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Sarah Tamura
University of Colorado Boulder

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Thesis Advisor: Sona Dimidjian, Psychology and Neuroscience
Thesis Advisor: Angela Bryan, Psychology and Neuroscience
Committee Member: Joanna Arch, Psychology and Neuroscience
Committee Member: Daniel Jones, Honors Program

Department: Psychology and Neuroscience

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Abstract

The present study sought to examine associations between physical activity, domain specific self-efficacy, general self-efficacy, and positive affect, negative affect or depressive symptoms . It was found that level of physical activity, exercise self-efficacy, and general self-efficacy were correlated in a positive direction with positive affect such that positive affect increased as physical activity, exercise self-efficacy or general self-efficacy increased. Additionally it was found that positive affect was most closely associated with general self-efficacy followed by exercise specific self-efficacy and physical activity. General self-efficacy was correlated in a negative direction with depressive symptoms and negative affect such that as general self-efficacy increased depressive symptoms and negative affect decreased; exercise self-efficacy and physical activity were not correlated with depressive symptoms or negative affect. Regression analysis demonstrated that the proposed model was potentially consistent with the relationships of exercise and self-efficacy to positive affect but not to mood or negative affect. Findings are discussed with respect to the limitations of the present study and implications these results have on future research.

Keywords: exercise, self-efficacy, affect, depressive symptoms

Relationships Between Exercise Behavior, Self-Efficacy and Affect

Regular physical activity has long been recommended for its effects on physical health, and it has been recognized also for having positive effects on psychological well being including affect and depressive symptoms. Affect refers to the experience of specific emotions, typically classified as positive or negative (Watson & Clark, 1994); depressive symptoms refer to mood, cognitive and or somatic experiences that are assessed by measures such as the Beck Depression Index II (BDI-II) to characterized depressive disorders as classified by the Diagnostic and Statistical Manual of Mental Disorders (5th ed.; *DSM–5*; American Psychiatric Association, 2013). It is well established that physical activity is strongly correlated with affect as well as depressive symptoms (Dunn, Trivedi, & O Neal, 2001; Craft, 2003; Bodin & Martinsen, 2004). Evidence suggests that physical activity has beneficial acute effects on affect such that affect improves immediately after a bout of exercise as compared to immediately before exercise was initiated (Reed, 2005). Additional evidence suggests that physical activity also has broader effects on depressed mood that are comparable to those of antidepressants (Dinas, Koutedakis, & Flouris, 2010). While there is significant evidence to support a relationship between physical activity and affect or depressed mood, less is known about the factors that might mediate the effects of physical activity on global mood or affect.

It is reasonable to believe that acute effects upon affect may have physical mediators such as hormone regulation (Duman, 2005). It is also reasonable to assume that the broader effects upon depressed mood and affect may be at least partially mediated by cognitive process (Craft, 2003). One candidate cognitive process is self-efficacy. It remains unclear what type of self-efficacy may be mediating the effects that physical activity has upon affect and mood; it may be general self-efficacy or a domain specific self-efficacy or both. General self-efficacy is a

person's level of confidence in their ability to face challenges, and perform particular behaviors to produce a desired outcome (Bandura & Adams, 1997). Domain specific self-efficacy differs from general self-efficacy in that general self-efficacy is the belief in one's competence to cope with a broad range of stressful or challenging demands, whereas domain specific self-efficacy is constrained to a particular task at hand

General self-efficacy may be better able to explain a broader range of human behaviors and coping outcomes as context becomes less specific (Luszczynska, Scholz, & Schwarzer, 2005). It was proposed by Bandura and Adams (1997) that those who suffer from negative mood experience lower levels of general self-efficacy, which lead to negative self-evaluations and negative ruminations and in effect perpetuate negative mood. The promotion of higher general self-efficacy may lead to improved mood or affect over time.

It has been suggested that domain specific self-efficacy and general self-efficacy may depend on each other in a mutual fashion where specific self-efficacy beliefs may be influenced by general self-efficacy belief (top down) or conversely general self-efficacy beliefs may be influenced by specific self-efficacy beliefs (bottom up) (Hanss & Böhm, 2010; Fishbein & Capella 2006). Choi (2005) presented empirical evidence from a college student sample to support the existence of a relationship between domain specific and general self-efficacy. In this study, three different self-efficacy measures, general self-efficacy, academic self-efficacy and course specific self-efficacy, were utilized (with academic and course specific self-efficacy as measures of domain specific self-efficacy). Results of this study showed a positive correlation between general self-efficacy and academic self-efficacy ($r = 0.59$), a positive correlation between academic self-efficacy and course specific self-efficacy ($r = 0.40$), and a positive correlation between course-specific self-efficacy and general self-efficacy ($r = 0.20$). These

results present evidence to suggest that there can be a significant relationship between domain specific self-efficacy and general self-efficacy. It may be that a similar correlation exists between exercise self-efficacy and general self-efficacy. Should this association exist, it may help to provide a foundation on which additional questions about the relationship between physical activity or mood and affect may be asked.

It may be that exercise has effects on general self-efficacy directly or indirectly through increases in exercise specific self-efficacy and these effects upon self-efficacy are then related to less depressive symptoms, lower levels of negative affect and higher levels of positive affect. The aim of this study was to explore the associations among physical activity, exercise specific self-efficacy, general self- efficacy, and mood or affect. It was hypothesized that higher levels of physical activity would be associated with higher levels of exercise self-efficacy; higher levels of exercise self-efficacy would be associated with higher levels of general self-efficacy; and higher levels of general self-efficacy would be associated with fewer symptoms of depression, lower levels of negative affect and higher levels of positive affect. Specifically, it was predicted that physical activity participation, exercise self-efficacy and general self-efficacy would all be significantly positively correlated. Additionally, it was predicted that general self-efficacy would be associated with mood, and positive and negative affect.

Method

Participants

A sample of 200 CU students participated. Of these 200, $N = 197$ participants completed all measures and were used in the subsequent analyses. Participant demographics are displayed in Table 1. The majority of participants were female, 69.2%, and self-identified as White, 83.3%.

Age for the sample ranged between 18 – 27 years old, and the average age for the sample was 18.98 years old (*SD* = 1.378).

Procedure

The University of Colorado Boulder (CU) Institutional Review Board (IRB) approved all study procedures. Participants were recruited via the SONA system, an online research portal at CU. The SONA system portal displays all of the studies that are available for Psychology Department course credit. From this portal, individuals were directed to an external survey management system, Qualtrics, licensed by the University. Once at this site, individuals read a consent form (the first screen to appear on the survey) and then either agreed to participate or not. Access to the rest of the survey was contingent on provision of consent on this page. In the case that someone did not provide consent, the survey was terminated. There were no exclusionary criteria. The only inclusionary criteria for the study were that participants be at least 18 years of age and have access to the university online research web portal. Data were collected over the course of four months (September 2012 – December 2012).

Measures

Godin Leisure-Time Exercise Questionnaire (GLTQ). This scale (Godin & Shephard, 1985) was used to calculate 'activity scores' based on how many times in a typical week participants engaged in strenuous, moderate, or mild physical activity for more than 15 minutes during their leisure time. The three levels of intensity were defined as follows: (1) strenuous exercise, defining features include rapid heartbeat, heavy breathing (difficult or unable to carry on conversation), and physical exhaustion; (2) moderate exercise, defining features include accelerated heartbeat, moderately elevated breathing rate (able to carry on a conversation), and mild physical exhaustion; (3) mild exercise, defining features include, slightly elevated heartbeat,

slightly elevated breathing rate (able to carry on a conversation effortlessly). Participants answered how many times per week they engaged in each type of activity. Overall leisure time activity scores were then converted into metabolic equivalent (MET) values as follows: activity score = 3 (number of light exercise sessions) + 5 (number of moderate exercise sessions) + 9 (number of strenuous exercise sessions).

Exercise Self-Regulation Scale. This scale developed by McAuley and Mihalko (1998) was used to measure participants exercise specific self-efficacy. This scale asks participants to rate how confident they feel they would be able to "exercise three times per week even if..." and proceeds to 12 items that reflect common reasons that prevent participation in exercise or that are associated with prematurely stopping exercising. Sample reasons include "I felt self conscious about my appearance when I exercised", "exercise was not enjoyable or fun", and "I felt pain or discomfort while exercising." Participants have the opportunity to answer each item using a scale ranging from 0 (0%, *not confident at all*) to 10 (100%, *completely confident*). Items were averaged and scores were calculated such that higher scores indicated higher self-efficacy for exercise. Reliability for the Self Efficacy for Exercise Scale was good $\alpha = 0.89$.

General Self-Efficacy Scale (GSS). This is a 10-item scale (Schwarzer & Jerusalem, 1995) that measures a participant's sense of general self-efficacy. Each item in this measure is presented as a statement describing a sense of personal ability to achieve one's goals. Sample items include "I can remain calm when facing difficulties because I can rely on my coping abilities" and "No matter what comes my way, I'm usually able to handle it." These statements are rated by participants on a 5-point scale indicating the degree to which the participant agrees with the statement. A response of 1 corresponds to "*definitely disagree*" and a response of 5 corresponds to "*definitely agree*". Scores on these items were averaged so that a higher overall

score corresponded to higher general self-efficacy. This scale was found to posses good reliability $\alpha = 0.88$.

Beck Depression Inventory II (BDI-II). The BD-II (Beck, Steer, Ball, & Ranieri,1996) is an inventory measuring depression symptom severity in the last two weeks. There are 21 items in this inventory in which each item is associated with four statements arranged by severity increasing from 0 (*minimal)* to 3 (*severe*) that describe a particular symptom of depression. Sample items include "sadness", "self dislike" and "indecisiveness." Reliability for the BDI-II was good $\alpha = 0.90$. For each item participants are asked to identify which statement best describes the way they have felt for the last two weeks. Scores can range from 0-63 and determine categorical depression ratings: minimal (0-13), mild (14-19), moderate (20-28) and severe (29-63). In this study, we did not have adequate resources to assess or respond to clinical emergencies; thus, question nine, which considers suicide ideation, was omitted from the inventory provided to participants, resulting in a range of 0-60 of possible total scores for the BDI-II in this study.

Expanded Positive and Negative Affect Scale (PANAS-X). This 60-item scale developed by Watson and Clark (1994) consists of words or phrases that describe different feelings. Within this scale there are 13 different subscales that can be grouped into four different categories: general dimension scales (positive affect and negative affect), basic negative emotion scales (fear, hostility, guilt and sadness), basic positive emotion scales (joviality, self assurance and attentiveness) and other affective states scales (shyness, fatigue, serenity and surprise). Items of the positive affect scale include "active," "alert," "attentive," "determined," "enthusiastic," "excited," "inspired," "interested," "proud," and "strong." Items of the negative affect scale include "afraid," "scared," "nervous," "jittery," "irritable," "hostile," "guilty," "ashamed,"

"upset," and "distressed." Participants are asked to rate each item using a point scale ranging from 1 (*very slightly*) to 5 (*extremely*) to indicate the extent to which each item describes how they currently feel. Items of the different subscales are averaged separately to produce different scores for each affective state. Only responses to the positive affect and negative affect scales were used in analysis for this study. Both the positive affect and negative affect subscales were found to possess adequate or better reliability, positive affect (α =.88), negative affect (α =.79).

Results

Participants in this study reported engaging in an average of 4.77 bouts per week of mild physical activity, 3.39 bouts per week of moderate physical activity, and 2.86 bouts per week of strenuous physical activity. On average participants reported relatively similar levels of both exercise self-efficacy (M = 5.71, SD = 1.94) and general self-efficacy (M = 3.93, SD = 0.59). Participants reported slightly higher levels of positive affect (M = 3.11, SD = 0.72) than negative affect (M = 2.12, SD = 0.67). Overall, participants showed on average minimal symptoms of depression (M = 10.67, SD = 8.30) as measured by the BDI-II.

Table 2 presents results of correlation analysis. Briefly, results demonstrated that consistent with our hypothesis, physical activity, exercise self-efficacy and general self-efficacy were significantly correlated in the positive direction. Also consistent with our hypothesis, it was found that each of these variables was significantly correlated, in the positive direction, with positive affect. However, only general self-efficacy was significantly, in the negative direction, to negative affect and depressive symptom level; physical activity and exercise self-efficacy showed no significant correlation with negative affect as well as depressive symptom levels.

Regression analyses were used to determine if there were unique associations, once overlap was accounted for, between physical activity, exercise self-efficacy and general self-efficacy and the depressive symptoms, positive affect, and negative affect.

Depressive Symptoms

Results indicated that the overall regression model with depressive symptoms as the outcome variable was statistically significant $R^2 = 0.070$, $F(3, 184) = 4.64$, $p = .04$. Thus, 7% of the variance in mood was explained by general self-efficacy, exercise self-efficacy and physical activity. The main effect of general self-efficacy was significant $b = -.219$, $t(184) = -2.88$, $p<.001$ suggesting that higher general self-efficacy was associated with fewer depressive symptoms. General self-efficacy was uniquely able to explain 4.20% of the variance in depressive symptoms. The main effects of exercise self-efficacy $b = -.114$, $t(184) = -1.43$, $p = .153$ and physical activity $b = .056$, $t(184) = .719$, $p = 0.47$ were not significant.

Positive Affect

Results indicated that the overall regression model with positive affect as the outcome variable was statistically significant $R^2 = .278$, $F(3, 184) = 23.58$, $p < 0.00$ with approximately 28% of the variance in positive affect explained by general self-efficacy, exercise self-efficacy and physical activity. The main effects of general self-efficacy $b = .304$, $t(184) = 4.53$, $p <.001$, exercise self-efficacy $b = 0.251$, $t(184) = 3.57$, $p<.001$, as well as physical activity $b = .146$, $t(184) = 2.13$, $p = .034$ individually were each significant suggesting that higher general self-efficacy, exercise self-efficacy and physical activity were each associated with higher levels of positive affect. General self-efficacy alone explained 8.06% of the variance in positive affect while exercise self-efficacy and physical activity explained 5.01% and 1.80% of the variance in positive affect respectively. This suggests that although all three variables are uniquely

associated with positive affect, general self-efficacy shows the strongest relationship with positive affect.

Negative Affect

Results indicated that the overall regression model with negative affect as the outcome variable was not statistically significant R^2 =.035, $F(3, 184) = 2.21$, $p = .089$ indicating that combined physical activity, exercise self-efficacy, and general self-efficacy were not able to account for a significant amount of the variance in negative affect. However while the model may not be significant results indicate that the main effect general self-efficacy $b = -1.97$, $t(184) = -2.53$, $p = .012$, was significant indicating that higher general self-efficacy is associated with lower levels of negative affect.

Discussion

The present study showed significant positive associations among physical activity, general self-efficacy and exercise-specific self-efficacy such that as levels of physical activity increased levels of exercise specific self-efficacy and general self-efficacy increased as well. Further, general and exercise-specific self-efficacy were significantly associated with each other demonstrating a positive relationship such that as levels of exercise specific self-efficacy increased levels of general self-efficacy increased as well. In contrast, physical activity, exercise-specific self-efficacy and general self-efficacy were significantly associated with positive affect such that as physical activity or exercise-specific self-efficacy increased positive affect increased as well, but were not associated with negative affect or depressive symptoms. Additionally when considering levels of positive affect, general self-efficacy is most closely associated to the outcome variable followed by exercise specific self-efficacy and finally physical activity.

It is important to note limitations to this study. Although this study was focused on a college-aged sample, the participants were limited to CU students currently taking psychology courses; thus excluding a large portion of the CU student population. It is also important to recognize that self-reported data is limited by the fact that it cannot be independently verified and is likely to contain potential sources of bias.

This study is also limited by the fact that it was not longitudinal and therefore was unable to reveal any information about the direction of the relationships between the constructs (i.e., it is impossible to tell whether positive affect increases feelings of self-efficacy or whether self-efficacy increases feelings of positive affect). It is also not possible to examine how the relationship among the variables may change over time. It is important to consider the relationship between physical activity, depressive symptoms, and affect over time as there is evidence to suggest that as exercise self-efficacy increases the impact that self-efficacy has upon depressive symptoms and affect also increases. For example, Bodin and Martinsen (2004) conducted a study comparing different forms of exercise and effects upon mood. It was found that during martial arts sessions, individuals experienced a significant increase in exercise specific self-efficacy, whereas no significant increase in exercise specific self-efficacy was observed during stationary bike exercise. In addition, mood was more positive after martial arts sessions compared to stationary bike exercise sessions, suggesting that it is not necessarily an initially high level of exercise specific self-efficacy but rather a change or an increase in exercise specific self-efficacy that is needed to improve mood.

Future studies that address the limitations of the current study are warranted given the potential positive psychological impact of physical activity. Future studies should aim to explore what if any characteristics of physical activity are best able to improve or promote exercise

specific self-efficacy and or general self-efficacy as a way to better predict positive affect. In addition, future longitudinal studies may test a proposed model that is informed by patterns evident in the current study. Thus, it is possible that that the effects of physical activity may be partially mediated by both exercise specific self-efficacy and general self-efficacy (see Figure 1).

In conclusion, this study fails to identify associations between physical activity, domain specific and general self-efficacy and depressive symptoms or levels of negative affect. However this study does identify important associations between physical activity, domain specific and general self-efficacy, and positive affect that may be used as a foundation to explore these associations further through future research. Future studies using longitudinal and experimental designs are needed to confirm this model.

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Table 1

Baseline Demographics

Characteristic	n	%
Age: Mean (SD)*	18.98 (1.378)	
Gender		
Female	137	69.5%
Male	60	30.5%
Ethnicity		
Non Hispanic or Latino	176	89.3%
Hispanic or Latino	21	10.7%
Race		
American Indian or Alaskan Native	7	3.6%
Asian	25	12.7%
White	165	83.8%
Current Year (four year bachelors program)		
Freshman	104	58.2%
Sophomore	51	25.9%
Junior	25	12.7%
Senior	11	5.6%
N/A	6	3.0%

Note. N=197, * Range 18.0-27.0 years

Table 2

Intercorrelation Matrix

Measure	1	2	3	4	5
1. Positive Affect	--------				
2. Negative Affect	-.245**	--------			
3. Depressive Symptoms	-.465**	.604**	--------		
4. General Self-Efficacy	.413**	-.165*	-.220**	--------	
5. Exercise Self-Efficacy	.400**	-.025	-.131	.340**	--------
6. Activity Score (Physical Activity)	.316**	-.012	-.042	.248**	.376**

Note. * $p<.05$, ** $p<.01$, *** $p<.001$

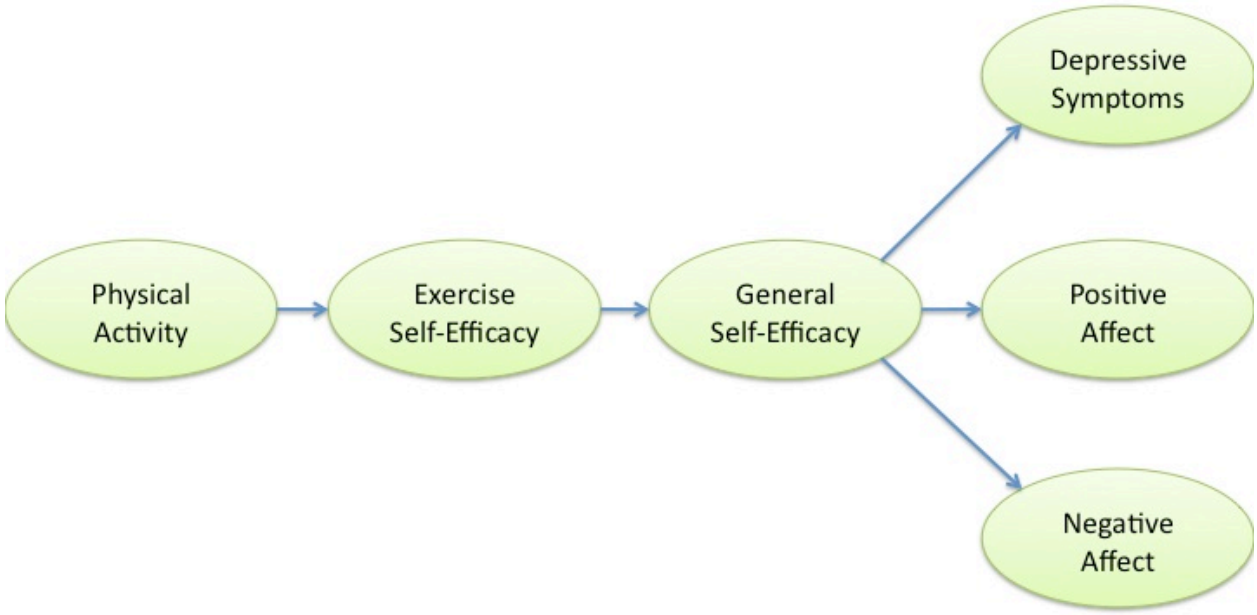

Figure 1. Proposed model of how the effects of physical activity upon the three outcome variables may be mediated by self-efficacy and general self-efficacy.