved putting performance among top German golfers (Kutzner et al., 2013). However, the present study does not suggest that highly experienced people are not influenced by regulatory fit at all—it may just be more difficult to impact them. Further, Kutzner and colleagues (2013) generated fit between task frame and chronic focus, rather than induced focus. This said, it might be easier to influence those with high experience when regulatory fit includes their chronic focus. Future research should investigate this further, but would likely need to experimentally match the chronic and situational focus to get the largest interactive effects with reward.

While our hypothesis was fully supported for overall performance, the regulatory fit effect may have been driven by the exercises of sit-ups and squats, which had the same pattern as overall performance. The pattern of performance for the plank and wall-sit exercises was nonsignificant; this can be explained in two different ways. First, there were significant order effects for the plank and wall-sit exercises. When these exercises were in the later part of the experiment, participants may have been too tired or depleted (Baumeister, Bratslavsky, Muraven, & Tice, 1998) to give their full effort. This would explain the nonsignificant three-way interaction for these two exercise types. Second, the plank and wall-sit require people to avoid breaking form and therefore may not be neutral in regulatory focus (instead possibly having a prevention focus). Studies by Neumann and Strack (2000) and Cacioppo, Priester, and Berntson (1993) demonstrate how muscle flexion and extension consistent with approach or avoidance can influence processing. Comparatively, sit-ups and squats could be considered more neutral movements. We think the first explanation is more probable because one existing study by Raab and Green (2005) suggests that it may the goal of the movement, rather than muscle flexion and extension, which affects cognitive processes. Because goals for movement were manipulated in the present study, flexion and extension may not have had major effects.

Further, we found an unexpected interaction between focus and experience for the plank. Figure 3 demonstrates that this interaction was due to those high in experience performing better in the promotion condition compared with the prevention condition. Although further investigation is necessary to fully understand this relationship, those high in experience may perceive this exercise differently and find a promotion focus more motivating. Existing work shows that athletes (who arguably possess a good deal of experience) are often more promotion oriented in sports (Unkelbach et al., 2009). It may be that for a challenging exercise such as the plank, experienced participants were more influenced by an induced promotion focus.

With the message assessments, the most interesting finding was a three-way interaction predicting believability. As shown in Figure 2, participants with low and mean experience showed regulatory fit effects. However, there was not a significant relationship between believability and performance. Given the lack of an overall relationship and the fact that believability was measured after task performance, our study does not provide evidence that believability drove our effects. We also found that across all experience levels, interestingness was rated higher in prevention losses than prevention gains. Because this direction is consistent with the regulatory fit effect, we suggest that interestingness ratings were higher in prevention and losses because they "seemed right" due to regulatory fit. Lastly, we found that experience level had a negative relationship with how distracting the mantra was found to be, but only in the gains condition. It is unclear why the same relationship did not occur in the losses condition. Although these measures were aimed to ensure that our exercise messages were credible, the findings are interesting and should be explored further in future research.

The current study extends previous work on regulatory fit theory to behavioral exercise performance in a laboratory setting. As mentioned previously, only four published studies have examined the impact of fit on exercise participation, and all relied on self-reported behavioral data (Daryanto et al., 2010; Gallagher & Updegraff, 2011; Latimer, Rivers, et al., 2008; Martinez et al., 2013) and provided mixed evidence. The present study adds to this body of literature, suggesting that regulatory fit can lead to improved exercise performance, but experience may be a moderating individual difference that researchers should consider in future work.

Furthermore, the current study was the first to recognize how counting up (gains) versus counting down (losses) would act as a reward structure for exercise tasks. In some respects, our work is similar to the body of work in behavioral economics on the differences between gains and losses framing. According to prospect theory (Kahneman & Tversky, 1979), people make different decisions based on a gains compared with losses frame. Future research should examine if and when cognitive processes impact exercise behaviors in addition to motivational ones. For example, it may be the case that cognitive processes could be influenced in contexts with risky gain/loss manipulations compared to certain gain/loss manipulations.

In regulatory fit research, individuals are posed with a task where they are trying to maximize gains or minimize losses (e.g., trying to gain points or avoid losing points; Grimm et al., 2008, 2009). In the present study, we created a more extreme case in that decreases could not be stopped; a goal was given and then the assigned objective was completed with a continual focus on losses. Counting up versus counting down repetitions is an easy, simple, and universally accessible way to manipulate reward structure and create regulatory fit. If everyday people are aware of their personal reasons for exercising (i.e., to be healthy or to avoid being unhealthy), their direction of counting repetitions could potentially help them exercise longer. Clinicians can help create regulatory fit in patients by recognizing patients' personal reasons for exercising; this framing could be especially useful for people who are showing initial signs of declining health, as prevention goals may be more salient for them. Similarly, doctors could induce regulatory focus by emphasizing reasons to exercise (e.g., the benefits of promoting heart function vs. the importance of preventing heart disease). Considering that almost 80% of adults in the United States do not meet the current physical activity guidelines (Ward et al., 2013), research studying ways to improve individuals' behavioral performance such as time exercising is crucial. While the present study found regulatory fit effects only for inexperienced participants, this is likely the population that would benefit the most from increased exercise.

Limitations and Future Directions

While this study has the strength of relying on behavioral data in a laboratory setting instead of only self-report data, there were several limitations. First, the data were from a single source of undergraduate students, and due to institutional review board requirements, the sample was limited to students between the ages of 18 and 25 who exercised at least once a week. Therefore, these results may not be generalizable to a wider population with a greater age range and more variability in exercise experience. Also, although researchers were trained on proper form, some participants may not have fixed their form appropriately after being corrected. Beyond using a noncollege sample, future research may consider using different exercises beyond the four common strength training exercises used in this study. Future work could investigate regulatory fit effects using aerobic exercises such as running, biking, or swimming, or interactions with individuals' chronic regulatory focus. For example, if personal trainers, coaches, or gyms consistently use promotion-focused motivational messages and/or encourage a counting-up reward strategy, this could potentially lead to increased motivation for chronically promotion-focused low-experience exercisers. Lastly, future research may consider using a subject pool of at-risk adults—for example, people with high cholesterol or people diagnosed with prediabetes. As mentioned earlier, these participants could potentially show stronger regulatory fit effects in prevention and/or losses, as they may have stronger motivation to prevent the further deterioration of their conditions. A future study could tailor exercise messages for participants' specific health risks (e.g., "Protect your heart from high cholesterol") to induce a strong prevention focus and examine whether this interacts with chronic focus or a losses counting structure.

Conclusion

Overall, this study extends previous research and supports the notion that creating regulatory fit states can benefit exercise performance. As predicted, participants with low exercise experience in regulatory match conditions endured in exercise participation longer, as opposed to mismatch conditions. It is well known that regular exercise, such as aerobic activity and strength training, is important for maintaining health. This is the first study to examine regulatory fit using behavioral exercise data in a laboratory setting, but there is much room for future research to examine regulatory fit effects using other exercises or focusing on at-risk participants. These research findings are hopeful, suggesting that generating regulatory fit could positively influence exercise behavior.

Note

1. There were three outlying data points (that are plausible but unlikely—e.g., exercising 5 days per week for 10 hr per day), and if we correct their numbers to what we believe they intended (e.g., 5 days per week for 2 hr per day for 10 hr per week in total), the results do not change and the three-way interaction is still obtained, $\Delta R^2 = .05$, $F(1, 154) = 8.18$, $\beta = -.14$, $SE = .05$, $p = .005$.

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