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Predictive Abilities of Past Performance Versus Self-efficacy, Across Contexts and Goal Types

Alexandra Oldham
Western Kentucky University, alexandra.oldham616@topper.wku.edu

PREDICTIVE ABILLITIES OF PAST PERFORMANCE VERSUS SELF-EFFICACY, ACROSS CONTEXTS AND GOAL TYPES

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By

Alexandra C. Oldham

Western Kentucky University
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CE/T Committee:

Professor Steven R. Wininger, Advisor

Professor Lisa Duffin

Brian Lee, M.A.

Approved By:

_____

Advisor
Department of Psychology

ABSTRACT

Self-Efficacy (SE) has long been established as an important predictor of performance in many settings, including academics and athletics. In both of our studies, we were examined the relationship between performance and SE to determine which was more predictive of the other. Participants completed two academic tasks, two athletic tasks, and a SE measure. In the first study participants defined success for efficacy estimates. In the second experiment three different types of goals were utilized to define success as an additional independent variable. In both experiments we found a significant relationship between SE and performance, but past performance was a stronger predictor of SE. In our second study, we found the strongest relationship between SE and performance in the moderately difficult goal condition.

Keywords: Self-efficacy, performance, academic, athletic, goals, & previous experiences.

Dedicated to my friends and family

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VITA

May 28, 1994..... Born- Bowling Green, Kentucky
2012 ..... Bowling Green High School,
Bowling Green, Kentucky
2013-2016..... Student Researcher
2014..... WKU FUSE Grant Recipient
2015..... Poster Presentation at the
Association for Applied Sport
Psychology Annual Conference
2016..... Poster Presentation at APA
Annual Conference

FIELDS OF STUDY

Major Field: Psychology

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CONTEXT

According to Bandura (1997), self-efficacy (SE) is defined as a person's beliefs in his/her ability to perform at a certain level of proficiency in a given situation. This individual self-appraisal of competency has been consistently shown to be a key predictor of performance through many studies (Bandura, 1997; Maddux, 2000; Reeve, 2009; Feltz, Short, & Sullivan 2008). The four key factors that influence levels of SE are: previous experiences, modeling, verbal persuasion, and physiological sensations (Reeve, 2009). There is a common adage that past performance is the best predictor of future performance. In the current research, we were interested in further exploring the relationship between past experiences and SE, as this previous knowledge of task performance has been identified as the most influential factor on SE. Through the current research, we hope to determine which factor—previous experience or SE—has a greater impact on the other. The following literature review defines SE, examines the factors that influence SE, and summarizes previous research examining the relationship between SE and performance in both academic learning and athletic contexts.

SELF-EFFICACY

Often referred to as the father of self-efficacy (SE) theory, Albert Bandura has established not only the working definition of SE but how best to measure individuals' levels of SE. A standard definition of SE is the "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 3). Bandura states, "People guide their lives by their beliefs of personal efficacy" and this guidance "may entail regulating one's own motivation, thought processes, affective states, and actions" (Bandura, 1997, p. 3). SE beliefs are an individual's predictions of success based on their confidence in their own abilities.

People often misconstrue just what self-efficacy is. James Maddux explains it well in his article "Self-efficacy: The power of believing you can" (2000). Maddux clarifies that SE is not the same as: perceived skill, causal attributions, objectives to behave a certain way, or a source of self-esteem (2000). Even though SE can be connected to each of these concepts, one must keep in mind that efficacy beliefs are a separate entity from these. Individual's interpretations of their levels of efficacy are not just "reflective imprints of past action or performance attainments," but these impressions are individualized analyses of perceived competence even if these competency beliefs do not line up with their performance attainments (Bandura, 1986, p. 363-364). The next section will discuss four primary factors that impact

individual's SE levels.

FACTORS THAT INFLUENCE SE LEVELS

Efficacy beliefs are primarily caused by past outcomes in the execution of similar behaviors, observing others who have attempted the same behaviors, verbal persuasion, and physiological affective states (Reeve, 2009). Perceived SE can also be influenced by task familiarity or perceived difficulty of the task (Bandura, 2003). Past experiences in similar tasks are the major determining factor of SE. If one has successfully mastered a task, with consistent success, then one's efficacy beliefs toward this task should be high; similarly, one's beliefs will be low in the case of repeated failure (Feltz, Short, & Sullivan, 2008).

People will also alter their SE in accordance to how difficult they believe the task to be as well as how they perceive their failures in the past—as growth experiences or being incapable of succeeding (Feltz, et al., 2008). Changing perceptions of SE requires that individuals process the information they receive from their performance, compare it to the knowledge they already had about their abilities, and apply it to their future performance. Thus, across individuals "the same level of performance success may raise, leave unaffected, or lower perceived self-efficacy" depending on how an individual weighs the causal factors with regard to their performance (Bandura, 1997, p. 81).

Bandura identified three other distinct factors that influence SE beliefs: vicarious experiences (modeled behaviors), verbal persuasion, and interpretation of physiological states. Observations of others' success or failure at similar tasks, also known as vicarious experiences, can influence efficacy beliefs. Individuals will be

better able to predict their future success when they compare their performance to that of others who share a similar skill level (Bandura, 1993).

Verbal persuasive techniques can also influence self-efficacy. Feltz, et al. (2008) claim that the effects of said persuasion can vary according to the level of expertise of the persuader or how positive or negative the remarks are. In an athletic setting, coaches can "influence their athletes' efficacy beliefs through direct appeal, inspirational messages, evaluative feedback, expectations, and attributions" (Feltz, et al., 2008, p. 10). Examples of ways to positively influence SE levels in athletics are when coaches: say things such as "you can do this," place emphasis on success associated with progress, not outcome, and give attributions to success based on the athlete's ability (Feltz, et al., 2008).

In reference to the fourth category, Maddux (2000) expands on the impacts of physiological states on efficacy beliefs, stating, "we usually feel more self-efficacious when we are calm than when we are aroused and distressed" (p. 18). Individuals also perceive physiological responses differently than others, whereas one person may interpret a high heart rate as anxiety or nervousness, someone else may label it as excitement (Feltz, et al., 2008, p. 12). In addition to discussing the factors that influence SE, it is important to discuss what past studies how found with regard to the impacts of SE on performance.

EFFECTS ON PERFORMANCE

As mentioned before, SE and performance attainments are separate entities that influence each other—but just how strong is this relationship? According to Feltz, et al. (2008) individuals will "choose to undertake challenges and set goals

that they believe they can master" (p. 15). Therefore, people with reasonable efficacy predictions will take on tasks that are "realistically challenging" unlike people with much lower SE estimates who will avoid tasks for which they have lower SE estimates for and instead pursue easier tasks (Feltz, et al., 2008, p. 15).

One study on a grammar task —that manipulated individuals' levels of SE through positive or negative feedback— found that higher estimates of SE were complemented by an increase in the students' performance achievements (Bouffard- Bouchard, 2001). The aforementioned study also found that the participants in the high SE group (the condition where they received positive feedback) completed significantly more problems than the low SE group due to higher self-determined achievement goals (Bouffard-Bouchard, 2001). Individuals who have higher levels of SE will try more challenging tasks, therefore allowing themselves additional learning opportunities, which will lead them to better performance outcomes over time, with less confident individuals missing out on these valuable lessons.

Condiotte and Lichtenstein (1981), found that when smokers had lower SE estimates when trying to quit, they tended to relapse more without recovery than those who had higher SE. In addition, "perceived self-regulatory efficacy predicted months later which participants would relapse" and those with higher efficacy were better able to take control of their relapses than those with lower efficacy beliefs (Bandura, 1982, p. 131). In sum, participants who were more "self-efficacious" were better able to perform in this "personal change" program and had an easier time

quitting their smoking habit than those who were less confident (Bandura, 1982, p. 131).

Another study measured the correlation between math efficacy predictions and performance as well as math ACT achievement (Hackett & Betz, 1989). Participants complete the Mathematics Self-Efficacy Scale as well as a mathematics task. They examined the relationship between students' efficacy estimates and their ability to perform well on the math task—as well as comparing the current performance to their previous performance on the math section of the ACT (Hackett & Betz, 1989). They found a positive and reasonably strong correlation (.44) between SE and performance on individuals' predictions of their success on the Mathematics Problems Performance Scale.

Feltz and Lirgg (2001) did a thorough review of different literature that investigated the impact of SE on athletic performance. The authors explained that "performance accomplishments have proved to be the most influential source of efficacy information" (Fletz & Lirgg, 2001, p. 2). The studies examined in this review were supportive of the positive relationship between SE and performance in athletics. In addition to this, Feltz and Lirgg (2001) noted that in 14 various studies of SE and performance in athletics, "self-efficacy beliefs have predictive superiority over other variables or have similar predictive strength" (p. 8-9). This review done by Feltz and Lirgg confirms that SE estimates have a major effect on individuals' performances in athletics.

The current study will incorporate both familiar and novel tasks in order to determine the effect of past experiences on task-specific SE. Familiar tasks will have

a rich background with a history of experience for an individual to draw SE estimates from. However, novel tasks will have no experiential history, meaning they have to rely only on their current understanding of the task's demands or the history of a related task. Thus a secondary goal of this study will be to explore the impact of task familiarity on the predictive strength of SE on performance.

All of the aforementioned studies support the current study's hypothesis that SE will be a positive predictor of performance across both academic and athletic tasks. Our research question was: will SE estimates have a greater impact on future performance, or will past performances have a larger impact future SE estimates? Based on the research described above, we predict that while past experiences will account for significant amounts of variance in levels of future SE, SE will be a stronger predictor of future performance.

METHOD

Participants

One hundred and eighty three undergraduate students, ages ranging from 18-39 (N=183), completed the study one (142 female, 39 male, and 2 that did not indicate gender; age *M*= 18). They signed up through the Psychology Department's study board (SONA) and participated to receive course credit or extra credit for an undergraduate psychology class.

Materials

The demographics survey assessed information such as age, ACT overall score, ACT Math sub-score, and experience with NERF basketball (to prevent confounds during task completion).

Math Flash Cards (familiar academic task).

The math flash cards consisted of computerized math problems, presented one at a time. The math equations had a simple degree of difficulty: addition and subtraction problems consisted of a pair of two-digit numbers, and the multiplication and division problems consisted of one two-digit number and a one-digit number. The problems were presented in the order of addition, subtraction, multiplication, then division—example problems include 51 + 44, 25 – 16, 56 x 7, and 36 ÷ 4. The participants could complete anywhere from 0 to 100 cards during each timed trial of the flash cards, and the scores were calculated based off the total number of cards correctly solved by the participant in the allotted time. The participants had to accurately solve the current problem before moving on to the next problem.

Equate (novel academic task).

Equate is the math equivalent to the popular board game, Scrabble. We chose the math board game, Equate, to be the novel academic task for this study in order to introduce an unfamiliarity factor in the participants' efficacy estimates. The Equate game tiles included small numeric scores on the bottom corner and these numbers were used to add the participant's final scores for each round of the game. In order to get a performance total for each round of Equate, we summed up the numeric scores on each tile that was accurately used by the participant—the maximum potential scores were 176 for round 1 and 165 for round 2, if the participants had used every available tile they would have achieved these maximum scores.

NERF Basketball (familiar athletic task).

For the NERF basketball task, we used a plastic basketball goal with the basket raised to a height of about 5 feet; the basketballs were miniature plastic basketballs, allowing for seven shots per round. Participants' scores on the NERF task were the total number of shots they successfully made during each trial.

Hand Dynamometer (novel athletic task).

The Smedley hand dynamometer measured hand-grip strength from 0-100kg and was used to measure the participants' maximum hand-grip strength. The dynamometer works through a spring and when the participants squeezed the handle, a dial hand pointed to the grip poundage. Each participant was instructed to squeeze the dynamometer two times as hard as they could in order for the researcher to record their maximum hand strength. Their maximum strength was then divided in half in order to get the participant's hand-grip level for the hand-grip endurance task.

Hand-Grip Endurance Task (novel athletic task).

For this task, we used a Robert Baraban Adjustable hand-grip spring device that had a maximum resistance of 50.8kg. The hand-grip has two prongs which the participants closed together, holding a nickel between the prongs (when the nickel fell to the floor, the time of the trial stopped). As mentioned previously, the adjustable spring setting was determined by calculating half of the participant's maximum grip strength. The spring setting was then adjusted to the closest possible resistance poundage to match the strength of each participant.

Self-Efficacy Measure.

The self-efficacy item was adapted from Bandura's "Guide for Constructing Self-Efficacy Scales" (2006). The scale ranges from 0% to 100% in increments of 10%. The participant was instructed to rate their confidence in being successful on each task—with 0% being absolutely sure they will not succeed and 100% being absolutely sure of their success. When the dimensions of task success were questioned by the participants, the experimenter explained that "being successful" was based on the individual participant's interpretation of success. No explicit definition of success was given this study.

Figure 1: *Self-Efficacy Measure*
How confident are you that you can do well on this task.

I am sure I cannot										I am sure I can
0%	10	20	30	40	50	60	70	80	90	100%

Procedure

Before starting the study, we asked participants if they had any previous wrist injuries or issues with carpal tunnel or arthritis—this was used to rule out any participants who may be at risk of injury during the hand-grip task. Each participant was presented with an informed consent document and was instructed to read through the details and sign, agreeing to the terms of the experiment. Participants then completed a short demographic survey that asked age, gender, overall ACT score, math ACT sub-score, highest level of basketball playing experience as well as their experience with a NERF basketball set.

Upon completion of the demographics, participants were assigned to either condition one (starting with the flash cards) or two (starting with the hand-grip task), counter-balancing each participant. The way we counter-balanced the conditions was by alternating the order of each task between genders—i.e. the first female participant completed the tasks in the order of flash cards, NERF basketball, Equate, and then the hand-grip endurance task, and the second female's task order was the reverse. We followed this pattern for each male participant as well. We counter-balanced the order of the tasks in order to prevent confounds from physical or mental exhaustion from task completion.

For the sake of this paper, we will describe the procedure that was followed throughout condition one, with the understanding that the same procedure was followed in condition two in reverse order. Prior to task completion, participants were given four practice flash cards on the computer; after they completed the practice cards, the participant was asked to rate their SE. After two minutes were up, the researcher told the participant how many cards they successfully completed. The researcher asked the participant to rate their SE for trial two based off of their performance on trial 1. Trial two consisted of a new set of flash cards (with 100 cards available to be solved) and 2 more minutes to complete as many as the participant could.

For each of the tasks participants followed the same steps as mentioned above. The NERF basketball task included seven attempted basketball goals each time (allowing for two practice trials prior to task completion). The Equate math game trials were 5 minutes each time (the researcher showed the example

equations that were included with the game set for the practice trial). For the first trial of Equate, participants were given half of the game tiles and all of the addition and division symbol tiles and were instructed to make as many accurate equations as they could in the time allotted. Participants were given the same number of game tiles for trial 2 of Equate, however, they were only given the subtraction and multiplication symbol tiles. Each participant was required to make the equations connect to one another, just as the words are aligned on a Scrabble board.

The hand grip task was as long as the participant could comfortably hold the grip closed while it was set at approximately 50% of their maximum strength. Once we measured the maximum grip strength of the participant through the hand dynamometer, the Robert Baraban adjustable hand grip spring was set to the 50% threshold. Each participant was then given an opportunity to close the hand grip at the 50% setting a few times in order to give them an idea of their baseline ability to successfully hold the hand grip closed. Once the participant closed the hand grip, the experimenter would slide a nickel between the prongs below the participant's hand, and a stop watch would be started to keep track of the time. The nickel was used as an indicator of whether the grip was completely closed or not—when the nickel fell out from the grip, the time stopped.

Upon completion of the study, participants were given the opportunity to ask any questions they had about the study. There was no deception involved in this study.

We ran correlational analyses between SE and performance to determine if SE was more predictive of performance achievements.

RESULTS

Table 1 presents descriptive statistics for age and ACT scores of the participants. A total of 183 undergraduate students at Western Kentucky University were subjects of this study.

Table 1

Descriptive Statistics of Age and ACT Scores

	Mean	**Median**	**Std. Deviation**	**Skewness**	**Std. Error of Skewness**	**Kurtosis**	**Std. Error of Kurtosis**
Age	18.91	18.00	2.078	6.074	.186	53.212	.370
Overall ACT Score	23.91	24.00	4.448	-0.087	.188	-0.923	.374
Math ACT	23.75	24.00	4.831	.101	.285	-0.726	.563

Tables 2 and 3 present descriptive statistics on the self-reported levels of SE taken prior to each trial and the participants' actual performance totals. We noticed a slight pattern in the changes between SE for trials 1 and 2 with the novel tasks. On the Equate task participants had an increase in SE between trial 1 (*M*= 54.67) and trial 2 (*M*= 64.40), and the inverse of this pattern can be seen on the hand-grip task (trial 1 *M*= 57.32, trial 2 *M*= 47.08). These variations, as compared to the stability of the familiar task SE (flash card trial 1 *M*= 51.43 and trial 2 *M*= 51.09, NERF trial 1 *M*= 52.75 and trial 2 *M*= 51.59), indicate that the participants were less accurate with

their initial novel task SE predictions for trial 1 due to a lack of experience with the tasks, becoming more or less confident for trial 2 based off their performance from trial 1.

Table 2

Descriptive Statistics of Self-Efficacy (SE) Measures

	Mean	**Median**	**Std. Deviation**	**Skewness**	**Std. Error of Skewness**	**Kurtosis**	**Std. Error of Kurtosis**
SE Flash Cards Trial 1	51.43	50.00	24.955	-0.114	.180	-0.862	.357
SE Flash Cards Trial 2	51.09	50.00	24.199	-0.183	.180	-0.684	.357
SE Equate Trial 1	54.67	50.00	19.201	-0.316	.180	-0.329	.358
SE Equate Trial 2	64.40	70.00	17.914	-0.582	.180	-0.006	.358
SE Basketball Trial 1	52.75	50.00	23.201	-0.035	.180	-0.87	.358
SE Basketball Trial 2	51.59	50.00	23.673	.060	.180	-0.907	.358
SE Hand Grip Trial 1	57.32	60.00	21.121	-0.317	.187	-0.579	.373
SE Hand Grip Trial 2	47.08	50.00	22.81	.069	.191	-0.737	.379

Note. Self-Efficacy (SE)

Table 3

Descriptive Statistics of Performance Measures

	Mean	Median	Std. Deviation	Skewness	Std. Error of Skewness	Kurtosis	Std. Error of Kurtosis
Flash Cards Trial 1	12.814	14.00	7.825	.555	.180	.936	.357
Flash Cards Trial 2	13.874	13.00	7.896	.931	.180	1.614	.357
Equate Trial 1	48.72	48.50	13.165	.57	.180	-0.065	.358
Equate Trial 2	54.47	55.00	12.792	-0.067	.181	-0.219	.360
Basketball Trial 1	2.54	3.00	1.554	.158	.180	-0.599	.358
Basketball Trial 2	2.64	3.00	1.605	.316	.180	-0.382	.358
Hand Grip Trial 1	11.35	8.07	10.116	1.89	.192	4.045	.381
Hand Grip Trial 2	12.01	9.78	8.745	1.277	.193	1.732	.384

Pearson's correlations (table 4) showed significant relationships between several SE reports and the individual's resulting performance on the task. The results show a significant relationship ($p < .01$) between SE prior to both trial 1 and 2 of the flash card task with the performance totals from each trial (trial 1 $r = .553$, trial 2 $r = .484$). However, we found an even stronger relationship between their performance on trial 1 and their SE prior to trial 2 ($r = .613$).

We found a similar pattern of results with the NERF task, with SE still being predictive of performance (trial 1 r= .311, trial 2 r= .463) but performance on trial 1 was yet again a stronger predictor of SE for trial 2 (r= .569). This trend seemed to be strongest with the two familiar tasks; the strength of the correlations for the novel task SE and performance were noticeably weaker.

When given the novel math task, Equate, the predictions of success were much less related to the performance totals (trial 1 r= .294, trial 2 r= .172). Even with the weaker relationship between SE and performance on this novel task, we still found a stronger relationship between performance 1 and SE for trial 2 (r= .390). Also, there was a larger correlation between the SE predictions between trials 1 and 2 of the hand-grip task (r= .679, p< .01) and the performance times between trials 1 and 2 (r= .500**,** p< .01) than there was between the SE predictions and the totals for each trial (trial 1 r= .271, trial 2 r= .274, p< .01). We found that the relationship between performance 1 and SE 2 was once again stronger (r= .347).

Table 4

Relationship between Self-Efficacy Measures and Performance

	SE FC1	FC1	SE FC2	FC2	SE EQ1	EQ1	SE EQ2	EQ2	SE BB1	BB1	SE BB2	BB2	SE HG1	HG1	SE HG2	HG2
SE FC1	1	.553**	.886**	.463**	.621**	.192**	.542**	.223**	.267**	0.101	.212**	.166*	.172*	-0.06	0.032	0.065
FC1		1	.613**	.843**	.305**	.342**	.273**	.372**	0.018	0.141	0.049	.177*	-0.013	0.043	-0.038	0.034
SE FC2			1	.484**	.596**	.224**	.566**	.245**	.199**	0.115	.185*	.170*	0.144	-0.057	0.047	0.05
FC2				1	.238**	.313**	.245**	.315**	0.074	0.137	0.133	.177*	0.012	0.081	0.05	0.091
SE EQ1					1	.294**	.785**	.168*	.162*	0.048	0.133	0.052	.190*	-0.077	0.003	0.047
EQ1						1	.390**	.416**	-0.052	0.11	0.017	0.053	-0.056	-0.06	-0.051	-0.003
SE EQ2							1	.172*	.181*	0.08	.207**	0.113	.259**	-0.019	0.122	0.089
EQ2								1	0.004	0.09	0.037	-0.005	-0.028	0.03	0.011	-0.086
SE BB1									1	.311**	.792**	.396**	.301**	0.119	.301**	-0.091
BB1										1	.569**	.416**	-0.007	0.014	0.044	-0.069
SE BB2											1	.463**	.191*	-0.048	.217**	-0.153
BB2												1	0.05	0.029	0.082	-.177*
SE HG1													1	.271**	.679**	.225**
HG1														1	.347**	.500**
SE HG2															1	.274**

DISCUSSION

There was a stronger relationship between past performance and future SE which is not what we had previously predicted. Previous literature consistently tells us that SE is a very good predictor of performance, which we also found to hold true in our current study. However, we found that past performance is an even better predictor of future SE—thus confirming previous experiences as the most influential factor. These findings also demonstrate that the impact of performance on SE is greater than the impact of SE is on performance. Our original hypothesis was not supported by these findings, but we did find it important to examine these results further.

Our results did support what has been suggested by past literature (Bandura, 1993, and Feltz, Short, & Sullivan, 2008) about familiarity with the task and performance experiences. The results of our experiment demonstrated a stronger relationship between SE and performance for the familiar tasks (math flash cards & NERF basketball) than for the novel tasks (Equate and hand-grip endurance). We found, for all four tasks, an increase in the magnitude of the relationship between SE and performance between trials 1 and 2—when performance was influencing SE—indicating the larger impact of performance on SE (table 4).

A weakness we encountered during this study was the lack of an explicit defintion of success for each of the tasks. Participants repeatedly asked for an explanation of what we meant when we asked them to "rate their confidence in being successful." Typically, in both academic and athletic contexts, there is a clear definition of what score equates with success, however in this study, we allowed the participant to interpret success in their own way. After the completion of this study we decided that for future research it would be beneficial to have a score participants are aiming to achieve in order to be "successful." In our second study, we decided to compare a three different explicit definitions of success across the four tasks.

EXPERIMENT 2

As mentioned before, the major weakness from experiment 1 was the lack of a defined standard of success. To resolve this ambiguity, we examined goal-setting theory.

Locke and Latham (2006) explain the impact that goals have on SE when they are successfully utilized. Goals are an important source of feedback, which is important for individuals to receive in order to track their success, the difficulty of the task, and how much effort is needed to be successful (Locke & Latham, 2006). Goals can function both as motivational factors as well as tools to teach individuals what skills are needed in order to be successful on certain tasks, and when used correctly, these goals can "direct attention, effort, and action toward goal-relevant actions" (Locke & Latham, 2006, p. 265). Locke & Latham (2006) go on to explain that high performance goals direct more effort and persistence from the individual.

Burton & Weiss (2008) add to the importance of goal difficulty by stating "the more challenging the goal is, the greater are the motivation and self-confidence benefits that accrue from successful goal attainment" (p. 356). It is important to keep in mind, however, that there is "some sort of an inverted-U-shaped relationship between goal level and performance," with moderately difficult performance goals being most conducive for success (Garland, 1983, p. 21).

Additionally, there are a few moderating variables that influence one's ability to accept and achieve their assigned goals. Locke & Latham (2006) state these moderators as being: performance feedback, goal commitment, task difficulty and complexity, and the specific restrictions of the situation at hand. The likelihood of one's ability to accept and achieve a goal increases with the amount of feedback they are given, the level of commitment to success they are demonstrating, the extent of their knowledge of the task, and the suitability of the situation in which they are performing. Goal-setting literature further explains that goal difficulty is critical in one's acceptance of performance goals; individuals are more likely to accept goals they perceive to have a reasonable level of difficult. (Burton & Weiss, 2008) Additionally, there is an inverse relationship between goal difficulty and acceptance, according to Reeve (2009), and this relationship demonstrates higher acceptance rates for less challenging goals.

Goal-setting literature also states there are two important types of goals: personal/mastery versus normative/outcome (Bouffard, Boisvert, Vezeau, & Larouche, 1995; Ames & Archer, 1988). An individual who is oriented to the personal goal type is more attentive to the learning of new skills and knowledge of

the tasks' demands (Bouffard, et al., 1995). On the other hand, an individual who is oriented to the normative/outcome goal type is concerned with the external judgement of their performance and how they compare to others—i.e. winning or losing (Ames & Archer, 1988). Ames and Archer (1988) go on to explain that situational demands, whether social comparison is present or task learning is crucial, can mediate the pattern of goal orientations used by individuals. The situational impact on goal orientation, as well as the relationship between goal difficulty and acceptance, made us want to explore the possibility of a third goal orientation that fits somewhere between personal mastery and normative/outcome goals.

For our experiment the first goal type was a specific personal oriented goal (i.e. mastery orientation) of an individual increase in performance on the second trial as compared to performance on the first trial. We also assigned a "win" goal (normative orientation) where winning consisted of scoring higher than the top-scoring participant from the previous experiment. In order to create the third goal orientation between personal and normative, we set a "sub-win" goal where the goal was to score in the top 25th percentile of scores from the previous experiment.

As with our previous experiment, we were interested in examining the relationship between SE and performance. Due to our findings in study one, we predicted that we would once again find a stronger relationship between performance and future SE than between SE and future performance.

In terms of goal conditions, and as previous literature suggests, we expected to see the participants who were given the least demanding goal, one that just told

them to perform better the second time, easily accept the goal thus having a higher relationship between their SE and performance. Additionally, we expected to see the strongest relationship between SE and performance in the participants assigned to the moderately difficult goal category, due to goal acceptance as well as performance motivation. We also predicted the individuals who were given the toughest, or most seemingly unrealistic goal, would not accept the goal due to the belief the goal was unachievable and we predicted this would result in a weaker relationship between SE and performance. Through these predictions, we expected to see the strongest relationship between SE and performance from individuals in the "sub-win" goal condition.

METHOD

Participants

Seventy-nine (54 female, 25 male, 3 did not indicate gender; age *M*= 19, *R*= 18-49) undergraduate WKU students participated for course credit (N= 79). Participants once again signed up through the Study Board website, just as in experiment 1.

Materials

In order to ensure consistency in the variables, the same materials were used in the second experiment as were used in the first study. The only change to the actual materials was a decrease from 5 minutes to 3 minutes per trial of Equate.

Goal Conditions.

In experiment 1, we told participants to base their SE estimates on their "confidence in being successful" on each task, allowing them to interpret success in

their own way. In contrast, in experiment 2 we asked the participants to evaluate their SE based on their "confidence in successfully achieving the goal" to which they had been assigned. The goal categories were "Win," or scoring the same or higher than the top scorer from experiment 1, "Sub-Win", or scoring within the top 25% of scores from experiment 1, and "Personal," or scoring better than the individual participant's score from trial 1.

For each of the tasks the win goals were successfully completing the same as or more than: all 7 NERF basketball attempts, 54 seconds on the hand grip endurance task, 47 flash cards, and scoring 88 on Equate. Additionally, the sub-win goals included: 3 NERF basketball shots, 16 seconds on the hand-grip endurance, 18 flash cards, and scoring 61 on Equate.

Procedure

The procedure remained the same from experiment 1: math flash cards, NERF basketball, Equate board game, and hand-grip endurance. However, unlike experiment 1, we did not give the participants any practice rounds prior to completing the task. Each participant completed trial 1, and was then asked to complete the SE rating after being assigned to a goal condition. This SE measure was evaluating the participants' predictions of their success in reaching their assigned goal in trial 2. We based the goal thresholds off the data we collected from Experiment 1.

They proceeded to perform trial 2 and upon completion were asked a dichotomous question: do you believe you were successful on this task? The

participant was then asked to rate their SE in being successful on a similar task in the future.

RESULTS

Table 5 presents descriptive statistics for age and ACT scores of the participants. A total of 79 undergraduate students at Western Kentucky University were subjects of this study.

Table 5

Descriptive Statistics of Age and ACT Scores for Experiment 2

	Mean	**Std. Deviation**	**Skewness**	**Std. Error of Skewness**	**Kurtosis**	**Std. Error of Kurtosis**
Age	19.90	3.706	6.401	.269	49.024	.532
Overall ACT Score	23.92	4.220	.265	.277	-.738	.548
Math ACT	24.44	5.016	.055	.403	-.872	.788

Table 6

Descriptive Statistics of Performance Totals for Experiment 2

Goal		**Mean**	**Std. Deviation**	**Skewness**	**Std. Error of Skewness**	**Kurtosis**	**Std. Error of Kurtosis**
1.0	Ball1	2.75	1.37	-.154	.441	-1.059	.858
	Ball2	3.35	1.74	.123	.441	-.629	.858
	Grip1	6.21	6.64	1.440	.441	1.789	.858
	Grip2	5.77	5.59	1.255	.441	2.607	.858
	Card1	12.81	9.67	.893	.441	1.084	.858
	Card2	11.86	7.62	.634	.441	-.901	.858
	EQ1	32.71	12.98	-.268	.441	-.212	.858

	EQ2	41.75	13.63	-.548	.441	1.754	.858
2.0	Ball1	2.61	1.65	.213	.456	-.953	.887
	Ball2	2.46	1.60	.546	.456	.169	.887
	Grip1	10.24	8.50	1.672	.456	4.089	.887
	Grip2	14.06	10.79	.208	.456	-1.163	.887
	Card1	12.00	8.22	-.257	.456	-1.694	.887
	Card2	12.53	6.98	.603	.456	-.015	.887
	EQ1	35.57	10.48	-.361	.456	.446	.887
	EQ2	40.88	8.73	.203	.456	-.742	.887
3.0	Ball1	2.76	1.61	-.351	.464	-.304	.902
	Ball2	2.92	1.65	.437	.464	.635	.902
	Grip1	9.43	7.72	2.454	.464	8.593	.902
	Grip2	11.57	9.67	.925	.464	-.400	.902
	Card1	12.68	8.96	.408	.464	-.521	.902
	Card2	14.08	8.53	1.079	.464	1.315	.902
	EQ1	34.80	11.69	-.072	.464	.480	.902
	EQ2	41.28	9.87	-.087	.464	.076	.902

Note. Ball: NERF basketball task, Grip: Hand-grip task, Card: Math flash card task, EQ: Equate math board game, 1and 2: trial number, Goal conditions: Personal (1), Sub-Win (2), Win (3)

Table 7

Descriptive Statistics of SE Measure from Experiment 2

Goal		**Mean**	**Std. Deviation**	**Skewness**	**Std. Error of Skewness**	**Kurtosis**	**Std. Error of Kurtosis**
1.0	Ball1	40.39	23.26	.457	.441	.617	.858
	Ball2	27.43	27.29	1.101	.441	.511	.858
	Grip1	15.39	18.52	1.424	.441	1.675	.858
	Grip2	14.32	19.30	1.329	.441	.429	.858
	Card1	16.82	19.03	1.611	.441	3.184	.858
	Card2	25.03	24.38	.669	.441	-.483	.858
	EQ1	40.39	27.49	.149	.441	-1.016	.858

	EQ2	47.82	26.40	-.164	.441	-.195	.858
2.0	Ball1	59.23		-.471	.456	-.879	.887
	Ball2	37.74	28.70	.557	.456	-.467	.887
	Grip1	37.30	28.64	.128	.456	-1.211	.887
	Grip2	46.15	30.99	-.413	.456	-1.080	.887
	Card1	45.76	32.14	.228	.456	-1.034	.887
	Card2	50.38	30.13	.036	.456	-.875	.887
	EQ1	62.30	26.72	-.812	.456	-.147	.887
	EQ2	60.76	25.44	-.014	.456	-.336	.887
3.0	Ball1	57.20	19.47	.760	.464	.635	.902
	Ball2	41.91	31.35	.383	.464	-.929	.902
	Grip1	46.80	26.88	.553	.464	-.266	.902
	Grip2	48.40	29.81	-.160	.464	-.943	.902
	Card1	57.20	24.58	-.069	.464	-.224	.902
	Card2	60.40	20.09	-.026	.464	.562	.902
	EQ1	57.60	18.99	.890	.464	.466	.902
	EQ2	61.60	22.11	-.571	.464	2.000	.902

Note. Ball: NERF basketball task, Grip: Hand-grip task, Card: Math flash card task, EQ: Equate math board game, 1and 2: trial number, Goal conditions: Personal (1), Sub-Win (2), Win (3)

We found that performance once again were a stronger predictor of future SE than SE was of future performance. Table 6, below, shows the correlations for experiments 1 and 2 in order to show the pattern consistency in the relationship of SE to performance. Experiment 1 correlations are on the right side of the diagonal and experiment 2 correlations on the left.

In this second experiment we found that across almost all tasks the sub-win goal category (top 25%) had the strongest relationship between performance and SE estimates. This pattern held true except for the second round of the Equate task

(flash card r= .752 and r= .652, p< .01, equate r= .617 and r= .150, p< .01, basketball r= .658 and r= .518, p< .01, and hand grip r= .766 and r= .866, p< .01).

For this experiment we also found that the win-goal category consistently had weaker relationships between performance and SE than did the sub-win category (flash card r= .575 *and* r= .288, p< .01, equate r= .360 and r= .396, p< .01, basketball r= .409 and r= .481, p< .01, and hand grip r= .419 and r= .289, p< .01).

Table 8

Comparisons of SE and Performance Correlations across Experiments

	SE FC1	FC1	SE FC2	FC2	SE EQ1	EQ1	SE EQ2	EQ2	SE BB1	BB1	SE BB2	BB2	SE HG1	HG1	SE HG2	HG2
SE FC1	1	.553**	.886**	.463**	.621**	.192**	.542**	.223**	.267**	0.101	.212**	.166*	.172*	-0.06	0.032	0.065
FC1	.575** .752** .328	1	.613**	.843**	.305**	.342**	.273**	.372**	0.018	0.141	0.049	.177*	- 0.013	0.043	- 0.038	0.034
SE FC2	.633** .885** .452*	.410* .665** .335	1	.484**	.596**	.224**	.566**	.245**	.199**	0.115	.185*	.170*	0.144	- 0.057	0.047	0.05
6FC2	.438* .690** .193	.855** .885** .893**	.288 .672** .477*	1	.238**	.313**	.245**	.315**	0.074	0.137	0.133	.177*	0.012	0.081	0.05	0.091
SE EQ1					1	.294**	.785**	.168*	.162*	0.048	0.133	0.052	.190*	- 0.077	0.003	0.047
EQ1					.360 .617** .022	1	.390**	.416**	- 0.052	0.11	0.017	0.053	- 0.056	-0.06	- 0.051	- 0.003
SE EQ2					.729** .627** .444*	.282 .311 -.477*	1	.172*	.181*	0.08	.207**	0.113	.259**	- 0.019	0.122	0.089
EQ2					.364 .017 .089	.686** .313 .692**	.396* .150 -.021	1	0.004	0.09	0.037	- 0.005	- 0.028	0.03	0.011	- 0.086
SE BB1									1	.311**	.792**	.396**	.301**	0.119	.301**	- 0.091
BB1									.409* .658** -.297	1	.569**	.416**	- 0.007	0.014	0.044	- 0.069
SE BB2									.638** .742** .694**	.185 .681** -.002	1	.463**	.191*	- 0.048	.217**	- 0.153
BB2									.373 .069 -.002	.142 .212 .554**	.481* .518** .449*	1	0.05	0.029	0.082	-.177*
SE HG1													1	.271**	.679**	.225**
HG1													.419* .766** .116	1	.347**	.500**
SE HG2													.473 .571** .664**	.032 .502* .153	1	.274**
HG2													.504** .324 .261	.672** .443* .619**	.289 .866** .450*	1

The pattern of relationships for the personal goal category was much more inconsistent than the other goal categories. Initially we assumed that this goal

would increase both participant's SE and performance totals, but we did not find a consistent pattern as with the other goals. The personal goal relationships for Equate trial two (r= -.021, $p< .01$) and basketball trial one (r= -.297, $p<$ .01) were the only time we found a negative relationship between performance and SE.

DISCUSSION

Our hypotheses for experiment 2 were that performance would once again be a stronger predictor of SE than SE was for performance, and we expected to find the strongest relationship between SE and performance in the "sub-win" goal condition. Performance was a stronger predictor of SE—and this relationship was stronger for the familiar tasks than it was for the novel tasks, just as in experiment 1. Additionally, we did find the strongest relationship between SE and performance in the "sub-win" goal condition.

Through examining previous literature and the results of our studies, there appears to be a cyclical relationship between SE and performance—and our findings suggest the most important stage of this cycle is the previous performance experiences. These somewhat unexpected findings demonstrated to us that when attempting to improve students' or athletes' confidence in their abilities it would be more effective to facilitate repeated successful engagement of said tasks, which in turn will increase their SE.

When examining which goal conditions had higher success rates we found the sub-win category (score at or above the top 25th percentile) to be more accepted and motivating than either of the other goals across all four tasks. Our findings suggest that this "sub-win" goal had a stronger impact on the relationship between

performance and SE than did that other goal conditions. These findings support that successful goal setting processes involve setting moderate difficulty, encourage goal acceptance, and meet somewhere between personal and normative orientations.

The lower relationship between performance and SE in the personal goal category could be due to the goal "do better than you did in the first trial" appearing too easy or not specific enough to explain the standard for success—it may have only elicited a minimal amount of additional motivation from participants. The participants may have found the goal too easy and stopped expending effort as soon as they outperformed their first trial. The participants may have believed they had already performed their "best" in trial one causing them to perform the same or worse during the second trial.

When examining the win-goal (perform the same as or better than the top score) we found that this goal category was too difficult, too unrealistic for most of our participants to achieve, therefore only eliciting a slight improvement in performance. This demonstrated the effect of goal achievability on perceived confidence and task performance itself. When the goal was to "win" it appears the participants found the tasks unrealistic compared to when the goal was sub-win or personal (i.e. completing 47 flash cards in the two minute time period versus 18). However, the participants in this condition did on average perform better during the second trial of the tasks, showing there was some goal acceptance and increase in performance motivation. These findings suggest that in the goal setting process it is important for the individual to have some sort of a baseline understanding of the task at hand as well as making sure the goal is specific yet realistic.

Task familiarity was further demonstrated as a key factor that influences the relationship between SE and performance through the results of the two novel tasks in our studies. The results from the hand-grip task, as well as the Equate task, imply that when presented with a novel task, individuals appear to have more difficulty predicting their success (SE) until they have had at least one trial of the unfamiliar task to better understand the requirements of the task at hand. As noted previously (in studies done by Bandura (1997) and Maddux(2000)), SE predictions are strongly affected by a person's previous experience with a task, and in this instance of participants being presented with completely unfamiliar tasks the predictability patterns in SE hold true in that familiarity affects confidence.

Weaknesses

We encountered a weakness in the hand-grip endurance task for each of these studies. We ran into an issue of some participants (n=6) not being able to completely close the hand-grip device when it was set at 50% of their maximum strength, thus eliminating a number of participants from this task. Although we were still able to use the data from this task and found results that further confirmed our hypotheses, it would be beneficial to examine the relationship between SE, performance, and goals on another less challenging athletic task.

Additionally, in this study, the only academic field we tested these effects on was mathematics. This does not necessarily allow for our findings to be generalized to all areas of academia, although based off previous literature, the effects can be implied. We did not include in our initial demographics any questionnaire on math

identity or anxiety, and this created a potential weakness in our study, as those concepts are potential moderating variables on math performance.

Suggestions for Future Research

In an effort to expand on the accepted understanding that past performance predicts future SE we suggest further manipulative experiments that can induce unexpected failure in order to test the reverse effects of performance on SE, or research that may ask participants to return for additional performance trials days, weeks, or months after the initial study participation to test for the long-term effects of past experience on SE.

To further build on the relationship between past performance and future SE it may be beneficial to examine scenarios in which performance feedback is given and/or manipulated. Karl, O'Leary-Kelly, & Martocchio (1993) found that providing objective performance feedback to students who completed training sessions in speed reading tasks increased their SE estimates for the future training sessions, thus increasing their overall performance. Our study also found a similar relationship between SE and performance, however, we found the strongest relationship between previous performance and future SE. This causes us to wonder what would happen if Karl, et al., had manipulated their feedback cues by giving false descriptions of performance. Would this cause students to rely less on their past performance to predict their SE or cause their SE to plummet due to "poor" performance? Future research in this field should examine whether there is a moderating impact from manipulated performance feedback on the relationship between performance and SE.

We also suggest looking into these relationships between performance and future SE in other academic and athletic contexts. Because we found significant relationships between performance and SE in controlled math and specific athletic tasks, we can assume, not confirm, the same relationships would be found in other areas of academia and athletics.

APPENDIX

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