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The Effects of Group Fitness Classes on Self-Efficacy

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The Effects of Group Fitness Classes on Self-Efficacy

A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Science in Kinesiology

by

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Abstract

Self-efficacy is one of the largest predictors of behavior, when related to exercise studies have shown that self-efficacy can predict drop-out rates within six months of being an exercise program (Middelkamp, et. al., 2016; Sallis, et. al., 1988). College students have the biggest decline in physical activity when compared to other stages of life (Buckworth, 2001; Grubbs & Carter, 2002). University recreation centers provide group fitness classes for students to promote physical activity. Minimal research has been done to show the impact that group fitness classes has on student life. This study aimed to show the impact of group fitness classes on self-efficacy levels, when compared to independent exercise groups. It had a pre-post test design and assessed change in self-efficacy via survey over the course of the spring semester at the University of Arkansas. A total of 112 students completed the survey from pre to post test. Overall changes in self-efficacy were determined using a t-test to compare means from pre to post test. ANOVA was used to determine significance levels for several confounding variables: physical activity level, physical activity enjoyment, and start of physical activity participation. No significant changes were found in the change in self-efficacy overtime ($p < 0.05$). There was no difference between participants who attended group fitness class or individuals who exercise independently in regards to their self-efficacy levels.

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Introduction

Exercise is an important part of an individual's well-being. It has been linked to the reduction of many chronic diseases (type 2 diabetes, hypertension, and cardiovascular disease) (Boren, 2017; Grant, Todd, Aitchison, Kelly, & Stoddart, 2004; Wallace, Buckworth, Kirby, & Sherman, 2000a). Exercise has also been shown to have a positive effect on depression, anxiety, and stress (Byrne & Byrne, 1993). The American College of Sports Medicine (ACSM) recommends 150 minutes of moderate-intensity exercise per week or 75 minutes of vigorous-intensity exercise per week to have the benefits mentioned above (Riebe, et. al., 2018). Though the benefits of exercise are widely accepted, young adults are not getting enough physical activity (Boren, 2017; Buckworth, 2001; Linke, Gallo, & Norman, 2011). The National College Health Assessment (NCHA) reports that only 46.2% of college students are getting the recommended amount of physical activity (2019). The mental benefits of exercise can aid in students having a greater sense of belonging at their institution, improvement of mood, and increased energy (Miller, 2011; Tucci, 2018).

College students are in a stage of life where choices they make now effect their habits later in life. Often, this is the first-time students are living on their own, and navigating a new environment, friend groups, and a heavier course load. When compared to other life stages, college students have the largest decline in regular physical activity (Buckworth, 2001; Grubbs & Carter, 2002). The decline in activity determines how active these students will be throughout the rest of their lives (Buckworth, 2001). The importance of providing physical activity programming for college aged participants allows for the release of stress in the short-term while developing long-term habits (Forrester, 2014; Trockel, Barnes, & Egget, 2000) Collegiate recreation departments specialize in providing facilities for physical activity, events to encourage

socialization, and information on wellness for students (Sanderson, DeRousie, & Guistwite, 2018; Tucci, 2018). Participation in recreation facilities and programs have shown benefit for the university as there is an increase in grade point average (GPA), retention status, and student satisfaction of the university (Forrester, 2006; Huesman Jr., Brown, Lee, Kellogg, & Radcliffe, 2009; Sanderson et al., 2018). Students who participate in recreation programs report increases in self-confidence, overall health, and time management skills (Forrester, 2014; Miller, 2011). Campus recreation programming has been linked to increase opportunities for social bonding for students, which can provide students with a structured way to make and build friendships (Miller, 2011).

A factor that influences exercise adherence is social support. Social support is important to the total wellbeing of students. Studies have shown that those who have social support (family, friends, peers, etc.) are more likely to adhere to an exercise regimen (Wallace, Buckworth, Kirby, & Sherman, 2000). Social support in college increases students sense of belonging, and mental wellbeing (Tucci, 2018). Collegiate recreation facilities are a space that allows for this social support to develop and grow. Group fitness classes are one example of programming that campus recreation offers. Group fitness is defined by ACSM as exercise performed by a group of people that is led by an instructor (Wing, 2014). Group fitness classes (GFC) are an opportunity to blend physical fitness and socialization together. GFC provide instruction, community, and motivation for participants.

In addition to social support another factor known to increase adherence to exercise is self-efficacy. Self-efficacy is an individual's confidence in one's ability to perform a specific behavior is strongly related to whether they will actually perform the behavior. (Bandura, 1977). Self-efficacy plays a large role in the maintenance of an exercise routine (Marcus, Selby, Niaura,

& Rossi, 1992). Self-efficacy is one of the largest predictors of behavior (Sallis, Pinski, Grossman, Patterson, & Nader, 1988). It has been shown that those who report high levels of self-efficacy are more likely to start and adhere to an exercise program (Middelkamp, Rooijen, Wolfhagen, & Steenbergen, 2016). Fifty percent of people who begin an exercise routine will drop out within the first six months (Linke et al., 2011). The ability to measure and increase self-efficacy in college students will allow for programs to be developed to target behavior to decrease stress and anxiety and increase the likelihood of prolonged exercise habits post-graduation. Group fitness research has shown that there is an increase in mood and decrease in social anxiety after one single exercise class, but a cross sectional measurement is not generalizable to the long-term (Lamarche, Gammage, & Strong, 2009). As previously stated, self-efficacy predicts the adherence to an exercise program this has been assessed for general exercise and specifically for GFC (Middelkamp et al., 2016). Minimal research explores how GFC can change self-efficacy levels, which begs the question is there an effect on self-efficacy when participating in GFC, and is that change significant from individuals who exercise independently? Independent exercise will be defined as exercise done without in person supervision from an instructor or trainer. This study aims to fill the gap in what modality of exercise creates the largest increase in self-efficacy in college students.

It is hypothesized that GFC participation will have a greater impact on college student's change in self-efficacy. The group fitness setting provides an experience that cannot be obtained through exercising by oneself. The coaching, motivation, and encouragement from the instructor as well connecting with other participants may provide an impact on self-efficacy levels. The results of this study will provide more insight to the benefits of GFC. The purpose is to determine if the change in self-efficacy is different between GFC exercisers and independent

exercisers. This study aims to answer three questions: 1) Do GFC participants and independent exercisers differ at baseline measures? 2) Does GFC significantly change levels of self-efficacy when compared to independent exercise? 3) Does baseline self-efficacy level effect attendance (GFC or independent exercise)?

Literature Review

This literature review aims to explore the relationship between exercise and self-efficacy, the benefits of group fitness, and the importance of collegiate recreation on student well-being.

Exercise

ACSM recommendation for physical activity is a minimum of 150 minutes of moderate-intensity exercise per week for health benefits (Olson et al., 2018). Exercise has both physical and psychological benefits. Physically it helps to lower blood pressure and resting heart rate, manage weight, and increase muscle strength (Grubbs & Carter, 2002). College students, often, are more focused on how to manage more immediate concerns to them (i.e. physical appearance, stress management) instead of exercising for the prevention of chronic disease (Grubbs & Carter, 2002; Pendeo & Dahn, 2005). There has been shown to be a dose-response correlation of exercise and it's effects on mental health (Craft & Landers, 1998). One in three students reported having a mental health concern (depression, sleep, anxiety, inattentive, hyperactive, etc.) in the past year (Bruffaerts et al., 2018). The same study by Bruffaerts and colleagues correlated any type of mental health issue with a decline in GPA by up to 0.3 points. It is known that aerobic activity has been linked to significant improvements in improving mood and the reduction of anxious and depressive symptoms (Pendeo & Dahn, 2005). As well, a meta-analysis revealed that individuals who participate in larger amounts of physical activity experience lower levels of depression compared to pre-exercise regimen. The same analysis also concluded that longer

intervention programs were more beneficial (twelve or more weeks), but any amount of exercise was better than none (Craft & Landers, 1998). College campuses have a large mental health outbreak, being able to implement and encourage physical activity can aid in the well-being of students.

Self-Efficacy

Self-Efficacy is defined as the belief in one's ability to perform a given behavior (Bandura, 1977). It has been found to be a strong predictor of behavior and has often been used in exercise research (Sallis et al., 1988). It has a direct impact on exercise adherence, a study showed that those with higher self-efficacy levels had decreased drop-out rates (GFC attendance) when exercising (Middelkamp et al., 2016). GFC attendance has been studied in relation to self-efficacy to determine if there were significantly different cognitive patterns depending on how often an individual came to GFC (Shrigley & Dawson, 2004). Attendance was recorded throughout the duration of the semester, and self-efficacy was surveyed in the eighth week of the ten-week session. It was found that there was no difference in self-efficacy between those that had been consistently coming for the eight weeks versus the individuals who had sporadic attendance (Shrigley & Dawson, 2004). Self-efficacy is a measurement that informs a person about their ability to perform behavior in specific context (Davis, 2019). While one's attendance may sporadic during the ten-weeks, when asked how confident they are to continue attendance it may be a different answer when asked at the beginning versus the end of the semester. A measurement at the beginning of the semester of all attendees and again at the end of the semester of the same group will provide a better picture of what is occurring with attendance levels and self-efficacy throughout the semester.

The Health Belief Model was used to assess perceived barriers and benefits of exercise (Grubbs & Carter, 2002). Though not directly related to the self-efficacy theory, barriers and benefits of exercise are important and can potentially influence the constructs of self-efficacy (Bandura, 1977). One of the perceived benefit items measured in this study was “exercise gives me a sense of accomplishment” and was reported to have a mean of 3.45 on a 4-point Likert scale (Grubbs & Carter, 2002). Accomplishment can be related back to Bandura’s construct of mastery experiences. The more an individual successfully performs a behavior the more likely they are to continue that behavior, and self-efficacy increases (1977). For this population, which was largely female (82%) and college students, the largest perceived barriers to exercise were physical exertion based (i.e. “exercise tires me”, “exercise is hard work for me”) (Grubbs & Carter, 2002). This is interesting to point out, because it relates to the self-efficacy construct of affect state, their emotional connection to exercise is decreased because they have associated exercise with fatigue (Bandura, 1977; Grubbs & Carter, 2002).

Self-efficacy has been paired with the Stages of Change construct from the Transtheoretical model to determine if there is a correlation between stage of change and self-efficacy level (Marcus et al., 1992). The stages of change measure places individuals into stages based on their willingness to change. Ranging from precontemplation to maintenance it can be a way to quantify how willing a person is to change their behavior. High levels of self-efficacy were significantly related to participants determined stage of change. Higher levels of self-efficacy related to being further along in the stages (preparation, action, maintenance) (Marcus et al., 1992). The study demonstrates that high self-efficacy is needed to increase the likelihood of starting and maintaining a behavior.

Repeatedly, self-efficacy has been associated with higher levels of exercise persistence. When creating habits for the future, at an individual or institutional level, it is important to understand what goes into behavior change. Collegiate recreation has a large influence on students desire to maintain exercise habits post-graduation (Forrester, 2014). Placing focus on programs that influence self-efficacy rates for exercise is an important factor in assisting to develop those habits.

Group Fitness

GFC are classes that are led by an instructor to a group of participants, they include several components: a warm-up with dynamic movements at a low to moderate intensity designed to warm the muscles and increase the heart rate, the exercise designed to achieve the purpose of the class, and a cool-down to stretch the muscles and decrease the heart rate (Herrmann, 2012). Multiple studies measured enjoyment, self-efficacy, social anxiety, mood state, leisure time, participation influence, and goal confidence when assessing the benefits of group fitness. The studies in this review were chosen for their discussion on college students, self-efficacy, mood, and/or stress management in relation to group fitness.

There is a variety of reasons one may participate in a group fitness class. A study of college student's motivation to attend GFC and found that high motivation for exercise included: positive health, strength and endurance, enjoyment, weight management, and stress management (Boren, 2017). Their discussion included reasons that students saw benefit in campus recreation such as, improved well-being, improved stress management, and self-confidence. The motivations to exercise and benefits of campus recreation in the study are similar to survey's done by the National Intramural Recreational Sports Association (NIRSA) which will be discussed in further detail later in this review (Forrester, 2014).

Health-related quality of life (HRQOL) was also looked at in respect to reasons for group fitness participation. McGrath et al. compared three different GFC formats: Pilates, strength, and step aerobics and surveyed participants on their HRQOL. Questions included topics of physical functioning, emotional energy/fatigue, emotional well-being, social functioning, pain, and general health from the RAND 36-Item Short Form Health Survey (McGrath, O'Malley, & Hendrix, 2011). The results reported strength and step aerobics formats reported average scores that were significantly higher in all domains than the Pilates format. There was also a significant association between the chosen format and how long a person had been exercising. Those that had been exercising for a longer period were more likely to take a step aerobics class (McGrath et al., 2011). A reason for this may be related to exercise intensity, as strength and step aerobics are of higher intensity levels than Pilates. The HRQOL scores may report higher in the strength and step aerobics classes because participants of those formats reported longer periods of regular exercise. McGrath et al. found that the group setting for exercise assisted class participation. Specifically, high intensity formats reported GFC promoted continued hard work and comradery among participants (2011).

When assessing GFC participation potential barriers need to be assessed, two examples are body image concerns and potential embarrassment in front of others. A study hypothesized that the removal of mirrors would lower this barrier and increase self-efficacy and decrease social anxiety in active women (Lamarche et al., 2009). It was studied using a one-time session with an evaluation of self-efficacy and social anxiety before and after. There were two groups and one had mirrors (control) and the other had the mirrors in the studio covered. While the mirrored or non-mirrored environments did not play a role with self-efficacy or anxiety, anxiety decreased, and self-efficacy increased post exercise compared to before the bout (Lamarche et

al., 2009). The increase in self-efficacy with exercise in a group setting promotes the idea that self-efficacy may increase over a longer period of time when consistently participating in GFC

Another factor to consider when it comes to GFC is format. There are many formats offered and each provide unique benefits. A study was done comparing hatha yoga and resistance exercise and the effects each had on mental health and well-being (Taspinar, Aslan, Agbuga, & Taspinar, 2014). The intervention lasted seven weeks with the hatha yoga and resistance training group meeting three times a week, there was also a control group that only participated in pre and post testing. It was found that yoga improved self-esteem, lowered fatigue, and increased quality of life more than resistance training. Though both modes of exercise were found to be beneficial. (Taspinar et al., 2014). The format that a participant most frequently attends may be a factor that effects self-efficacy levels. The proposed study may be able to provide insight into varying confidence levels of students who participate in various group fitness formats.

Collegiate Recreation and Academics

GFC is one of the many offerings of campus recreation departments. Campus recreation programs provide many important resources for college students. Recreation departments have been assessed to show how they improve GPA, retention status, and student well-being among other factors. The following section will discuss the influence collegiate recreation programs have on students. Though literature does not always specifically mention GFC, they are a part of collegiate recreation departments which is why campus recreation was included in the review.

When looking at the benefits of campus recreation regarding the university as a whole GPA, retention, and degree completion are factors of consideration. To start, campus recreation participation has been shown to promote an increase in GPA. The study done by Sanderson et al.

in 2018 demonstrated that for each one-hour increase in contact hour per week predicted GPA increase was 0.06. Though this is not a drastic number it shows a positive correlation. Credit hours data was also collected, showing that with a one-hour increase in hours spent at recreation facilities/programs there was a 1.24 prediction of credits passed (Sanderson et al., 2018). When mental health concerns effect one-third of students and are associated with a 0.2-0.3 drop in GPA, getting students to participate in campus recreation resources in a consistent and frequent manner can provide deterrent against this decline (Bruffaerts et al., 2018; Sanderson et al., 2018). Retention and five-year graduation status was predicted using recreation facility use resulting in those with more frequent use of campus recreation facilities having an increased likelihood of retention and graduation in five years (Huesman Jr. et al., 2009). The study took recreation card swipe data and academic progress records to predict retention and graduation status. Student use of recreation center was found to have a significant influence on both predicted probability of first year retention and five-year graduation. It was found that with the use of recreation facilities shifting one standard deviation higher than the mean, which was equivalent to about twenty-five visits throughout the semester, predicted a one-percent increase in retention and two-percent increase in five-year graduation (Huesman Jr. et al., 2009). GPA, retention, and graduation status impact the university and with more data to support campus recreation's importance provides recreation with the support from larger divisions across campus.

Another impact of campus recreation is on student's well-being. Out of class activity, of any kind, has shown benefit to college students helping them learn outside of a classroom setting (Forrester, 2006). When surveyed regarding their frequency and satisfaction of recreation facilities it was found that student's satisfaction with their campus recreation experience was a significant predictor of overall academic satisfaction. Academic satisfaction was described as the

likelihood they would return to the university, academic success, and sense of belonging on campus. Academic satisfaction was also linked to physical health and well-being benefits that one can receive through campus recreation services (Forrester, 2006).

The recreation center on campus provides strong emotional ties for undergraduate students at a university (Miller, 2011). Students reported increases in self-confidence, better time management skills, and perceived overall happiness. The recreation center on campus created opportunities for social bonding and students developed relationships with other students through their use of recreation facilities (Miller, 2011). GFC are one such opportunity, that allows students to interact with peers outside of the classroom setting and meet people who have similar interests as them. The top reported health benefits students associated with recreation participation from NIRSA's Recreation and Wellness Benchmark Survey were: feelings of wellbeing (91%), overall health (91%), fitness level (90%), stress management (86%), and self-confidence (83%) (Forrester, 2006). These numbers demonstrate the effect that campus recreation programs, which includes GFC, have on college campuses. GFC play a role in each of the above-mentioned items, how much of these reports are due to GFC involvement. This study aims to assess how much GFC influence self-confidence by measuring class attendance and self-efficacy levels.

Methods

Participants were selected based on the following criteria: they were a current student (undergraduate or graduate) of the University of Arkansas and visited the University Recreation Fitness Center, located in the Student Union on campus. The study was limited to the UREC-Fitness Center because the satellite facility only has access to cardiovascular equipment, selectorized equipment, free weights, and a group fitness studio. This allows for the ability to

control for activity that is outside of participation in GFC or independent exercise. Upon entrance to the facility all users must use an identification card from the University of Arkansas to be allowed access to the facility. Collaboration with UREC has allowed access to card swipe data for use of recruiting participants and to track entry data to the UREC-Fitness Center facility. The study is a pre-test post-test design, the same online survey was sent to participants as described below. The survey was sent out via email to users of the UREC-Fitness Center, participation in the survey was voluntary and students could opt to leave the survey at any time. The online survey was sent out at the beginning of the third week of classes in the Spring 2020 semester, and a reminder email to non-respondents was sent out a week later. The post-test survey was sent out during the ninth week of classes in the Spring 2020 semester, with a reminder email to non-respondents sent out a week later. A flow chart of data collection is represented in Figure 1.

The survey collected demographic information on all participants including age, gender, housing (on-campus or not), GPA, and how often they use UREC services. Self-reported history

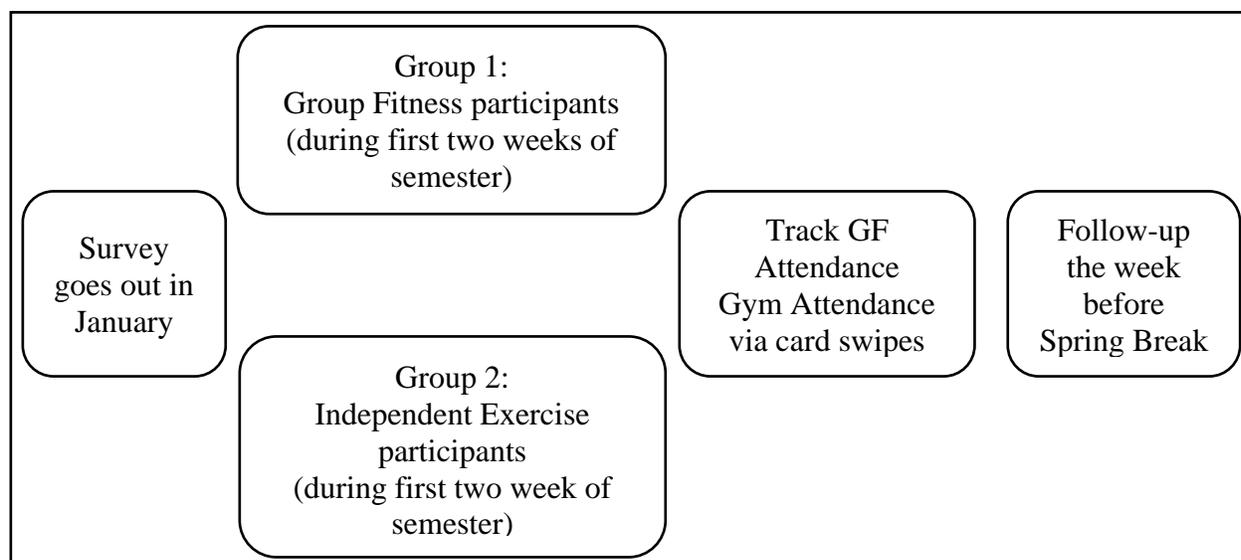


Figure 1
Survey Method Flow Chart

of physical activity and past GFC experience was collected along with self-reported frequency of use to the UREC-Fitness Center (both GFC and independent exercise). Questions were asked regarding the participant's prior or current sport participation and any other activities they participate in (i.e. club sports, swimming, running, etc.) and how long they have been participating in any form of exercise (i.e. week, month, etc).

Self-report physical activity was assessed using the Leisure-time Exercise Questionnaire (LTEQ) (Godin & Shephard, 1985). The questionnaire measures how many times a week an individual participates in physical activity (low to high intensity) for at least fifteen minutes at a time during a seven-day period. It was developed to provide a simple questionnaire that correlates to an individual's physical activity levels. There is a strong correlation between self-reported strenuous exercise and objective VO₂ max measurements with an $r = 0.38$ ($p < 0.001$) (Godin & Shephard, 1985). The LTEQ scale has a Wilkes Lambda of 0.88, showing that there is a relationship between self-reported physical activity and actual physical activity levels.

Items from the Physical Activity Enjoyment Scale (PACES) was used to assess one's current enjoyment of their chosen activity (GFC or not) (Kendzierski & DeCarlo, 1991). Questions are rated on a bipolar 7-point Likert scale, item examples being: "I enjoy it/I hate it", "I am very absorbed in this activity/I am not at all absorbed in this activity". All questions are in relation to a recent exercise bout (Kendzierski & DeCarlo, 1991). PACES report's a Cronbach's coefficient of 0.96 for test-retest reliability (Kendzierski & DeCarlo, 1991).

Self-efficacy was measured using the Health-Specific Self-Efficacy Scales – Physical Exercise Self-Efficacy (Schwarzer & Renner, 2009). The internal consistency for the exercise scale was reported as a Cronbach's alpha = 0.88 (Schwarzer & Renner, 2009). Five items related to self-efficacy were measured by asking "how certain are you that you could overcome the

following barriers?” using a 4-point Likert scale 1 being very uncertain to 4 being very certain.

Table 1 shows the five items and how the questions were worded in the survey.

Table 1
The Physical Exercise Self-Efficacy Scale

“How certain are you that you could overcome the following barriers?”	
I can manage to carry out my exercise intentions, ...	
Item	
1	...even when I have worries and problems.
2	...even when I feel depressed.
3	...even when I feel tense.
4	...even when I am tired.
5	...even when I am busy.

Once initial data were collected the participants GFC attendance and UREC-FC usage was tracked over the next 8 weeks. Upon entering UREC-Fitness Center and/or participating in GFC the student’s identification card is swiped via the computer and data are tracked in Fusion (a campus recreation tracking software). Prior to spring break at the university (the end of the 8 weeks), the participants will be surveyed again using the same survey initially provided to determine if there are any changes in self-efficacy or self-reported exercise levels.

Statistical Analyses

The independent variable was GFC participation or independent exercise. The change in SE will be measured as dependent on their participation in GFC or independent exercise. Descriptive statistics will be created to have average SE levels, participation measures, and make-up of the sample populations. Only individuals that completed both the initial and follow-up survey were included in the analysis. To answer the first research question, the participants who completed the pre and posttest portion of the survey were matched via email and a paired t-test was used to determine if there was a significant change in SE. Analysis for the second

research question was done by separating the GF and independent exercise groups and determining the amount of change in SE in the two groups. Change scores were calculated by subtracting the SE score _{final} from SE score _{initial}. A t-test was used to determine if there was significance difference between SE change scores between GF and independent exercise.

In order to determine if self-reported physical activity levels had an effect on SE scores the LTEQ was used to gain self-reported information on participant's physical activity level throughout one week. Ranges of answers were between 0 days to 7 days. For analysis activity level was grouped into three levels: low activity (0-2 days a week), moderate activity (3-5 days a week), and high activity (6-7 days a week). Multiple single factor ANOVAs were used to determine differences in pre-test SE scores, post-test SE scores, and changes in SE.

Physical activity enjoyment was determined through PACES. Possible scores ranged from 18 to 126. Based on participant's responses the scores were split into three groups: low physical activity enjoyment (a score of 90 or less), moderate physical activity enjoyment (score of 91-111), and high physical activity enjoyment (score of 112 or more). In order to determine the influence of physical activity enjoyment between groups multiple single factor ANOVAs were used to find differences in pre-test SE scores, post-test SE scores, and changes in SE.

History of exercise participation information was also collected in the survey in order to determine if there was a relationship between time of participation (week, month, year, etc.) and SE scores. Participants reported a history of GFC participation as early as 2015 to as recent as 2020. UREC-Fitness Center usage for independent exercise ranged from 2016 to 2020. The self-reported start dates of GFC and independent exercise were grouped by year and further narrowed down into three time periods, 2015-2016, 2017-2018, 2019-2020. The year is representing the full year and not broken down by the academic calendar. For analysis GFC and independent

exercise participants were calculated together. Significant difference in SE scores for different length of exercise participation was calculated using multiple single factor ANOVAs. Specifically, three tests: pre-test SE scores and time, post-test SE scores and time, and changes in SE and time.

Results

The survey regarding exercise participation was sent out to 2,937 students at the University of Arkansas at the beginning of the Spring 2020 semester. The first round of the survey was fully completed by 369 people (response rate of 12.6%) in January 2020. The second round of data collection was sent out in March 2020 to the 369 mentioned previously, 112 people completed the survey (response rate of 30.3%). A summary of demographic data can be found in Table 2. Participants who did not complete the post-test survey (n=257) SE scores were determined have an average of 14.06 (± 3.4), which was not found to be statistically different when compared to individuals who completed both the pre- and post-test.

Table 2
Demographic Summary of Data (N (%) or N \pm SD)

	Total (n=112)	Group Fitness (n=89)	Independent Exercise (n=23)
Gender			
<i>Female</i>	90 (80.4%)	77 (86.5%)	13 (56.5%)
<i>Male</i>	21 (18.8%)	12 (13.5%)	10 (43.5%)
Average Age	22 \pm 4.7	22 \pm 4.7	22 \pm 4.7
Class Standing			
<i>Undergraduate</i>	87 (77.7%)	68 (76.4%)	19 (82.6%)
<i>Grad</i>	25 (22.3%)	21 (23.6%)	4 (17.4%)
Race/Ethnicity			
<i>Asian/Pacific</i>	8 (7.1%)	4 (4.5%)	4 (17.4%)
<i>Black</i>	4 (3.6%)	3 (3.4%)	1 (4.3%)
<i>Indian/Alaskan</i>	2 (1.8%)	1 (1.1%)	1 (4.3%)
<i>White</i>	99 (88.4%)	78 (87.6%)	17 (73.9%)
<i>Other</i>	4 (3.6%)	4 (3.4%)	0 (0%)
<i>Hispanic</i>	6 (5.4%)	4 (4.5%)	2 (8.7%)

Table 2 (Continued)
Demographic Summary of Data (N (%) or N \pm SD)
Greek Life

<i>Yes, Sorority</i>	33 (29.5%)	28 (31.5%)	5 (21.7%)
<i>Yes, Fraternity</i>	0 (0%)	0 (0%)	0 (0%)
<i>No longer associated</i>	7 (6.3%)	7 (7.9%)	0 (0%)
<i>Not involved in Greek Life</i>	72 (64.3%)	54 (60.7%)	18 (78.3%)

Overall Changes in SE

Overall difference in self-efficacy (SE) was analyzed by paired t-test to determine a statistical change in SE from January to March for all participants (n=112). SE scores were 14.06(\pm 3.0) at the first survey and 14.14(\pm 3.0) at follow-up. There was no significant difference in SE for all participants ($p=0.68$). The GF group had a mean SE score of 14.25(\pm 3.1) upon initial survey and a score of 14.07(\pm 3.1) at post. Similarly, the independent exercise group reported a mean SE score of 13.48(\pm 2.6) initially and a score of 14.34(\pm 3.3) at post. Table 3 summarizes the SE scores for overall, GF, and independent exercise groups.

Table 3
Overall Changes in SE Summary

	Pre-SE Score	Post-SE Score	Average Change (p -value)
Overall (n=112)	14.06(\pm 3.0)	14.14 (\pm 3.0)	0.09 (0.68)
Group Fitness (n=83)	14.25(\pm 3.1)	14.07(\pm 3.1)	-0.18 (0.56)
Independent Exercise (n=29)	13.48(\pm 2.6)	14.34(\pm 3.3)	0.86 (0.56)

Difference in SE between Groups

The change in SE from initial to follow-up was determined by subtracting the SE score $_{\text{final}}$ from SE score $_{\text{initial}}$. A t-test analysis determined that there was no significant difference between the change in SE between the GF and the independent exercise group ($p=0.26$).

Influence of Physical Activity on SE

Table 4 summarizes the SE scores, activity levels, and average change in SE score by group. As previously described an ANOVA was used to compare activity level (high, moderate, low) and SE score for pre-survey data, post-survey data, and change in SE. SE scores were only

found to be significantly different among activity levels in the post-survey group. None of the other comparisons were statistically significant.

Table 4
SE Scores and PA

	Days per Week	Pre-SE Score ($p=0.30$)	Post-SE Score ($p=0.01$)	Average Change ($p=0.42$)
High Activity	6 – 7	14.9(± 2.7)	15.3(± 2.6)*	0.77(± 3.9)
Moderate Activity	3 – 5	14.2(± 2.6)	14.1(± 3.0)*	-0.42(± 3.4)
Low Activity	0 – 2	13.7(± 3.3)	13.6(± 3.2)*	0.08 (± 4.5)

* = $p<0.05$

Physical Activity Enjoyment and SE

PACES was used to determine level of physical activity enjoyment among participants. ANOVA was used to find differences in SE levels and physical activity enjoyment. Pre-test results found a statistically significant differences between SE score and level of physical activity enjoyment. Significance was also found between SE score and level of physical activity enjoyment at the post-test. While SE scores were significantly different among the groups, there was no statistical significance in the change in SE.

Table 5
SE Scores and Physical Activity Enjoyment

	Pre-SE Score ($p<0.001$)	Post-SE Score ($p<0.001$)	Average Change ($p=0.63$)
High PACES	16.3(± 2.9) *	16.5(± 2.9) *	0.35(± 3.9)
Moderate PACES	13.7(± 2.0) *	13.6(± 2.6) *	-0.11(± 3.6)
Low PACES	11.6(± 2.9) *	12.6(± 2.8) *	0.82(± 3.8)

* = $p<0.05$

History of Physical Activity and SE

ANOVA was used to compare participants SE scores with their year of participation initiation. Table 6 shows averages of SE scores pre- to post- test. Overall, no significant difference was found for any pre- to post- test SE scores regardless of when the participant started exercise participation. Though no significant difference was found between year of

participation and SE, the average change in decreased by a small factor for the 2015-2016 and 2017-2018 groups.

Table 6
SE and Length of Participation

Year of Participation Initiation	Pre-SE Score <i>p</i> =0.95	Post-SE Score <i>p</i> =0.80	Average Change <i>p</i> =0.81
2015 – 2016	14.3(± 2.5)	13.8(± 3.08)	-0.40(± 4.2)
2017 – 2018	14.1(± 3.2)	14.2(± 3.19)	-0.07(± 4.4)
2019 – 2020	13.9(± 3.2)	14.3(± 3.04)	0.33(± 4.6)

Discussion

The purpose of the first research question was to determine if there was a difference between SE scores in participants of GFC compared to people who independently exercise. No significant change was found across the two groups from pre- to post- test. Overall, SE scores did not have a significant change from pre- to post- test. The second research question inquired about the change in SE from pre- to post- test between GFC and independent exercise. When the change in SE scores from pre- to post- test were calculated GFC and independent exercise both had an average change of less than one-point, which was not found to be significant. This can be understood to mean there was no significant change in SE scores between individuals in GF and individuals who exercised independently. When accounting for levels of physical activity, exercise enjoyment, or history of exercise participation, no significance was found between change in SE scores. In summation, GFC did not have an effect on SE levels.

The results in this study reinforce previous conclusions by researchers in 2004 who found no difference in SE between individuals that had consistent attendance for an eight-week duration of GFC and the participants who had sporadic attendance (Shrigley & Dawson). While the present study was unable to utilize attendance records, Shrigley & Dawson were not able to determine a difference between SE levels in these two groups and corresponds to the fact that a

significant change in SE was not found among the current sample (2004). Another study surveyed SE scores immediately prior and after the completion of a GFC and found there to be a positive correlation of SE scores, meaning that SE increased at the conclusion of the exercise bout (Lamarche et al., 2009). While the results in the present study do not reflect a change in SE, the above studies are cross-sectional surveys compared to the longitudinal data collected in this study. Over an eight-week time period college students SE levels did not change, perhaps a longer time period is needed before a change can be seen.

Average levels of SE were reported to be 14.1 in the present study, other studies completed using the Health-Specific Self-Efficacy Scales – Physical Exercise Self-Efficacy found average SE scores to be 14.19 ± 3.50 (Hutchins, Drolet, & Ogletree, 2011; Schwarzer & Renner, 2009). The study surveyed college student's physical activity rates and exercise-specific SE levels. Positive moderate correlations between SE and physical activity were found ($r = 0.462$) (Hutchins, et. al, 2011). Similar levels of SE was found with different samples of college students, 14.1 at present and 14.19 previously.

The third research question aimed to see how attendance effected SE levels, unfortunately, attendance records were unable to be obtained from UREC due to the COVID-19 pandemic. On March 12, 2020 the Chancellor of the University of Arkansas sent out a message stating that starting the following week all academic class will move to an online platform. In response to the announcement, UREC canceled all GFC effective at the time of the Chancellor's announcement, and later closed all UREC facilities until further notice. Due to UREC's closure the third research question was unable to be answered as there was no longer access to attendance records via UREC's Fusion software which needed to be accessed on campus.

Overall SE scores had small changes from pre- to post- test, and analysis showed a decrease in SE in some cases. Similar studies have discussed that exercise did not increase SE, rather that people with higher SE levels are more likely to continue with an exercise program (Middelkamp et al., 2016). The study design may have lent to the minimal changes reported in SE. It is important to remember that SE is specific to the context of a situation (Davis, 2019). The beginning of the semester may provide students with a positive outlook on the development of new habits or the confidence that they can continue old behaviors, in this case the habit or behavior is exercise. The middle of the semester may lend itself to being more stressful assignments are due and mid-terms are occurring (Wininger, 2004). Those two factors may lead to minimal changes in SE or even a small decrease as was reported in this study. In addition, a large number of people participated in the initial survey (n=369), potentially a more representative picture of the SE of the student body. Due to the nature of the pre- to post- test design it required an additional response from this group of 369. As participation was optional, only 112 people responded to the follow-up survey. The average SE level for the total pre-test group was 14.1, which was the same of the SE reported from individuals who completed both parts of the survey. While it may be thought that those who respond to voluntary surveys may have higher levels of SE, this study did not determine that to be a reason why no change in SE was seen.

Additionally, the timing of post-test survey collection and the announcement of suspending GFC and closure of UREC may have added confounding variables in which the initial survey was not built to account for. While students were completing the survey, there may have been other factors, like increased anxiety and mental health concerns, that may have influenced their SE. As previously mentioned, context is crucial in assessing SE level and the

context for these students rapidly changed (Davis, 2019). This may be one possible reason for not finding a significant change in SE scores. The students are finding that they are having limited access to gyms which may lead to them not feeling as efficacious to continuing to exercise regardless if they are tired, busy, or stressed. When filling out the post-test survey it may have decreased their SE scores due to the changing environment around them. There is no concrete information available as to how the pandemic will affect college students, it important to note there was no significant change in SE and SE levels did not decrease significantly. Even in the midst of the pandemic exercise participation (GFC and independent exercise) maintained consistent SE scores. It did not matter what modality in which an individual utilized, nor did level of physical activity, or year of participation initiation influence any change in SE. The consistency in SE scores may be due to exercise participation no matter the type: GFC or independent exercise.

Limitations

Design

The primary limitations to this design are that group fitness participants are predominantly female at this university, as well they are not randomized for participation in this study. Similar to other research done on GFC, the male population in this study was 18.8% (Lamarche et al., 2009). Randomization for the purposes of this study may not represent activity in the real-world, as people have different preferences about exercise activity. The pre- and post-survey results address this concern to be able to measure the change in self-efficacy and compare between both groups. While GFC are attended frequently by females, different formats have different percentages of gender participation. The main gym spaces at UREC have reported high usage by male students, and thus the two differences in exercise preference may not allow for

direct comparison in this study. To adjust for this concern the UREC fitness center was the only facility used for sample collection. The UREC-Fitness Center has a high percentage of females who utilize the gym and the facility was used in order to obtain as equal number of females as possible in each cohort. It is possible that those who do not participate in GFC have a higher level of self-efficacy to begin with limiting the amount of change they report to have during the study. Higher self-efficacy may be the reason they are not participating as they do not need the social persuasion received in a class setting. This concern was addressed by measuring the change in self-efficacy in both groups pre- to post- instead of only comparing the groups at one point in time.

The study did not have a large sample of participants in the independent exercise group (n=23). Compared to the sample size of the GFC group (n=89), there is a limit to the strength in statistical measures with a small population. Respondents in the independent exercise group may not represent the larger population of students who participate in independent exercise. There may be a potential for them to have a higher SE level than individuals who chose not to participate in the voluntary study. If the study is repeated, a focus needs to be placed on recruiting an equal amount to both groups in attempt to remedy this issue. Generalizability may also be a limiting factor since the population consisted of young college students.

An Unexpected Pandemic

Again, attendance records were unable to be analyzed due to the closure of UREC in response to COVID-19. The timing of post-test survey collection and the announcement of suspending GFC and closure of UREC may have added confounding variables in which the initial survey was not built to account for. As discussed above, access to facilities and mental health concerns are two factors that may have influenced students SE during the survey. In

addition, campus closure limited the access to statistical software, and thus, all statistical analysis was done using Microsoft Excel 2019. This limited the complexity of analysis that was able to be done.

Future Research

GFC do not appear to have an effect on SE scores. The question still remains: how does one increase exercise SE levels in participants? College recreation programming should look into the possibility of an event designed to educate participants on how to create workouts, utilize various equipment, and how to remain consistent. The education tool is part of the constructs of SE and utilizing it in a stronger role may provide more change in SE than just GFC (Bandura, 1977).

This study in particular may benefit from being repeated due to the confounding limitations that COVID-19 provided. It would allow for the revisiting of survey questions and slight revision of questions would be recommended. The LTEQ was a great tool, but the wording did seem to confuse participants as it asked how many times a week an individual participated in at least fifteen minutes of a certain intensity of physical activity. People appeared to count fifteen-minute intervals of participation rather than 0 through 7 days a week that the question was in regards too.

Conclusion

There was no significant change in SE overall, or between GFC and independent exercise groups. It has been shown repeatedly the importance that exercise has on mood state, physical health, and overall well-being (Forrester, 2006; Penedo & Dahn, 2005; Lynett, Craft, & Landers, 1998). Consistent exercise is a key factor and SE is a strong predictor of an individual's likelihood to continue exercise (Penedo & Dahn, 2005). Modality of exercise (GF and

independent exercise) was studied to determine its role in exercise SE scores. It was found that mode of exercise does not have a significant effect on SE. Understanding the role that GFC has on SE scores can assist in the development of programming to benefit students in collegiate recreation. Though no difference in modality was found, research done in times of pandemic can yield confounding results. This study suggests that individuals participating in exercise, no matter the modality, can maintain consistent SE scores even in times of pandemic.

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Appendix

IRB Protocol Approval



To: Katherine E Dalton
 BELL 4188
From: Douglas James Adams, Chair
 IRB Committee
Date: 01/30/2020
Action: **Expedited Approval**
Action Date: 01/28/2020
Protocol #: 1912237984
Study Title: The Effects of Group Fitness Classes on Self-Efficacy
Expiration Date: 01/27/2021
Last Approval Date:

The above-referenced protocol has been approved following expedited review by the IRB Committee that oversees research with human subjects.

If the research involves collaboration with another institution then the research cannot commence until the Committee receives written notification of approval from the collaborating institution's IRB.

It is the Principal Investigator's responsibility to obtain review and continued approval before the expiration date.

Protocols are approved for a maximum period of one year. You may not continue any research activity beyond the expiration date without Committee approval. Please submit continuation requests early enough to allow sufficient time for review. Failure to receive approval for continuation before the expiration date will result in the automatic suspension of the approval of this protocol. Information collected following suspension is unapproved research and cannot be reported or published as research data. If you do not wish continued approval, please notify the Committee of the study closure.

Adverse Events: Any serious or unexpected adverse event must be reported to the IRB Committee within 48 hours. All other adverse events should be reported within 10 working days.

Amendments: If you wish to change any aspect of this study, such as the procedures, the consent forms, study personnel, or number of participants, please submit an amendment to the IRB. All changes must be approved by the IRB Committee before they can be initiated.

You must maintain a research file for at least 3 years after completion of the study. This file should include all correspondence with the IRB Committee, original signed consent forms, and study data.

cc: Michelle Gray, Investigator
 Erin Kaye Howie Hickey, Key Personnel