Pilot Study: The Relationship Between Self-Efficacy and Adherence to an Exercise Program

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Abstract

Obesity has exponentially increased over the last few decades within the United States. In relation to obesity, several of the top leading causes of death in the United States are directly related to obesity, including cardiovascular diseases, type II diabetes, and variations of cancer. To combat chronic obesity and comorbidities, current guidelines for management of obesity propose a multi-modal approach, including lifestyle modification and behavioral counseling. In this, self-efficacy is considered to be a reliable predictor of adherence or withdrawal from an exercise program. This study utilized the General Self-Efficacy scale (GSE) to observe an individual's self-efficacy in relation to adherence to the exercise protocol. The fitness data was collected via provided FitBit, analyzing the participant's daily active minutes, steps, and calories burned. The individual's adherence was measured based on whether the individual met their assigned weekly exercise protocol. The individual's self-provided GSE scale score and rate of adherence were analyzed at the end of the study. It was determined that no participant truly met all their weekly goals; however, some participants had higher step and moderate-to-vigorous (MTV) exercise averages compared to others. The preliminary data was inconclusive between the long-term relationship between self-efficacy and adherence to an exercise program due to limitations within the study; however, predictive conclusions can be drawn. This paper also discusses future practical implications for revision of this study to improve the quality of future results.

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Erin Quick graduated from Augusta University with a BA in kinesiology, and is now enrolled in AU's Doctorate of Physical Therapy (DPT) program. Quick believes her career as a physical therapist will allow her to be a light for individuals within her community. She explains that physical therapy revolves around providing quality patient education, healthcare, and developing genuine relationships that build trust and serve as professional support for patients. Quick is excited to start her journey in becoming a physical therapist and to see the lives she impacts and those that impact her throughout her career.

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Dr. Hannah Bennett is an assistant professor in the Department of Kinesiology. She graduated with a bachelors in psychology from the University of Connecticut and earned an MS in kinesiology with a concentration in sport and exercise psychology from Georgia Southern University. She earned her PhD n human performance from Middle Tennessee State University. Dr. Bennett is currently the program coordinator for the undergraduate health and physical education degree within her department and teaches classes ranging from elementary physical education teaching methods to sport and exercise psychology. Dr. Bennett's research interests include social justice and diversity within sport and physical education, LGBTQ+ student-athletes, body image and psychological dispositions of female CrossFit athletes, and mental skills training within the performing arts. She continues to consult with athletes and exercisers in the surrounding areas.

BACKGROUND

Obesity has exponentially increased over the last few decades within the United States. According to the Centers for Disease Control and Prevention (2021), as of 2020, 42.2% of American adults are classified as obese, compared to just 16.2% in 2008. An individual is classified as obese when their body mass index (BMI) is more than 30 kg/m2. Obesity affects all ethnic groups; however, it is most prevalent in female non-Hispanic black adults and male Hispanic adults (Petersen, Pan, & Blanck, 2019). Furthermore, several of the top leading causes of death in the United States are directly related to obesity, including cardiovascular diseases, type II diabetes, stroke, asthma, and certain variations of cancer. Although it affects nearly half of the United States' population, obesity is still considered an untreated medical condition and is a significant economic burden on the United States, costing the health care system approximately 150 billion dollars annually (Finkelstein et al., 2009).

Current guidelines for weight loss and management of obesity propose a multi-modal approach, including lifestyle modification, behavioral counseling, pharmacotherapy, and surgery (Garvey, et al., 2016). According to the 2016 American Association of Clinical Endocrinologists and American College of Endocrinology (AACE/ACE) guidelines, the first recommended step for treating obese individuals is an active lifestyle intervention, which includes adding exercise, modifying the individual's diet, decreasing caloric intake, and adding behavioral or motivational intervention. The next steps include pharmacotherapy and surgical management; however, surgical management is only suggested for individuals with a BMI of greater than 40 kg/m2 (Garvey et al., 2016). The overall goal of multi-step intervention is to promote weight management, patient wellness, and enhance the patient's quality of life (Seger et al., 2016).

There are various methods to preventing and treating individuals with chronic obesity; however, exercise is the number one prevention tool as well as behavior modification. According the 2020 World Health Organization (WHO) and Physical Activity Sedentary Behavior Guidelines, physical activity

recommendations are 150 to 300 minutes of moderate exercise or 75 to 150 minutes of vigorous exercise, and 2 or more days of strength training each week. Unfortunately, approximately 1 out of every 5 adults in the United States meet these recommended guidelines (Sullivan & Lachman, 2017). These activity levels may not reverse the chronic effects of obesity, but they can help improve cardiovascular health and physical fitness. To transition from obese to overweight, it is recommended to participate in at least 60 minutes per day of moderate intensity and between 45 to 60 minutes per day to transition from overweight to a normal BMI for an individual's height and weight. A normal weight loss is approximately 1–2 pounds (0.5–1 kg) per week, which means decreasing caloric intake by 500–1,000 kcal per day for a period of time, varying per individual (Stone, DiPietro, & Stachenfeld, 2021). Exercise alone is not enough to maintain weight overtime, but nutrition plays an active role in weight loss and maintenance.

Poor nutrition can result in the development of obesity, its comorbidities, and nutritional deficiencies. Today, many individuals overconsume high-calorie, low-nutritional food that is overly processed. Overweight and obese individuals, compared to normal-weight individuals, report low intake of fruit, micronutrient intake, and lower quality diets (Astrup & Bügel, 2019). These lack of vitamins and minerals affect the function of important physiological systems and support the development of chronic diseases. For instance, a higher body fat percentage, lack of physical activity, and poor nutrition may contribute toward 87% of newer cases of type II diabetes because of how the lack of micronutrients affect glucose metabolic pathways and pancreatic β-cell function (Astrup & Bügel, 2019). Although further research is needed to understand the effects of micronutrient deficiencies and obese individuals, it is important to note the influence of nutrition on an individual's overall health.

Pharmacotherapy is an additional option that incorporates modification of maintaining weight, preventing unhealthy weight gain, and eating behaviors. Modern pharmacology suggests different versions of antiobesity drugs to focus on treating obesity-associated comorbidities in individuals, such as hypertension or hyperglycemia; however, it does not have significant evidence due to the lack of obese individuals in clinical trials. Antiobesity drugs focus on treating obesity-associated comorbidities in individuals over a specific BMI who fail to respond to lifestyle intervention after six months of treatment (May, Schindler, & Engeli, 2020). The goal is not solely to reduce the individual's weight. In fact, individuals taking prescribed antiobesity drugs may only see a weight decrease of only 5-10% over a 12-month period or experience even a slight weight gain (May, Schindler, & Engeli, 2020). Furthermore, depending on the prescribed drug, individuals may see a weight regain after weight loss treatment. Therefore, antiobesity medications should be categorized as a next step treatment for individuals and not the only treatment option.

Self-efficacy is defined as the extent to which an individual believes they can carry out an action or behavior (Bandura & Walters, 1977). Self-efficacy is considered a reliable predictor of adherence or withdrawal from an exercise program. Self-efficacy expectations consist of performance accomplishments, vicarious experiences (i.e., modeling), verbal persuasion, imaginal experiences, physiological states, and emotional states, which determine an individual's athletic performance (Feltz, 1984). According to Bandura's Social Learning Theory (1977), behavioral changes and adherence can be mediated by an individual's self-efficacy (Desharnais, Bouillon, & Godin, 1986). Self-efficacy judgments are determinants because they are hypothesized to influence an individual's thoughts and emotional patterns, including pride, shame, happiness, sadness, which directly affect an individual's motivation to complete a task (Feltz & Öncü, 2014). Whether in an athletic competition or a weight loss program, an individual's self-efficacy beliefs can surpass their actual performance, potentially resulting in enhanced performance. In contrast, if the individual has no incentive to complete the goal, this could result in poor performance. The formation of self-efficacy judgments is based upon the individual's perception of their surrounding environment (Bandura, 1997). Additionally, past

performances on specific tasks are significant in forming future self-efficacy judgments (Feltz & Öncü, 2014). If an individual has successfully performed a specific task in the past, then the individual's self-efficacy will increase if presented the same task in the future; however, if the individual experienced failure with the task, then self-efficacy will decrease and hinder performance (Weinberg & Gould, 2019; Bandura & Locke, 2003).

An individual's perceived self-efficacy can affect their behavior in several ways, including (1) whether the individual attempts to perform the task, (2) the individual's level of determination to complete a task when faced with difficulty, and (3) how successful an individual performs a given task (Desharnais, Bouillon, & Godin, 1986; Maddux, 1995). The Bandura theory (1986) suggests that when an individual's self-efficacy increases, they become more dedicated to the presented task. The strength of self-efficacy is reflective of how likely an individual is to continue working toward their goal or outcome expectancy. With this said, the expectation of self-efficacy and expectation of outcome is important to distinguish (Bandura, 1986). The expectation of outcome is defined as, "[a] person's given behavior that will lead to certain outcomes" (Desharnais, Bouillon, & Godin, 1986; Bandura, 1978). Furthermore, Bandura (1978) discusses how the expectation of self-efficacy is a more reliable determining factor of behavior compared to the expectation of outcome for an individual.

Desharnais et al. (1986) studied the prediction of an individual's rate of adherence to an exercise program based on the individual's initial expectation of outcome and self-efficacy. Using Social Learning Theory (1986), they determined that self-efficacy was a more reliable determinant factor compared to the individual's outcome expectancy. Participants who withdrew from the program displayed lower levels of self-efficacy, exhibiting lower self-confidence, less certainty of task completion, and high expectations from the program. Similarly, Dennis and Goldberg (1996) studied the relationship between self-efficacy types and weight loss outcomes in overweight and obese women. They found in the pre-and post-treatment measures, women with positive self-efficacy lost approximately twice the weight compared to woman with a lower self-efficacy. At the end of the study, obese individuals, who completed the study, demonstrated improved self-efficacy similar to non-obese individuals who were not a part of the study.

In summary, these studies demonstrate that obese individuals often display lower levels of self-efficacy compared to non-obese individuals. If an individual's self-efficacy is perceived as lower, then the individual is more likely to withdraw from the exercise program or goal (Bandura, 1997; Jones et al., 2005). Through behavioral intervention and evaluation of self-efficacy, participants within the exercise program can experience improved adherence rates, successful weight loss and control, and participant wellness education (Sullivan & Lachman, 2017). Intervention, overall, can enhance participants' quality of life by helping participants lose and maintain weight, improve self-efficacy, and live a healthier lifestyle.

OBJECTIVE

The objective of this study was to analyze the relationship between self-efficacy and adherence to an exercise program, particularly the exercise prescription guidelines. It was hypothesized that individuals who scored higher on the General Self-Efficacy Scale (GSE) would meet or surpass their recommended protocol, which was measured via the participant's Fitbit. The goal of this study was to provide future recommendations to practitioners and encourage patients and clients, allowing them to feel valued and supported throughout their health journey.

METHODS

Participants and Recruitment

The study's criteria included 20 participants, male and female, enrolled at the General Internal Medicine Faculty Clinic between the ages of 18-65 years old, with a BMI between 25 to 30 kg/m2 and have commercial insurance. All participants were given a pseudonym, which are utilized within the

results and discussion sections to protect participant confidentiality. Exclusions were made for pregnancy, individuals who were oxygen-dependent at home, those who were immobile, and those who experienced moderate to advanced systemic disease that prevented the use of anti-obesity medications. Within this study, mobility, and medical intervention were necessary and deemed valid exclusions by doctors. The candidate's primary physicians consulted them about this opportunity within this study. If the candidate was interested in the research project, they were informed of the study and consented by their primary care physician. The physicians were an active part of the research team, and if their candidate agreed to participate in this research project, they would be enrolled for one year. This aspect of the study focused on the first three months of intervention.

Table 1: Participant Demographics

Measure	All N = 8	Females N =8	Males N = 1
Age (yrs.)	43.5 ± 6.33	44.43 ± 6.21	37
Weight (kg)	102.99 ± 20.14	98.40 ± 16.64	135.1
Estimated BMI*	36.88 ± 5.63	36.79 ± 6.08	37.5

*BMI = Body Mass Index

Measures and Instruments

This study was a yearlong multipronged wellness intervention; however, this pilot study utilized the GSE to observe a participant's self-efficacy in relation to their adherence to the established protocol. For the yearlong research project, participants were assessed at months 0, 3, 6, and 12. Throughout the 12 -month intervention, team members analyzed and collected various health markers of participants along with physical activity data from the Fitbit. During fitness measurements, height, weight, and BMI were collected via an InBody Scanner. Fitbit technology was used to organize and present knowledge to participants to track their sedentary time, active minutes, and overall daily steps. If participants already had a Fitbit, already had a Fitbit, they were allowed to use their personal accounts. The American College of Sports Medicine (ACSM) recommends 225 to 420 minutes of moderate to vigorous (MTV) activity each week to maintain a healthy lifestyle. With that being said, participants were given a protocol of 300 minutes of MTV activity each week. The goal for the step protocol was based on the participant's baseline. Specifically, participants were encouraged to walk three 10-minute walks at a brisk pace. Each week, 10-minute increments were be added based on participants' progress.

Furthermore, each participant was given a General Anxiety Disorder (GAD-7) questionnaire, a Patient Health Questionnaire (PHQ-9), a Profile of Mood States (POMS), an adult General Self-Efficacy Scale (GSE), a Physical Activity Enjoyment Scale (PACES), and a Beck Depression Inventory (BDI). Each of the following measurements were given to patients every three months. These measurements allowed the research team to assess changes in the participant's quality of life, wellness, and fitness level, and affect toward the program in general. While this was a yearlong study, the purpose of this project focused on the participant's self-scoring on the GSE and adherence to the exercise protocol. It was hypothesized that participants would demonstrate positive changes within the measurements collected, suggesting an improved quality of life and wellness.

PROCEDURES

Participants were required to meet with the kinesiology and behavioral health team once in the beginning of the study. Here, they participated in testing and received their Fitbit to log guided exercises through a provided log-in, unless the participant had a personal account prior. The participant's data was collected via the Fitbit software so fitness trends and overall wellness could be analyzed. Participants were encouraged to view provided modules and guidance related to behavioral counseling, motivation, and adherence techniques. These were provided in the MetricWire software. The

Table 2: Timeline of Pilot Study Events

Event	Date of Study (Month of Week Marker
Pre-visit Assessment	Pre-study
Physician, Collecting Anthropometric Measurements, Vital Signs, Basic Blood Work	0, 3, 6, 12
Control Group: General Nutrition Education	Month 1: 1 visit
Exercise/Behavioral Counseling	Month 0 -3: Guided weekly video Month 4-6: Guided biweekly video Month 7-9: Guided monthly video Month 10-12: No guided videos. There will be open access to the resource library.
Guided Exercise Intervention	Participants will receive EMA notifications each week through metric wire system.

exercise regimen is a step count progression based on the participant's current exercise level. Participants could choose to walk or participate in activity of choice in their preferred environment, such as in their neighborhood or fitness center. The only requirement for participant physical activity was to remain within the target heart rate zones of a 70-85% maximal heart rate, which would be estimated from individual's resting heart rate. This pace was suggested to meet the minimal activity ACMS guidelines.

General Self-Efficacy Scale (GSE)

The General Self-Efficacy Scale (GSE) is a 10-question scale designed by Matthias Jerusalem and Ralf Schwarzer in 1981 that is globally available in 33 different languages. The purpose of the scale is to assess one's self-belief of how they approach and manage different stressors in life. Furthermore, the GSE also assesses an individual's optimism and accounts for personal agency (i.e., the belief that one's actions are responsible for successful outcomes), which is highly representative of one's self-efficacy. To take this assessment, an individual responds to 10 questions asking how capable they feel within a given specific situation by ranking themselves on a 1 to 4 scale, with 1 being "not true at all" and 4 being "exactly true." The GSE ranges from scoring a minimum of 10 points to a maximum of 40 points. To score the scale, take the sum from each column, calculate the total, and find the mean score.

Data Analysis and Timeline of Analysis

The anthropometrics, General Anxiety Disorder (GAD-7) questionnaire, Patient Health Questionnaire (PHQ-9), Profile of Mood States (POMS), and the adult General Self-Efficacy Scale (GSE) were analyzed every three months to address changes in the participant's quality of life and wellness based on the collected scores and measurements. This was where the relationship between self-efficacy and exercise program adherence was observed. At each checkpoint of the study, data was analyzed to produce an overall trend of participants to see if their self-efficacy was associated with adherence to their weekly exercises within the program.

For this study, participants' scores on the GSE from baseline (month 0) to month 3 were compared and their daily step count observed. Preliminary observations about the score compared to their step count was also made. To do this, the participants Fitbit data was downloaded and organized into

From here, the data was analyzed to see which participants did or did not complete both their weekly step count and MTV activity minutes. Furthermore, the GSE scale was scored for each participant and entered a new spreadsheet (Figure 1). Two average means of participant scores were calculated. One column including all participants and one column not including participants who withdrew from the study.

RESULTS

Figure 1 displays the mean average of self-efficacy scores of participants from study. The mean average of participants within the study was 3.41, which is an average score of 34.1 out of 40 on the GSE. Participants who withdrew from the study were not included within the average.

Participants Tracy, Mary, Daniel, and Shannon had the highest report self-score on the GSE with a 39 to 40 on the scale. Data from participants who withdrew from the study data was not included in the study. In Figure 2, Daniel's data from the first month of the study is displayed. Daniel did not meet the recommended 10,000 steps every day for the first month; however, he was close to reaching his goal. Daniel also had the highest average of MTV activity minutes of out of all participants within the study. In Figure 3, Tara did not meet her recommended daily steps and had a high average of 1,256 sedentary minutes. She also had only 0.83 fairly active minutes (i.e., moderate activity) and 0.92 very active minutes (i.e., vigorous activity) for the first month. In Figure 4, Delora had a higher average step count and MTV activity compared to participant Tara.

Figure 1: Mean Average of Self-Efficacy Scores of Participants from Study

Participant Pseudonym	Self-Score (Out of 40)	Dropped Out	Mean Average
Tracy*	39		3.9
Delora	30		3.0
Tara	36		3.6
Emily	34		3.4
Edward	38		3.8
Cecile	38		3.8
Mary*	39		3.9
Elaine	37		3.7
Kathleen	31		3.1
Jennifer	32		3.2
Cathy	29		2.9
Ruth	29		2.9
Rachel	37		3.7
Paul	37		3.7
Erica	38		3.8
Wendy	36	Yes	
Deborah	30		3.0
Peggy	34		3.4
Carmen	37	Yes	
Daniel*	39		3.9
Charles	28		2.8
Doris	35		3.5
Marla	31		3.1
Chris	30		3.0
Shannon*	40	Yes	
Mean Averages of Score:	**34.56**		**3.413636364**

Figure 2: Data from Daniel during First Month of Study

Daniel					
Date	Daily Steps	Minutes Sedentary	Minutes Lightly Active	Minutes Fairly Active	Minutes Very Active
8/12/21	9,394	735	267	38	35
8/13/21	9,814	743	339	55	9
8/14/21	5,189	813	233	0	0
8/15/21	7,356	695	221	26	6
8/16/21	8,659	742	315	38	12
8/17/21	7,622	745	274	19	8
8/18/21	6,003	805	236	13	6
8/19/21	6,341	745	254	24	6
8/20/21	7,678	695	357	24	1
8/21/21	542	1,269	32	0	0
8/22/21	0	1,440	0	0	0
8/23/21	9,366	677	305	89	37
8/24/21	8,771	720	272	51	22
8/25/21	7,926	631	303	19	6
8/26/21	6,998	803	277	0	0
8/27/21	11,394	498	461	136	37
8/28/21	4,674	805	209	24	4
8/29/21	6,817	857	215	6	19
8/30/21	5,948	615	248	16	7
8/31/21	8,114	682	303	39	8
9/1/21	11,373	765	256	35	42
9/2/21	11,199	574	254	66	54
9/3/21	11,623	969	364	73	34
9/4/21	9,806	641	385	49	24
9/5/21	9,617	707	285	36	8
9/6/21	9,055	756	267	45	13
9/7/21	8,192	753	240	33	23
9/8/21	6,461	867	229	20	14
9/9/21	9,762	780	276	51	32
9/10/21	6,659	775	356	7	1
9/11/21	11,616	689	386	49	20
Averages:	7,869.97	773.9	271.58	34.87	15.74

Figure 3: Data from Tara during First Month of Study

Tara					
Date	Steps	Minutes Sedentary	Minutes Lightly Active	Minutes Fairly Active	Minutes Very Active
10/4/21	4,885	1,252	188	0	0
10/5/21	4,872	1,239	201	0	0
10/6/21	7,589	1,109	331	0	0
10/7/21	1,656	1,358	82	0	0
10/8/21	1,203	1,205	74	0	0
10/9/21	2,021	1,322	118	0	0
10/10/21	438	1,419	21	0	0
10/11/21	6,844	1,138	302	0	0
10/12/21	6,593	1,142	298	0	0
10/13/21	5,670	1,188	252	0	0
10/14/21	0	1,440	0	0	0
10/15/21	1,635	1,214	97	0	0
10/16/21	4,489	1,059	221	0	0
10/17/21	281	1,423	17	0	0
10/18/21	7,268	1,146	294	0	0
10/19/21	8,099	1,086	354	0	0
10/20/21	6,753	1,135	305	0	0
10/21/21	0	1,440	0	0	0
10/22/21	0	1,440	0	0	0
10/23/21	0	1,440	0	0	0
10/24/21	0	1,440	0	0	0
10/25/21	7,319	1,177	248	5	10
10/26/21	8,968	1,114	310	11	5
10/27/21	6,527	1,213	216	4	7
Averages:	3,880	1,256	163.7083333	0.833333333	0.916666667

Figure 4: Data from Delora during First Month of Study

Delora						
Date	Steps	Minutes Sedentary	Minutes Lightly Active	Minutes Fairly Active	Minutes Very Active	
8/25/21	0	1,440	0	0	0	
8/26/21	12,194	1,174	138	17	111	
8/27/21	5,920	742	200	19	4	
8/28/21	10,319	575	203	7	53	
8/29/21	14,133	732	148	6	91	
8/30/21	14,523	720	253	4	92	
8/31/21	12,861	613	194	30	59	
9/1/21	12,404	749	130	15	71	
9/2/21	4,948	768	256	0	0	
9/3/21	13,026	781	215	1	66	
9/4/21	5,324	574	279	0	0	
9/5/21	12,263	728	145	2	80	
9/6/21	14,375	545	165	17	86	
9/7/21	15,659	621	305	4	77	
9/8/21	6,589	646	323	9	0	
9/9/21	6,882	820	318	15	2	
9/10/21	3,701	1,440	0	0	0	
9/11/21	3,664	1,440	0	0	0	
9/12/21	4,973	1,440	0	0	0	
9/13/21	4,018	1,440	0	0	0	
9/14/21	7,352	1,440	0	0	0	
9/15/21	5,979	1,440	0	0	0	
9/16/21	3,857	1,440	0	0	0	
9/17/21	14,694	1,440	0	0	0	
9/18/21	5,001	1,440	0	0	0	
9/19/21	10,888	1,440	0	0	0	
9/20/21	13,041	1,440	0	0	0	
9/21/21	14,215	1,440	0	0	0	
9/22/21	15,219	1,440	0	0	0	
9/23/21	12,065	1,440	0	0	0	
9/24/21	5,405	1,440	0	0	0	
Averages:	9,209	1,091	105.5483871	4.709677419	26.4	

DISCUSSION

As previously mentioned, the goal of this study was to analyze the relationship between self-efficacy and the level of adherence GSE. It was hypothesized that participants who had a higher self-efficacy (30 <) would demonstrate a higher level of adherence to the exercise program's step protocol. The Fitbit data was analyzed from the baseline to month three to show whether participants met their step protocol each week. This relationship could demonstrate their level of adherence to the exercise program. Given the purpose of the GSE centered around the self-efficacy, one could argue that this relationship demonstrates the participant's level of adherence. Figures 1, 2, and 3 are of three participants who best represent the observed trends.

Overall, 88% of participants scored themselves higher on the GSE (30<). Less than four participants scored themselves moderately (20 - 30) on the GSE scale. The average of the self-efficacy, including participants who withdrew, was a 34.56 out of 40. The highest self-scored participants within the study are marked with an asterisk in Figure 1. Most participants met their goals for the first two weeks of the program; however, the data became inconsistent toward the end of the 3-month study. Despite this, Daniel was the only outlier. He scored a 39 out of 40, met 90% of his weekly goals, and earned relatively high MTV activity minutes. In contrast, 89% of participants had higher average sedentary minutes and light activity minutes compared to fairly active minutes or very active minutes.

In this study, Daniel's preliminary data best represented Bandura's Social Learning Theory (1977). He highly scored himself and met more of the assigned goals compared to other participants. In contrast, Delora scored herself lower on the GSE compared with Tara; however, Delora (Figure 4) had higher average steps and activity minutes than Tara (Figure 3). Furthermore, in Figure 1, participants Shannon, Carmen, and Wendy each ranked them-

selves higher on the GSE; however, they withdrew from the study. This trend directly contradicts Desharnais et al. (1986) and Bandura (1986), which suggests that as an individual's self-efficacy increases, their adherence directly increases. Participant adherence during the first month could be related to different variables, including required meetings with the research team or staff involvement. Participants were required to meet once with the kinesiology research team at the beginning of the study to discuss the goals of the study and for general assessment. After the required meeting in the first month, the following participant data became more inconsistent. Having required in-person or online meetings with participants could potentially increase adherence to an exercise program. These meetings could serve as check-in points to see how the participant is managing the study. These adaptations to the protocol could also hold participants accountable to meeting their weekly goals and provide a clearer relationship between self-efficacy and level of adherence.

CONCLUSION

In conclusion, the preliminary data was inconclusive between the long-term relationship between self-efficacy and adherence to an exercise program due to limitations within the study. Furthermore, the preliminary data observed yielded varied results that aligned, yet contradicted Albert Bandura's Social Cognitive Theory (1986) and Jones et al. (2005). Participants, such as Daniel, ranked himself highly on the GSE and met most of his assigned goals within the study; however, participants, such as Delora and Tara, had an inverse relationship in their self-efficacy scores. This is common pattern for participants who volunteer in intervention studies. They often score themselves highly because they often seek out exercise interventions, but they fail to meet the provided goals. The higher self-scores could potentially represent an inaccurate self-reflection of self-efficacy of participants, meaning that individuals believe they are more capable of a task than they truly are. Although this study focused on the preliminary data from the first month of the pilot study, predictive conclusions could be drawn for the upcoming months of the study. As the 12 months of the study are completed, participants with a higher self-efficacy score should demonstrate a higher level of adherence to study goals. Although self-efficacy is considered to be a reliable predictor of adherence, a longer study is needed to observe the long-term relationship between self-efficacy and adherence.

PRACTICAL IMPLICATIONS

This study was initially a 12-month multipronged approach effective with lifestyle change study; however, due to limitations was reduced to 3-months. Limitations included, but not limited to moderate participant withdrawal, limited access and follow-up with participants, and limited controllability of participants as well as FitBits. As a result, there was a lack of quality data analysis to draw definite conclusions for this pilot study. Despite this the limitations of this study, revisions will be made so a second study can take place.

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