The Effect of Self-Efficacy on a Simulated Rehabilitation Task

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ABSTRACT

Successful rehabilitation is affected by many psychological factors. Research has shown that high self-efficacy is effective for motor tasks and pain perception. However, there is limited research on frustration, which is prevalent in rehabilitation. Based on past research, we hypothesize that participants primed to have high self-efficacy will perform better on a physically frustrating task than participants not primed. To examine this hypothesis, we explored the effect of self-efficacy priming strategies on participants' abilities to complete a frustrating task, simulating those used in rehabilitation therapy. Participants were 72 undergraduate students from the University of Wisconsin-La Crosse. They were screened for right-handedness and level of activity before recruitment. Participants were randomly assigned to one group: domain-specific self-efficacy scale, mastery experience, both, or control. Following that, participants balanced on a balance board while placing push pins into a corkboard with marked targets. The non-dominant hand was used to simulate an injury. Accuracy was measured by the targets hit in a minute.The study involved a between-participants design. A one-way ANOVA was used to examine the effect of self-efficacy priming strategy on task performance. Tukey tests showed that participants who were primed with the self-efficacy scale and mastery experience ($M = 11.00$, $SD = 2.17$) hit significantly more targets than participants who were not primed with anything ($M = 8.39$, $SD = 1.88$), $p = .02$. The results can provide insight into the psychological factors affecting rehabilitation, improving outcomes.

INTRODUCTION

Imagine that you have just torn a major muscle in your leg for the first time playing the sport you love. You are scared and you have no idea what to expect for the upcoming months in your recovery process. You are also starting to feel discouraged because, while your team is out playing, you are sitting around waiting to get better. You start to wonder if it is even worth trying to recover, and you are losing hope fast. You have overcome many obstacles in your life prior to your injury, however, you fail to realize this because you are focused on what you are incapable of doing rather than what you can physically achieve in the present and future. Will failing to realize this be detrimental to your recovery process? Now imagine that you have just broken an ankle and you will be out for the rest of the season. Instead of having the mindset that it is over for you, you focus on overcoming the injury and mentally preparing for the next season. Your physicians and teammates are supportive of your recovery process, and you truly believe that you will be able to endure the pain and emotional distress that accompanies the injury to make a full recovery.

These scenarios capture how a patient might feel during the rehabilitation and recovery process. Karvasarskii and colleagues (2002) postulated that results of medical treatments are highly dependent upon the medical professional's ability to factor in the different life experiences that shape a person. In other words, we cannot rely on a one-size-fits-all treatment approach without taking individual differences, experiences, and expectations into account. Arvinen-Barrow, Massey, and Hemmings (2014) pointed out that emotions, beliefs, and perceptions are not commonly talked about in an injury rehabilitation setting. Participants in the study voiced that they viewed a sports medicine professional as someone who would help them heal, and they assumed their emotions and perceptions would be understood by the physician. In some cases, the physician may be focused solely on the treatment of the injury, overlooking any psychological factors that may be affecting an individual's ability to heal. Although these factors are not always considered, they play a significant role in the recovery process. Emotional responses to injury may include feelings of frustration, anger, loneliness, and lack of drive to engage in activities (Herring et al., 2006). In particular, athletes can feel frustrated when they are no longer able to do something that was routine for them (Arvinen-Barrow et al., 2014). It can be beneficial, not only to the patient, but to the physician as well, to consider these emotional components in order to make the rehabilitation experience as productive as possible. Several

psychological factors have been identified as potentially affecting the recovery process. Some of these will be discussed in detail below.

Social support might aid in the recovery process. Most often, injury is accompanied by negative thoughts and feelings which can be alleviated by the support of friends and family. Clement, Arvinen-Barrow, & Fetty (2015) interviewed athletes dealing with an injury and discovered that a majority of athletes sought out some form of social support, whether that be from family, friends, teammates, coaches, or sports medicine professionals. Also, emotional intelligence is how in touch an individual is with their emotions and how they are able to display and interpret those emotions (Mayer, Caruso, & Salovey, 2016). Individuals with high emotional intelligence understand their emotions and can deal with them across different settings. Carmeli and Josman (2006) found that in a professional setting, individuals who had high emotional intelligence performed better on tasks in general. Similarly, Lane, Thelwell, and Devonport (2009) found that students with high emotional intelligence achieved their academic goals because they knew how to regulate their emotions. Finally, high trait emotional intelligence created a sense of motivation for athletes while competing. High trait emotional intelligence, also called emotional self-efficacy, is associated with believing one is able to understand the cause of their emotions and control them in an effective way (Furnham & Petrides, 2003). Lane et al. (2009) also summarized that this emotional self-efficacy could impact how one views the difficulty of a task, implying that high emotional self-efficacy leads to perceiving a task as less difficult. Emotional intelligence is a broad area in which other concepts, such as self-efficacy, can be further explored.

More broadly defined, self-efficacy refers to an individual's belief in his or her capacity to execute behaviors necessary to achieve specific performance goals (Bandura, 1977, 1986, 1997). According to Bandura (1997), individuals have the ability to control the way they perceive and respond to any situation. If an individual believes they are capable of completing a task successfully, they are more likely to do so. How a person perceives the situation can actually alter the outcome. There has been substantial research on the effect of self-efficacy on an individual's performance. Légal and Meyer (2009) studied the effect of self-efficacy on completing a motor skill task. Participants were primed to have higher self-efficacy, lower self-efficacy, or not primed at all. Those primed with higher self-efficacy performed better on the task.

In the rehabilitation setting, one of the many factors that may inhibit a person from completing a task is pain. Jackson, Iezzi, Gunderson, Nagasaka, and Fritch (2002) studied self-efficacy in relation to pain perception. They examined how long participants were able to keep their hands in ice cold water and found that self-efficacy beliefs were directly related to participants' pain perception. Individuals with higher self-efficacy beliefs were able to tolerate the pain longer. Marks, Allegrante, and Lorig (2005) studied the impact of different self-efficacy-enhancing mechanisms on patients with chronic disease. Increasing knowledge, creating a supportive and positive environment, and discussing other successes were all found to be helpful in improving self-efficacy and, consequently, chronic disease management.

METHOD

Participants

Participants were 72 undergraduate students recruited from the University of Wisconsin- La Crosse subject pool through SONA (M_{age} = 19.61, SD = 1.78; 60% women). Participants were compensated through extra credit points. Participants were screened for right-handedness and activity levels. We selected moderately physically active participants (i..e, people who reported being active in physically activity for 30 minutes or more at one time for at least 1-2 times per week) to ensure they were able to withstand the physical activity required of the balance task used in this study.. Participants gave informed consent prior to beginning the study.

Materials and Procedure

Self-efficacy Primers. Two different prompts were used to prime high self-efficacy. Past research has shown that asking individuals to answer questions about their self-efficacy using a domain-specific scale has a positive effect on performance (Légal & Meyer 2009). Thus, the first prompt was an accuracy self-efficacy scale asking questions about how confident participants were in their fine motor accuracy and physical balance skills (see Appendix A) The 1 through 10 likert scale ranged from 1, not at all true, to 10, exactly true.

The second efficacy primer was a mastery experience priming exercise that consisted of two questions asking about accuracy and balance in their life (see Appendix B). Participants were randomly assigned to one of four groups: the first group was primed with both the self-efficacy scale and mastery experience, the second group was primed with only the self-efficacy scale, the third group was primed with only mastery experience, and the fourth group received no priming (control group).

Following the self-efficacy priming, participants were asked to perform a physical task that caused frustration. We pilot tested the task prior to conducting our study in order to test for ceiling and floor effects. As a result of the pilot tests, we made the task progressively harder as more individuals participated. The targets became smaller, it was changed from balancing with two legs to the left leg only, and taping the left pointer finger and middle finger was added for more difficulty. After refining the task during pilot testing to find an adequate difficulty, the actual task involved participants balancing on a balance board with their left leg while they were doing an accuracy task with their non-dominant hand. They stood in front of a board, attached with magnets to a whiteboard, with 20 dots to simulate a target that they had to push pins into. There were 20 push pins placed on the ledge of the whiteboard. 10 push pins were placed on each side of the participant at a total distance of three feet away from each other, with the board in the middle. Participants picked up the pins, alternating each side, and placed them into the dots left to right top to bottom. To simulate an injury, participants used their non-dominant hand, with both the middle and pointer finger taped together, to complete the task. Accuracy was measured by if they hit the target or missed and how many dots they were able to hit in one minute. After completion of the study, participants were debriefed.

RESULTS

A one-way between-subjects ANOVA revealed a significant relationship between self-efficacy priming condition and number of targets hit, $F(3, 68) = 3.17$, $p = .03$ (See Table 1). Tukey tests showed that participants who were primed with both the self-efficacy scale and mastery experience ($M = 11.00$, $SD = 2.17$) hit significantly more targets than participants who were not primed with anything ($M = 8.39$, $SD = 1.88$), $p = .02$. However, the number of targets hit for participants primed with mastery experience ($M = 10.00$, $SD = 3.29$) did not differ from the number of targets hit for participants primed with the self-efficacy scale ($M = 9.94$, $SD = 2.71$; $p = 1.00$), participants primed with both ($p = .65$), or participants who were not primed ($p = .25$). Participants primed with the self-efficacy scale did not hit significantly more targets than participants primed with the both ($p = .61$), or participants who were not primed ($p = .28$).

DISCUSSION

The results from this study supported the hypothesis that participants who were primed with both the self-efficacy scale and mastery experience prior to the task would perform better compared to participants who were not primed. Extending the results from Jackson et. al (2002), who found that participants with higher self-efficacy had a higher pain tolerance, we found that priming for higher self-efficacy with the domain-specific self-efficacy scale and mastery experience increased performance on a frustrating task. This result likely occurred because the participants who were primed to have high self-efficacy on this specific task created a mindset in which they could excel. Being reminded of previous successes on similar tasks likely evoked a sense of achievement, which may have lead to a higher performance.

One limitation of the current study is that it was not conducted in an actual rehabilitation setting. Since the study was merely a simulation of rehabilitation, the results could be less generalizable than if it was conducted in physical rehabilitation with real patients who had injuries. For example, working with patients in a long term study could be more beneficial for showing how self-efficacy affects patients over time. In the future, a study conducted in a real-life setting could yield results that would be more specific to how rehabilitation can be enhanced.

Another limitation is that participants were not truly, randomly assigned to conditions. Instead, the participants were put into groups based on what times they signed up for on SONA. For example, if four people signed up for one day, they were put into groups in order based on the conditions: mastery experience, self-efficacy scale, both, and control. The fact that complete randomization did not occur could make the results of the study less reliable and generalizable. In the future, in order to avoid this issue, a similar study could completely randomize their participants into the conditions.

Despite the limitations, these results could be helpful in a rehabilitation setting. Health professionals could implement the priming techniques prior to rehabilitation to increase the patients self-efficacy. This would potentially increase task performance throughout the rehabilitation process and enhance the overall outcome and experience.

Appendix A

Modified scale from *The General Self-Efficacy Scale (Schwarzer & Jerusalem, 1995)*

1. I can always manage to complete a task if I try hard enough.
2. If an obstacle makes something more difficult, I can find the means and ways overcome it.
3. It is easy for me to stick to my aims and accomplish my goals.
4. I am confident that I could deal efficiently with unexpected events.
5. Thanks to my resourcefulness, I know how to handle unforeseen situations.
6. I can complete most tasks if I invest the necessary effort.
7. I can remain calm when facing difficulties because I can rely on my coping abilities.
8. When I am confronted with a problem, I can usually find several solutions.
9. If I am confronted with multiple challenges, I can usually think of a solution.
10. I can usually handle whatever conflicting challenge comes my way.

1 through 10 likert scale, 1 = Not at all true, 4 = Hardly true, 7 = Moderately true, 10 = Exactly true

Appendix B

Please respond to the following:

Describe an instance when one important aspect of your life was affected by another and how you succeeded at resolving the balance.

Describe a time, in a group setting when you expressed the right answer to a question. How did you feel?

Table 1. Mean Number of Targets for Participants in Different Priming Strategies

Type of Priming Strategy						
Control	Self-efficacy scale	Mastery experience	Both			
M(SD)	*M(SD)*	*M(SD)*	*M(SD)*	*F*	*df*	*p*
$8.39(1.88)_a$	$9.94(2.71)_b$	$10.00(3.29)_b$	$11.00(2.17)_a$	3.17	3,68	.03

Note. Means in the same row with the same subscripts are significantly different at $p < .05$.

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