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Long-Term Impact of Lifelong Fitness: Examining Longitudinal Exercise Behavior in College Students

Garrett Drake

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Garrett Drake

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by Garrett Austin Drake

Has been approved

at the

Graduate Student of Clinical Psychology

George Fox University

Signature:

Mary Peterson, PhD

Mary Peterson, PhD, Chair

Members:

Kathleen Gathercoal Ph.D.

Kathleen Gathercoal, PhD

James R. Foster

Jim Foster, PhD

Date: 8.28.17

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Garrett Drake

Graduate Department of Psychology

George Fox University

Newberg, Oregon

Abstract

Over time, the United States population has gradually shifted to an increasingly inactive lifestyle, and there has been a decline in health behavior. Only 50% of the population meet the recommended guidelines for weekly physical activity. With this glaring increase of inactive lifestyles, programs designed to increase health behavior change have become crucial. One solution to this problem has been a required Lifelong Fitness class at George Fox University where new college students learn knowledge and skills to implement for healthier lifestyles during this transformative time. A multiple regression model predicting long-term exercise by pre-minutes of exercise, post-minutes of exercise, and current exercise self-efficacy was fit to data. The model accounted for 18% of variance shared in all the predictors. When all variables were entered in the model, pre-minutes of exercise and current exercise self-efficacy were significant. There were no significant changes in mean levels of exercise longitudinally, suggesting the course helped students maintain levels of activity, but not increase them.

Keywords: exercise, self-efficacy, longitudinal, internal motivation, physical activity

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Chapter 1

Introduction

Over time, the United States population has gradually shifted to an increasingly inactive lifestyle, and there's been a decline in health behavior (American College Health Association [ACHA], 2012, United States Department of Health and Human Services [USDHHS], 2008). One of the most significant periods in which this happens is during the transition from high school to college. Physical activity (PA) level decreases by almost 63% during this transition (Cullen et al., 1999). This period is a critical transformational time when students learn many skills and begin to establish behavior patterns that impact the rest of their lives (Ben-Shlomo & Kuh, 2002, Halfon & Hochstein, 2002). College is one of the last opportunities to shape behavior, because postgraduate PA tends to remain stable (Sparling & Snow, 2002).

According to a survey of 66,887 undergraduate students by the American College Health Association (2014), 91% perceive themselves as being in "good", "very good" or "excellent" general health, and 57.9% rate their health as falling in the "very good" or "excellent" categories (p. 3). Despite these perceptions of good general health, many college students engage in risky health behaviors, including failure to meet exercise, nutrition, and BMI recommendations. For example, despite the well-documented benefits of exercise, over 50% of the college students do not meet the weekly recommendations of 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity for physical activity (ACHA, 2012, USDHHS, 2008). Consequences of an inactive lifestyle include the risk of several chronic diseases, including cardiovascular disease, type 2 diabetes, high blood pressure, increased cognitive decline and premature death (Proper, Singh, van Mechelen, & Chinapaw, 2011, USDHHS, 2008). The concern regarding the gap between recommended and actual level of activity prompted the government to include increasing PA as a major part of both the Healthy People 2020 (USDHHS, 2009), and Healthy Campus 2020 Objectives (ACHA, 2012).

Barriers to Physical Activity

A wealth of research has been generated to understand, and hopefully combat, the increasing inactive lifestyle of young adults. Research has identified both motivators and barriers to physical activity among college students. Findings indicate a variety of factors influence physical activity including a lack of time, motivation, energy, willpower, social and environmental support (Ebben & Brudzynski, 2008, Kulavic, Hultquist, & Mclester, 2013). A lack of time is the most common barrier reported among college students (Ebben & Brudzynski, 2008, Kulavic et al., 2013). It has also been well documented that PA tends to decline as age increases (USDHHS, 2009).

Theories of Behavior Change

Given the complex nature of physical activity behavior, it has been difficult to determine which factors can sufficiently mitigate the barriers to create lasting health behavior change. Several theories of behavior change have sought to explain behavior change, most notably the Transtheoretical Model and Social-Cognitive Theory.

The Transtheoretical Model (TTM) posits there are five stages of change: precontemplation, contemplation, preparation, action, and maintenance (Prochaska & Velicer, 1997). There are 10 processes of change according to the TTM, 5 of which are cognitive and the other 5 behavioral (Prochaska & Velicer, 1997). The five cognitive processes of change are to increase knowledge, become aware of risk, care about the consequences for others, comprehend benefits, and identify emotional relationship to behavior (Prochaska & Velicer, 1997). The five behavioral processes of change include substituting alternatives, acquiring social support, committing, reminding, and rewarding oneself (Prochaska & Velicer, 1997). While studies on the efficacy of using the TTM have demonstrated mixed results, a meta-analysis review found that only 29% of the studies and experiments incorporated every aspect of the TTM (Hutchinson, Breckon, & Johnston, 2009). If only parts of the TTM are being used in research, this could explain the mixed findings of the TTM's efficacy (Hutchinson et al., 2009).

Social-Cognitive Theory suggests that individuals actively shape their lives through observing their thoughts and feelings and reflecting on them (Bandura, 1997). According to social-cognitive theory, the most important factors in behavior change are self-efficacy (SE) and outcome expectations (Bandura, 1997). SE is an individual's belief in one's own ability to accomplish a task and achieve goals (Bandura, 1997). Research has consistently found a relationship between self-efficacy and health behavior change. Exercise self-efficacy is important because it is the belief that one can continue to exercise despite challenges, which is associated with a greater likelihood of exercising (Bandura, 1997).The higher one's self-efficacy in regard to a certain behavior, like exercise, the more likely one is to engage in that behavior (Bandura, 1997). Jackson, Tucker & Herman (2007) found that health self-efficacy contributed to engagement in a health-promoting lifestyle among college students. Similarly, high exercise self-efficacy increases a perception of self-competence, which is then associated with increased exercise behavior (Teixeira, Carraca, Markland, Silva, & Ryan, 2012). SE also helps increase one's self-worth, which is also associated with maintained exercise adherence (Huberty et al., 2008). Furthermore, people with higher SE set higher goals and are more committed to accomplishing them (Locke & Latham, 2002). However, while myriad studies have demonstrated a causal relationship between SE and PA, the direction of causality is unclear (French, 2013) and it is likely that self-efficacy and PA have a reciprocal impact.

Studies on Goal Setting/Planning

Another effective way to bolster meaningful activity is through goal setting. Goal setting is widely used for behavior change in health and physical activity settings (Nothwehr &Yang, 2007). As long as an individual is committed to the goal and has the available resources, there is a linear relationship between goal difficulty and performance (Locke & Latham, 2006). For example, individuals who set higher goals demonstrated a greater increase in PA (Dishman, Vandenberg, Motl, & Nigg, 2010). The key moderators of goals are feedback, commitment, task complexity, and situational constraints (Locke & Latham, 2006). SE and goal importance help increase one's commitment to a goal (Locke & Latham, 2006). Individuals with higher SE demonstrate a greater use of goal setting, planning, and monitoring behaviors, resulting in an increase of PA (Rovniak, Anderson, Winett, & Stephens, 2002). Individuals who set focused and higher goals demonstrated a greater increase in PA (Dishman et al., 2010, Nothwehr &Yang, 2007). Despite many positive findings for a relationship between goals and PA, White, Wójcicki, and McAuley (2012) did not find any long-term support for a direct relationship between goals and PA over an 18-month period. This could be due to other numerous factors of behavior change explained by other cognitive and behavioral processes of change according to the TTM.

Maintenance of Health Behavior Change

There appears to be a change in one's cognitions when transitioning to the maintenance phase of health behavior change. For example, behavior regulation becomes less about self-efficacy and more about motivation for the behavior (Rothman, Baldwin, & Hertel, 2004). This may be explained through a shift of extrinsic motivation, the desire to engage in an activity to receive a reward or avoid punishment, to intrinsic motivation, desire to engage in a task because it is personally rewarding (Deci & Ryan, 2009). While extrinsic motivations like weight loss or appearance are important for initial adoption of exercise behavior, intrinsic motivations such as valuing a challenge and skill development are more closely associated with long-term exercise (Teixeira et al., 2012). Autonomous motivation, a combination of intrinsic and identified motivation, is the desire to willingly and enthusiastically engage in an activity (Deci & Ryan, 2009). There is increasing evidence that high autonomous motivation is important in sustaining long-term exercise behavior (Teixeira et al., 2012). People with higher autonomous motivation typically have more intrinsic motivation, which correlates with long-term behavior change.

Benefits/Purpose of Study

It has been well documented that PA tends to decline as age increase (USDHHS, 2009). College is an informative and influential time in one's life, and universities can help support students by providing opportunities for them to find meaningful activities in their lives and place greater importance on them, thus increasing SE and autonomous motivation (Ullrich-French, Cox, & Bumpus, 2013).

This study seeks to expand the literature on long-term PA and exercise adherence. We proposed the following hypotheses.

Hypothesis 1: College students with high exercise self-efficacy will report (a) a higher baseline activity level than peers with low exercise self-efficacy, and (b) this trend will persist at T2 (post-measure end of the semester), and T3 (one-year post-class).

Hypothesis 2: College students reporting higher levels of internal motivation at T3 will be more likely to report a greater amount of weekly exercise at T1 (pre-measure before class), T2 (post-measure end of the semester), and T3 (one-year post-class) than students who reported lower level of internal motivation.

Hypothesis 3: College students exercise level will initially increase at T2 (end of the semester), then decrease at T3 (one-year post-class), returning to a similar amount of weekly exercise reported at T1 (pre-measure).

Chapter 2

Methods

Participants

Participants included two cohort samples of college students who have taken the lifelong fitness (LLF) course at George Fox University, a private Christian university located in Newberg, Oregon. The cohort A took the LLF course in the Fall 2015 semester (n = 287), and the cohort B took the LLF course in the Spring 2016 semester (n = 186) for a total of 473 participants. All participants completed the entire 15-week semester course. A $4 gift card was provided as an incentive to complete each follow-up survey. At time of LLF commencement, participants were composed of 45% Freshman, 28% Sophomore, 5% Junior, 3% Senior, and 19% unreported. The gender distribution was 48% female, 33% male, and 19% unreported.

Measures

Health Behaviors Questionnaire. Health behaviors were measured using a constructed set of questions (Appendix A). The first set are open-response items constructed to measure each participant's typical daily amount of exercise. The second set contains nine self-report questions on a 1-7 Likert Scale that are designed to evaluate continued health behaviors emphasized in the LLF class. Because this is not a standardized measure, reliability and validity have not been established.

Exercise Self-Regulation Questionnaire (SRQ-E) (Ryan & Deci, n.d.; see Appendix B). Items on the intrinsic motivation subscale of the SRQ-E were used to identify intrinsic motivation. While several studies have used this scale, none have been published.

Self-Rated Abilities for Health Practices Scale (Becker, Stuifbergen, Oh, & Hall, 1993; see Appendix C). The Self-Rated Abilities for Health Practices Scale (SRAHP) is a 28-item, self-reported measure on a 5-point Likert scale used to measure self-perceived ability to implement different health behaviors. The SRAHP contains four subscales with seven items each: Exercise, Nutrition, Responsible Health Practice, and Psychological Well Being. Subscale scores are summed to obtain a total score, with higher scores indicating greater self-efficacy for health behaviors. Cronbach's alpha for the total scale was .94, and .81, .86, .89, and .88 for the Nutrition, Psychological Well-Being, Exercise, and Responsible Health Practices subscales, respectively. Test Re-test Reliability was established by administering the SRAHP twice within two weeks. The Pearson Correlations between the two administrations were .70, .63, .63, .69, and .73 for the total scale and the Nutrition, Psychological Well-Being, Exercise, and Responsible Health Practices subscales, respectively.

Procedure

An online electronic survey was sent to all students who completed the 15-week LLF course in Spring and Fall 2015. Students were divided into two cohorts; Cohort A was composed of all students who completed LLF in Fall 2015, and Cohort B was composed of all students who completed LLF in Spring 2016. Cohort A was sent a survey at the 12-month interval post class completion, and Cohort B was sent a survey 12-month post class completion.

Cohort A and Cohort B were sent a survey at the 12-month mark. Students that did not initially respond were sent a follow-up survey approximately two days later. If no response was received in two days' time, a third survey was sent.

To test the hypotheses about psychological variables predicting number of weekly minutes of exercise, three multiple regression analyses were conducted. As per recommendations by Weinstein (2007), the first analysis included only psychological variables as independent variables, while the two-subsequent analysis included past behavior as additional independent variables.

Chapter 3

Results

Data were analyzed using R, an open source data analytics software program. In addition, the following packages in R were used to assist analyses: *apaTables, boot, car, ggplot2, Hmisc, lattice, leaps, mice, multcomp, nlme, polycor, psych, and QuantPsych, reshape2, WRS2* (Canty & Ripley, 2017; Davison & Hinkley, 1997; Fletcher, 2012; Fox, 2016; Fox, & Wiesberg, 2011; Harrell & Dupont, 2017; Hothorn, Bretz, & Westfall, 2008; Lumley & Miller, 2017; Mair, Schoenbrodt, & Wilcox, 2017; Pinhiero, Bates, DebRoy, Sarkar & R Development Core Team, 2010; R Core Team, 2017; Revelle, 2017; Sarkar, 2008; Stanley, 2017; Van Buuren & Groothuis-Oudshoorn, 2011; Wickham, 2007; Wickham, 2017). The variable exercise self-efficacy reported in the tables below was calculated using the exercise subscale from the SRAHP measure. Descriptive statistics and correlations for variables included in the multiple regression predicting pre-number of minutes exercised are included in Table 1.

Descriptive statistics and correlations for variables included in the multiple regression predicting post- and 1-year number of minutes exercised are included in Table 2.

Multiple Regression Predicting Pre-Minutes of Exercise.

Assumptions of multiple regression were met for all three multiple regression models (e.g., independence and multicollinearity; Field et al., 2012). To test the hypotheses while following Weinstein's (2007) recommendation to first uniquely examine psychological predictors of behavior, a multi-step process was implemented. First, an exhaustive best subset

Table 1

Means, Standard Deviations, and Correlations for Variables at Pre-Measurement Time (T1).

Variable	*M*	*SD*	1	2	3	4	5
1. Sex							
2. Weight	154.78	36.81	-.39***				
3. Minutes active	223.14	241.27	-.31***	.25***			
4. General health	5.54	1.22	-.08	-.12	.19***		
5. Psychological well-being	3.88	.66	-.06	-.19*	.09	.30***	
6. Exercise self-efficacy	3.82	.77	-.12	-.15	.37***	.30***	.59***

Note. * *p* < .05, ** *p* < .01., *** p < .001. *M* and *SD* are used to represent mean and standard deviation, respectively. For Sex males were coded 0 and females 1.

regression was conducted using the *leaps* package in R, to identify the best independent variables predicting the dependent variable, pre-minutes of weekly exercise. Then, four multiple regressions were examined in parallel processes: regression-one was non-imputed data with outliers in, regression-two was non-imputed data with outliers removed, regression-three was imputed data with outliers removed, and regression-four was imputed data with outliers in. Only one difference in significance of predictors was noted; in regression two (non-imputed data and outliers removed) one variable, overall general health, became non-significant (p = .05020) in comparison to all other models. Overall model fit with all variables was significant for all four regressions, therefore only results from regression-four (imputed data and outliers not removed) are reported in the testing for Hypothesis 1.

Table 2

Means, Standard Deviations, and Correlations for Variables at Post-Time (T2) and One-Year (T3)

Variable	*M*	*SD*	1	2	3	4	5	6	7
1. Sex									
2. Pre-minutes exercise	227.34	242.45	-.19***						
3. Pre-exercise self-efficacy	3.70	0.73	-.14**	.38***					
4. Post-minutes exercise	238.39	236.70	-.27***	.64***	.31***				
5. Post-exercise self-efficacy	4.21	0.58	-0.04	0.12	0.06	.30***			
6. One-year minutes exercise	207.83	230.40	-0.13	.36***	.25*	.24*	0.11		
7. One- year exercise self-efficacy	3.78	0.76	-0.09	0.13	.32**	0.07	0.14	.34***	
8. One-year internal motivation	3.88	1.16	-0.06	.23**	.36***	0.2	0.07	.38***	.58***

Note: M and *SD* are used to represent mean and standard deviation, respectively. For Sex males were coded 0 and females 1. *Note.* * *p* < .05, ** *p* < .01., *** p < .001.

Model 1. The model predicting pre-minutes of weekly exercise was significant, accounting for 23% of the total variance (adj. $R^2 = .23$, $F(5, 250) = 15.9$, $p < .001$). Both exercise self-efficacy and general health were positively related, while sex and psychological well-being were negatively related, and all independent variables made significant contributions to the prediction of number of weekly minutes exercised. The following variables were grand means centered in the final model, weight, exercise self-efficacy, psychological well-being, and general health. Centering variables does not change the model fit, but it can help in providing an interpretable intercept or constant (Field et al., 2012). The weights of variables in the final model were $\beta = -.15$, $t = -2.49$, $p < .001$, for sex, $\beta = .14$, $t = 2.33$, $p = .01$, for weight, $\beta = .44$, $t = 5.76$, $p < .001$, for exercise self-efficacy, $\beta = -.22$, $t = -2.91$, $p = .004$, for psychological well-being, and $\beta = .14$, $t = 2.31$, $p = .022$, for general health. Results are presented in Table 3.

Multiple Regression Predicting Post-Minutes of Exercise.

In accordance with Weinstein's (2007) recommendation the third step of the analysis involved multiple linear regressions examining psychological variables and previous exercise behavior contributing to post-minutes of exercise (T2). Two multiple regressions were examined in parallel processes: one including outliers and the other with outliers removed. Both models retained the same significant predictors, and overall model fit with variables selected was significant for both regressions, therefore only results with outliers included have been reported.

Table 3

Multiple regression results predicting pre-minutes (T1) of weekly exercise with outliers

Step and predictor	ΔR2	b	SE B	β	Adj.R2	F statistics
Model 1						
Step 1	.09***				0.09	F(2, 253) = 13.85
Constant		173.08	78.07			
Sex		-120.7	32.4	-.24***		
Weight		0.82	0.43	0.12		
Step 2	.14***				0.23	F(5,250) = 15.9
Constant		273.46	23.04			
Sex		-76.66	30.77	-.15*		
Weight		0.96	0.41	.14*		
Exercise Self-efficacy		143.39	24.91	.44***		
Psychological Well-being		-87.74	30.13	-.22**		
General Health		27.2	11.79	.14*		

Note: The following step 2 variables were centered at grand means: weight, exercise self-efficacy, psychological well-being, and general health. This was done to provide interpretable constant for step 2. Centering does not affect standardized β- weights. * $p < .05$. ** $p < .01$. *** $p < .001$. For Sex males were coded 0 and females 1.

Model 2. The second model included the predictors sex, pre-exercise self-efficacy, and post-exercise self-efficacy. The final model shared 16% of the variance in post-weekly minutes of exercise (adj. $R^2 = .16$, $F(3, 155) = 11.33$, $p < .001$). All variables in the final entry were significant to the prediction of post-weekly minutes of exercise. The weights of the variables were β = -.21, $t = -2.82$, $p = .005$, for sex, β = .19, $t = 2.24$, $p = .026$, for pre-exercise self-efficacy, β = .19, $t = 2.23$, $p = .027$, for post-exercise self-efficacy.

Model 3. The initial predictor in the third model was pre-weekly minutes of exercise (previous behavior). This shared 37% of the variance in post-weekly minutes of exercise (adj. $R^2 = .37$, $F(1, 147) = 89.52$, $p < .001$). The second entry examined previous psychological and behavior variables. Pre-exercise self-efficacy ($\beta = .18$, $t = 8.67$, $p = .016$) and pre-weekly minutes of exercise ($\beta = .19$, $t = 2.92$, $p = .004$) were both positively related and made significant contributions to the prediction of post-weekly minutes of exercise. These predictors provided a significant, but modest increase in the model's variance (adj. $R^2 = .40$, $F(2, 147) = 51.35$, $p < .001$). The third entry introduced current exercise self-efficacy as a predictor. This model also accounted for a modest but significant increase in the model's variance (adj. $R^2 = .42$, $F(3, 145) = 37.36$, $p < .001$). In the third entry, pre-weekly minutes of exercise ($\beta = .58$, $t = 8.61$, $p < .001$), and current self-efficacy ($\beta = .18$, $t = 2.43$, $p = .016$, reported as post-exercise self-efficacy) were significant, while pre-exercise self-efficacy ($\beta = .10$, $t = 1.33$, $p = .18$) was non-significant. Results are presented in Table 4.

Multiple Regression Predicting One-Year Minutes of Exercise.

The fourth step of the analysis involved multiple linear regressions examining psychological variables and previous exercise behavior after LLF course completion, again in accordance with Weinstein's (2007) recommendation. Two multiple regressions were examined in parallel processes: one including outliers and the other with outliers removed. Both models retained the same significant predictors and overall model fit with variables selected was significant for both regressions, therefore only results with outliers included have been reported.

Table 4

Multiple Regression results predicting post-minutes of weekly exercise (T2) with outliers

Step and predictor	ΔR2	b	SE B	β	Adj.R2	F statistics
Model 2						
Step 1	.06***				0.06	F(1, 157) = 11.79
Constant		319.82	30.58			
Sex		-130.46	37.99	-.26***		
Step 2	.08***				0.14	F(2, 156) = 14.15
Constant		-21.21	91.65			
Sex		-111.06	36.69	-.22**		
Pre-exercise Self-efficacy		86.53	22.04	.29***		
Step 3	.02*				0.16	F(3,155) = 11.33
Constant		-324.62	163.51			
Sex		-102.66	36.43	-.21**		
Pre-exercise Self-efficacy		57.06	25.46	.19*		
Post-Exercise Self-efficacy		95.5	42.86	.19*		
Model 3						
Step 1	.37***				0.37	F(1, 147) = 89.52
Constant		102.95	21.13			
Pre-minutes exercise		0.64	0.07	.62***		
Step 2	.03**				0.4	F(2, 146) = 51.35
Constant		-108.18	75.02			
Pre-minutes exercise		0.59	0.06	.57***		
Pre-exercise Self-efficacy		58.55	20	.19**		
Step 3	.02*				0.42	F(3, 145) = 37.36
Constant		237.11	15.06			
Pre-minutes exercise		0.58	0.07	.56***		
Pre-exercise self-efficacy		30.43	22.82	0.1		

Post-exercise self-efficacy	89.81	36.91	.18*

Note: Model 1: Post-minutes of exercise predicted by psychological variables. Model 2: Post-minutes of exercise predicted by previous exercise and psychological variables. The following step 2 variables were centered at grand means: pre-exercise self-efficacy, pre-minutes of exercise, and post-exercise self-efficacy. This was done to provide a meaningful constant. Centering does not affect standardized β- weights. * $p < .05$. ** $p < .01$. *** $p < .001$. For Sex males were coded 0 and females 1.

Model 4. The fourth model included the predictors sex, pre-exercise self-efficacy, post-exercise self-efficacy, one-year exercise self-efficacy, and one-year internal motivation. The final model shared 14% of the variance in one-year weekly minutes of exercise (adj. $R^2 = .14$, $F(5, 84) = 3.88$, $p = .003$). One variable in the final entry significantly contributed to the prediction of one-year weekly minutes of exercise, which is one-year internal motivation ($\beta = .26$, $t = 2.08$, $p = .04$). The weights of the non-significant variables in the final entry were $\beta = -.09$, $t = -.89$, $p = .37$, for sex, $\beta = .09$, $t = .84$, $p = .41$, for pre-exercise self-efficacy, $\beta = .05$, $t = .52$, $p = .61$, for post-exercise self-efficacy, and $\beta = .15$, $t = 1.18$, $p = .24$, for one-year exercise self-efficacy.

Model 5. The fifth model included previous behavior as predictors. The initial predictor in the fifth model was pre-weekly minutes of exercise ($\beta = .36$, $t = 3.59$, $p < .001$). This shared 12% of the variance in one-year weekly minutes of exercise (adj. $R^2 = .12$, $F(1, 88) = 12.88$, $p < .001$). The second entry introduced post-weekly minutes of exercise as a predictor. This model provided a significant increase in estimation from only means, but modestly decreased the model's variance from step 1 (adj. $R^2 = .11$, $F(2, 87) = 6.38$, $p = .002$). In the second entry, both variables were positively related; pre-weekly minutes of exercise was significant ($\beta = .34$, $t =$

2.62, p = .01), while post-weekly minutes of exercise was non-significant (β = .02, t = .16, p = .88). The third entry introduced current exercise self-efficacy as a predictor. This model accounted for a modest but significant increase in the model's variance (adj. R^2 = .18, F(3, 85) = 7.57, $p < .001$). In the third entry, pre-weekly minutes of exercise (β = .30, t = 2.36, p = .02) and current self-efficacy (β = .30, t = 3.06, p = .003, reported as one-year-exercise self-efficacy) were significant, while post-weekly minutes of exercise was non-significant (β = .03, t = .22, p = .82). The final entry introduced internal motivation as a predictor. This model accounted for a modest but significant increase in the model's variance (adj. R^2 = .21, F(4, 84) = 6.87, $p < .001$). In the final entry, pre-weekly minutes of exercise (β = .28, t = 2.25, p = .03), was significant, while internal motivation (β = .22, t = 1.86, p = .07), post-weekly minutes of exercise (β = .01, t = .04, p = .97), and current exercise self-efficacy (β = .17, t = 1.48, p = .14) were non-significant. Results are presented in Table 5.

Internal Motivation

A hierarchical regression was calculated for each of the three measurement periods and used to test hypothesis two: students with higher internal motivation at T3 (one-year) will report higher levels of exercise at T1 (pre-measure), and T2 (post-measures). The first model predicted pre-minutes of exercise, and included the initial predictor pre-exercise self-efficacy (β = .38, t = 7.52, $p < .001$). This shared 14% of the variance in pre-minutes of exercise (adj. R^2 = .14, F(1, 331) = 56.56, $p < .001$). The second entry introduced internal motivation at one-year as a predictor. This model did not provide a significant increase in the variance accounted for by the model from step 1 (ΔR^2 = .00, model adj. R^2 = .14, F(2, 87) = 8.36, $p < .001$). In the second entry, both variables were positively related; pre-exercise self-efficacy was significant (β = .36, t

Table 5

Multiple Regression Results Predicting 1-Year-Minutes (T3) of Weekly Exercise with Outliers

Step and predictor	ΔR2	b	SE B	β	Adj.R2	F statistics
Model 4						
Step 0	0.005				0.005	F(1,88) = 1.46
Sex		-61.62	50.98	-0.13		
Step 1	.05*				0.05	F(2, 87) = 3.35
Constant		-7.34	119.49			
Sex		-50	50.07	-0.1		
Pre-exercise self-efficacy		68.21	30.02	.24*		
Step 2	-0.01				0.04	F(3, 86) = 2.35
Constant		-116.86	208.27			
Sex		-49.14	50.26	-0.1		
Pre-exercise self-efficacy		65.05	30.52	.23*		
Post-Exercise self-efficacy		27.9	43.38	0.07		
Step 3	.07**				0.11	F(4, 85) = 3.63
Constant		-309.38	214.21			
Sex		-41.84	48.68	-0.09		
Pre-exercise self-efficacy		41.06	30.88	0.14		
Post-Exercise self-efficacy		17.09	42.15	0.04		
One-year exercise self-efficacy		85.2	32.29	.28**		
Step 4	.03*				0.14	F(5, 84) = 3.88
Constant		-316.98	210.19			
Sex		-42.48	47.76	-0.09		
Pre-exercise Self-efficacy		26.01	31.15	0.09		
Post-Exercise Self-efficacy		21.34	41.4	0.05		
One-year exercise self-efficacy		44.18	37.33	0.15		

One-year Internal Motivation		51.34	24.72	.26*		
Model 5						
Step 1	.12***				0.12	F(1, 88) = 12.88
Constant		127.71	31.92			
Pre-minutes exercise		0.33	0.09	.36***		
Step 2	-0.01				0.11	F(2, 87) = 6.38
Constant		125.68	34.64			
Pre-minutes exercise		0.32	0.12	.34*		
Post-minutes exercise		0.02	0.13	0.02		
Step 3	.07**				0.18	F(3, 86) = 7.79
Constant		204.07	21.94			
Pre-minutes exercise		0.28	0.12	.30*		
Post-minutes exercise		0.03	0.12	0.03		
One-year exercise self-efficacy		89.8	29.32	.30**		
Step 4	0.02				0.2	F(4, 85) = 6.87
Constant		204.4	21.64			
Pre-minutes exercise		0.26	0.12	.28*		
Post-minutes exercise		0.05	0.12	0.01		
One-year exercise self-efficacy		52.29	35.28	0.17		
One-year Internal motivation		43.69	23.55	0.22		

Note: Model 1: One-year minutes of exercise predicted by psychological variables. Model 2: One-year minutes of exercise predicted by previous exercise and psychological variables. The following variables in model 2 step 4 were centered at grand means: pre-minutes of exercise, post-minutes exercise, one-year exercise self-efficacy, and one-year internal motivation. This was done to provide an interpretable constant. Centering does not affect standardized β- weights. * $p < .05$. ** $p < .01$. *** $p < .001$. For Sex males were coded 0 and females 1.

= 3.39, *p* = .001), while internal motivation at one-year was non-significant (β = .10, *t* = .92, *p* = .36). The second model predicted post-minutes of exercise, and included the initial predictor post-exercise self-efficacy (β = .36, *t* = 5.75, *p* < .001). This shared 9% of the variance in pre-minutes of exercise (adj. R^2 = .9, F(1, 331) = 33.05, *p* < .001). The second entry introduced internal motivation at one-year as a predictor. This model did not provide a significant increase in the variance accounted for by model from step 1 (ΔR^2 = .00, model adj. R^2 = .09, F(2, 87) = 5.24, *p* < .001). In the second entry, both variables were positively related; post-exercise self-efficacy was significant (β = .26, *t* = 2.58, *p* = .01), while internal motivation at one-year was non-significant (β = .18, *t* = 1.77, *p* = .08). Results are presented in Table 6. The results for the model predicting one-year minutes of exercise are presented in Table 5 under the subheading Model 4.

Table 6

Hierarchical Regression Results Predicting Weekly Minutes of Exercise at Pre-, Post-Measurements by Internal Motivation

Step and predictor	ΔR2	b	SE B	β	Adj.R2	F statistics
Model 1 – predicting pre-minutes exercise						
Step 1	.14***				0.14	F(1, 331) = 56.55
Constant		227.34	12.3			
Pre-exercise self-efficacy		126.11	16.77	.38***		
Step 2	0				0.14	F(2, 87) = 8.36
Constant		248.33	24.27			
Pre-exercise self-efficacy		110.65	32.69	.36**		
One-year Internal Motivation		20.65	22.49	0.1		

Model 2 – predicting post-minutes exercise						
Step 1	0.09				0.09	F(1, 331) = 33.05
Constant		238.39	12.39			
Post-exercise self-efficacy		122.14	21.25	.30***		
Step 2	0				0.09	F(2, 87) = 5.24
Constant		234.35	23.84			
Post-exercise self-efficacy		108.91	42.23	.26*		
One-year Internal Motivation		36.1	20.36	0.18		

Note: All variables were grand mean centered. Hierarchical regression results predicting one-year minutes of exercise by internal motivation can be found in Table 5 Model 4.

Exercise Change Over Time

A one-way repeated measures ANOVA was used to test Hypothesis 3; changes in exercise level over time. Two versions of a one-way repeated measures ANOVA were conducted, and both results are presented. A robust one-way repeated measures ANOVA based on 20% trimmed means was significant, F = 3.15, F_{crit} = 2.75, $p < .05$, while a multilevel model had a non-significant effect on students' weekly minutes of exercise $X^2(2) = 4.27$, $p = .12$. The results for the robust one-way repeated measures ANOVA are presented in Table 7. A robust post hoc analysis showed a significant difference for minutes of exercise between post-measure and one-year $\hat{\psi}$ = 64.26 (23.44, 105.08), $p < .05$, and showed non-significant differences between pre- and post-minutes of exercise groups, $\hat{\psi}$ = -49.37 (-103.33, 4,59), $p > .05$, and pre- and one-year minutes of exercise groups, $\hat{\psi}$ = 21.15 (-26.69, 67.98), $p >.05$. In the multilevel model, Tukey post hoc tests showed non-significant differences between all groups, pre- and post-minutes of exercise groups, *p* = 37, post-measure and one-year, *p* =.13, and pre- and one-year, *p* = .69.

Table 7

Bootstrapped One-Way ANOVA for Minutes of Exercise Grouped by Time Measured

Group	*n*	*M*	*SD*	Skew	Kurtosis
Pre-minutes exercise	232	223.14	241.27	1.83	3
Post-minutes exercise	294	241.97	244.35	2.34	5.84
One-year minutes exercise	126	206.25	218.69	2.26	7.52

Note: *n* = number of students, *M* = mean, *SD* = standard deviation.

Chapter 4

Discussion

College is an informative and influential time in one's life, and universities can help support students by providing opportunities for them to find meaningful activities in their lives and place greater importance on them. College is one of the last opportunities to shape behavior, because postgraduate physical activity tends to remain stable (Sparling & Snow, 2002). The purpose of this study was to examine the effect of an undergraduate course designed to teach and maintain health behaviors on students' level of physical activity and whether exercise self-efficacy and internal motivation would predict future long-term physical activity and exercise adherence.

One purpose of the study was to determine whether a college student's perceived exercise self-efficacy after a semester-long course designed to teach and maintain positive health behaviors would predict level of exercise one year later. To accomplish this, exercise self-efficacy was modeled using only psychological variables, then modeled using previous exercise behaviors. The hypothesis was supported in that college students' exercise self-efficacy before and after the course was positively related to weekly exercise amount after one year. The higher an individual's exercise self-efficacy, the greater the association with sustained long-term exercise behavior. When modeling long-term exercise behavior, current exercise self-efficacy was the only statistically significant predictor when all three measurement times were considered (pre-, post-, and one-year). When previous behaviors were included, the two significant predictors in the best model for long-term exercise were pre-exercise level and current exercise self-efficacy. These findings support Strachan, Perras, Brawley & Sink (2016) that efficacy reinforced by previous behavior helps to motivate continued behavior when individuals experience challenges (e.g., exercising long-term).

Supplemental analysis explored predictors for post-minutes of weekly exercise levels (T2). When modeling post-minutes of weekly exercise without previous exercise behavior, sex, pre- and post-exercise self-efficacy were significant. When previous behavior was included, the two significant predictors in the best model were pre-exercise level and current exercise self-efficacy. This is the same pattern demonstrated in the long-term model, further suggesting that previous behavior helps to motivate continued behavior. This also emphasizes the importance of early intervention in regard to teaching and implementing positive health behaviors.

Another purpose of this study was to determine whether internal motivation (IM) measured at one year would predict amount of exercise. A hierarchical regression model was used examine the unique contribution of IM after the variance of exercise self-efficacy was accounted for. There was evidence to support a positive relationship between internal motivation at one-year, indicating that the higher a student's IM was, the more they exercised. IM at one-year was a significant predictor in the long-term model, but not significant in the pre- and post-models. When IM was added as a predictor in the psychological variables-only model for the long-term model, IM became the only significant predictor. Other studies have demonstrated that IM mediates both behavioral initiation and maintenance through differing mechanisms (Phillips, Chamberland, Hekler, Abrams, & Eisenberg, 2016). Although outside the scope of this study, this supports the findings that IM could mediate the relationship between exercise self-efficacy and exercise behavior, indicating that IM may be a precursor to exercise self-efficacy, although further analysis would be needed to verify this.

The final purpose of this study was to examine the trend of reported weekly exercise levels over time. We postulated that exercise levels would increase after course completion, T2, then one-year later, T3, return to a similar level that was reported before the course began. The data supported this, showing mean exercise levels increased at T2, then decreased at T3. A bootstrapped ANOVA demonstrated there was a significant decrease in exercise levels between the post- and one-year groups, but there were no significant differences between the pre- and one-year groups. This suggests the lifelong fitness course helped students to maintain their exercise levels, but did not likely contribute to increasing lasting exercise levels. While students' exercise levels do not remain as high as immediately after the intervention, this supports the findings that exercise level tends to remain stable in this population, at least for a one-year period.

Limitations

One limitation of the study that is common to others is the use of a self-reported measures for data collection. Given the larger sample size and longitudinal nature of the study, objective exercise measurement would have presented practical challenges. The study encouraged honest reporting (Gagne & Godin, 2005), but nevertheless, the use of an objective measure of exercise may have provided for more accurate measurement. With the rapid increase in wearable fitness technology, (e.g., activity trackers, smart watches, and smart phones), objective measurement may become easier with time but still poses limitations, (e.g., equipment calibration, verification of user, etc.).

Another limitation of the study concerns the lack of causal inferences that can be concluded from correlational analyses between variables. In one analysis, extraneous circumstance prevented internal motivation from being collected with other pre- and post-measures. Internal motivation was included in the one-year measure, so changes over time in internal motivation could not be examined. Because there is only one measure of internal motivation in our study, and it occurred after the intervention, causal inferences cannot be concluded between internal motivation and amount exercised or exercise self-efficacy. We can conclude only that there are positive relationships between internal motivation and both amount exercised and exercise self-efficacy.

Future Studies

Our study supports the growing evidence of the positive relationship between internal or autonomous motivation and long-term exercise adherence (Teixeira et al., 2012). Future research may focus on moving beyond correlational analysis and establishing a causal influence of internal motivation on the perseverance of long-term exercise and its effect on exercise self-efficacy. This may be accomplished through utilizing a research design either with matched controls or random assignment for all variables. We echo the recommendation that long-term and follow-up studies are needed to evaluate the difference between efficacy and intrinsic motivators in exercise maintenance (Teixeira et al., 2012).

Additionally, questions about the generalizability of these results for other populations remain unanswered. This study examined primarily traditional college students (entering college immediately after high school). Future studies examining longitudinal exercise adherence in diverse population such as adolescents or seniors would be useful. Since self-efficacy is shown to be an important component of exercise, it would be interesting to explore the application of interventions designed to bolster one's self-efficacy, especially in children.

Lastly, one factor the current study did not address that has been demonstrated to be a consistent predictor of exercise participation is social support (Trost, Owen, & Bauman, 2002; Vrazel, Suander, & Wilcox, 2008). One of the five processes of change according to the TMM is acquiring social support (Prochaska & Velicer, 1997). Research indicates higher social support also leads to an increase of SE (Rovniak et al., 2002). The combination of higher social support and increased SE lead to an increase in exercise (Rovniak et al., 2002). Alternatively, teaching individuals various ways to access social support can help increase SE, which increases their likelihood to exercise (Huberty et al., 2008; McAuley, Jerome, Marquez, Elavsky, & Blissmer, 2003). Future research can look at the long-term impact of establishing social support for exercise.

Conclusion

From a theoretical perspective of social-cognitive theory, efficacy determines how people view opportunities and obstacles. According to social-cognitive theory, previous behavior is an important source of information for self-efficacy. Individuals with differing levels of self-efficacy respond and think differently about tasks. People with high self-efficacy view their effort in overcoming obstacles worthwhile and continue to persevere, while people with low self-efficacy view their effort in surmounting obstacles as pointless and quickly give up (Bandura, 2016). When transitioning behavior to the maintenance stage, there appears to be less of an emphasis on self-efficacy and a greater importance on internal rewards (Rothman et al., 2004).

In the present study, students with higher exercise self-efficacy maintained higher levels of physical activity than did students with lower exercise self-efficacy. Additionally, there was a positive relationship between internal motivation and long-term exercise behavior. When internal motivation was considered with exercise self-efficacy, there was a modest but significant increase in variance accounted for the by the model, and internal motivation became the only significant psychological predictor. These findings suggest that while self-efficacy is associated with transitioning behavior from the action to maintenance phase, this relationship may be mediated by internal motivation.

Although psychological factors shared a significant amount of variance in exercise levels, adding previous exercise behavior as a predictor reduced the influence of the psychological variables in the regression model. This has been noted in previous experiments, and thus was the impetus for following Weinstein's (2007) recommendation to examine psychological and behavioral difference separately before combining them. Our final model demonstrating a significant increase in model fit was Model 5 Step 3, located in Table 5. This model predicted long-term exercise by pre-minutes of exercise, post-minutes of exercise, and current exercise self-efficacy. When all variables were entered in the model, pre-minutes of exercise and current exercise self-efficacy were significant predictors and accounted for 18% of the model's variance. Because the predictors in this model were grand mean centered, this model demonstrates that when all predictors were at their means, the estimated weekly exercise amount would be 204 minutes.

While college is an informative time in one's life, as previously mentioned, there is a nearly 63% decrease in activity level during the transition from high school to college (Cullen, et al., 1999). George Fox University created a semester-long course required to be taken by all undergraduate students in an effort to teach and maintain positive health behaviors. Although this study has no way to measure the decrease in activity level from high school to university, students enrolled in the class maintained similar levels of exercise over one-year above the recommended level of physical activity established by the United States Department of Health and Human Services. Given that the amount of weekly exercise significantly decreased after Lifelong Fitness course completion but students returned to exercising a similar amount as when measured before the Lifelong Fitness class, college may be a difficult time to create lasting positive health behavior change. This supports the overwhelming body of evidence in almost every domain that early intervention is a key factor in affecting outcome.

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Appendix A

Health Behaviors Questionnaire

1. How many servings of fruits and vegetables do you have in a typical day?

2. On average how many minutes per week do you currently spend doing moderate to vigorous physical activity?

3. On average how many times do you participate in moderate to vigorous physical activity in one week?

4. On average how many hours per night have you slept this week?

5. Respond to each of the questions below on the 1-7 scale.

	Strongly Disagree	Disagree	Weak Disagreement	Neutral	Weak Agreement	Agree	Strongly Agree
I have consistently made healthy food choices in the past month	○	○	○	○	○	○	○
My current nutrition will impact my health 10 years from now	○	○	○	○	○	○	○
The nutrition of a female college student impacts the health of the children she will have in the future	○	○	○	○	○	○	○
I consistently track or monitor my fitness activites	○	○	○	○	○	○	○
I consistently track or monitor my nutritional intake	○	○	○	○	○	○	○
The information I learned in Life Long Fitness improved my nutritional choices	○	○	○	○	○	○	○

The information I learned in Life Long Fitness improved my fitness activity choices	○	○	○	○	○	○	○
Overall, my General Health is very good	○	○	○	○	○	○	○
Overall, my Quality of Life is very good	○	○	○	○	○	○	○

Appendix B

Exercise Self-Regulation Questionnaire

I exercise because I enjoy seeing my own improvement.	○	○	○	○	○	○
I exercise because it is fun and interesting.	○	○	○	○	○	○
I exercise because it's a challenge to accomplish my goals.	○	○	○	○	○	○

Appendix C

Self-Rated Abilities for Health Practices Scale

Self Rated Abilities for Health Practices Scale

0 = Not at all 1 = A little 2 = Somewhat 3 = Mostly 4 = Completely

I AM ABLE TO:		
1.	Find healthy foods that are within my budget	1 2 3 4
2.	Eat a balanced diet	1 2 3 4
3.	Figure out how much I should weight to be healthy	1 2 3 4
4.	Brush my teeth regularly	1 2 3 4
5.	Tell which foods are high in fiber content	1 2 3 4
6.	Figure out from labels what foods are good for me	1 2 3 4
7.	Drink as much water as I need to drink every day	1 2 3 4
8.	Figure out things I can do to help me relax	1 2 3 4
9.	Keep myself from feeling lonely	1 2 3 4
10.	Do things that make me feel good about myself	1 2 3 4
11.	Avoid being bored	1 2 3 4
12.	Talk to friend and family about the things that are bothering me	1 2 3 4
13.	Figure out how I respond to stress	1 2 3 4
14.	Change things in my life to reduce my stress	1 2 3 4
15.	Do exercises that are good for me	1 2 3 4
16.	Fit exercise into my regular routine	1 2 3 4
17.	Find ways to exercise that I enjoy	1 2 3 4
18.	Find accessible places for me to exercise in the community	1 2 3 4
19.	Know when to quit exercising	1 2 3 4
20.	Do stretching exercises	1 2 3 4
21.	Keep from getting hurt when I exercise	1 2 3 4
22.	Figure out where to get information on how to take care of my health	1 2 3 4
23.	Watch for negative changes in my body's condition (pressure sores, breathing problems)	1 2 3 4
24.	Recognize what symptoms should be reported to a doctor or nurse	1 2 3 4
25.	Use medication correctly.	1 2 3 4
26.	Find a doctor or nurse who gives me good advice about how to stay healthy	1 2 3 4

27.	Know my rights and stand up for myself effectively	1	2	3	4
28.	Get help from others when I need it	1	2	3	4

Appendix D

Curriculum vitae

Garrett Drake

Graduate Department of Clinical Psychology, Doctoral Student
George Fox University
414 N. Meridian St. #V341
Newberg, OR 97132

Education

PsyD Clinical Psychology, George Fox University, Expected 2019
M.A. Clinical Psychology, George Fox University, 2016
B.A. Major: Psychology, Cum Laude, University of North Texas, 2013
Minors: Military Science, Spanish, Fashion Merchandising, and Fashion Marketing,

Clinical Experience

Behavioral Health Crisis Consultation Team Newberg, OR
Behavioral Health Crisis Consultant *2/2016 – Present*

- Provided on-call Behavioral Health Crisis Consultation services for two county hospitals
- Conducted evidence-based suicide risk assessments, brief neuropsychological screenings, and crisis interventions of individuals at risk of harm to self and others in hospital Emergency Departments, Intensive Care Units, and Medical/Surgical Departments.
- Collaborated with medical staff to determine appropriate level of care placements e.g. psychiatric hospitalization, sub-acute hospitalization, detoxification placements, etc.
- Participated in weekly, modified Grand Rounds presentations, including formal presentation of patient cases; facilitated group discussions of diagnosis, risk and protective factors.

Cedar Hills Hospital Beaverton, OR
Assessment Counselor *4/2016 – Present*

- Conducted evidenced-based psychological intake assessments to determine the appropriate level of care for patients
- Collaborated with hospital staff and administrators to ensure timely processing of patients
- Worked with myriad insurance providers to attain preauthorization for inpatient psychiatric hospitalization

Oregon State Hospital Salem, OR
Practicum II Student *8/2016 – 5/2017*

- Conducted brief and comprehensive psychological assessments on patients with a variety of severe mental illness
- Provided individual and group inpatient counseling services to patients with psychotic, mood, and cognitive disorders
- Collaborated with interdisciplinary team of psychiatric, nursing, mental health, and social work providers to coordinate patient care
- Engaged in monthly didactic trainings on Malingering, Competency to Stand Trial, Criminal Responsibility, Violence Risk Assessment and other forensic related topics.

Samaritan Health Services Corvallis, OR

Oregon State University Neuropsychological Assessment *7/2016*

- Conducted brief neuropsychological assessments with Oregon State University athletes to establish baseline concussion data
- Gained additional training on uses and administration procedures of various neuropsychological tests

Archer Glen Elementary School Sherwood, OR
Practicum I Student *9/2015 – 6/2016*

- Provided individual and group counseling services for Kindergarten through 5th grade
- Provided consultation services to faculty and staff on student issues
- Developed a take home curriculum to reinforce the "Second Steps" self-regulation course taught to grades K-2

Other Professional Experience

U.S. Army Texas National Guard Terrell, TX
Infantryman / Simultaneous Membership Program Cadet *4/2010 – 4/2016*

- Trained to take instantaneous leadership roles and establish chain of command developing cohesive, effective groups.
- Skilled in peacekeeping, disaster relief, reconnaissance, covert navigation, and infantry battlefield tactics.
- Awarded Airborne Qualification Badge after completion of rigorous 3-week airborne paratrooper school.

U.S. Army ROTC Denton, TX
Cadet *1/ 2010 - 10/2014*

- Chief Personnel Officer - track attendance and managed auxiliary operating budget for entire ROTC program of 80.
- Chief Training Officer - responsible for all training and education for ROTC program of 80.
- Execute weekly soldier training seminars, review curriculum materials and provide teaching performance reviews.
- Created Excel database for all Cadet information, tracking student mentor list, and assigning battle roster positions.
- Created positive, energetic environment, carefully monitored morale and quantitatively tracked cadet improvement.

TGA Junior Golf Program Lewisville, TX
Lead Instructor *9/2013 - 5/2014*

- Chief instructor for elementary afterschool enrichment program designed to use golf principles to teach etiquette and skills.
- Managed up to 16 students, providing individual and group instruction with emphasis on leadership development.

Palmer Drug Abuse Program San Antonio, TX
Assistant Youth Counselor Intern *Summer 2011*

- Facilitated and led tri-weekly support groups for up to 30 adolescents with addiction and substance abuse problems.
- Organized weekly activities and supervised group outings to promote teamwork, leadership, and augment self-esteem.
- Offered free, no-questions-asked recovery services to youth ages 10-17.

Presentations

Presentations

Drake, G. (August, 2017). *Impacting long-term fitness in college students*. A symposium presented at the annual meeting of the American Psychological Association, Washington, DC.

Peterson, M., Turgesen, J., **Drake, G**. (March 2017). *Juggling the Demands of Live*. A workshop presented at the George Fox University Health and Wellness Week, Newberg, OR.

Stere, H., **Drake, G**. (October, 2015). *Self-Regulation in Elementary School, an overview of a pilot project and practical strategies to try*. A workshop presented at the annual Oregon School Counselor Association, Salem, OR.

Poster Presentations

Drake, G., Dunbar, K., Peterson, M. A., & Gathercoal, K. A. (August, 2017). Impacting long-term fitness in college students. A poster presented at the annual meeting of the American Psychological Association, Washington, DC.

Fish, R., Speck, K., & **Drake, G**. (August, 2016). Exploring graduate students' knowledge, skills and attitudes of current legislative advocacy. A poster presented at the annual meeting of the American Psychological Association, Denver, CO.

Fish, R., Speck, K., & **Drake, G**. (August, 2016). Getting involved: national graduate student participation in legislative advocacy. A poster presented at the annual meeting of the Oregon Psychological Association, Portland, OR.

Smith, C., Lowen, J., Oliver, H., Peterson, M., Theye, A., Lee, J., Shoup, R. **Drake, G**. Ellis, J., Spromberg, C. (August, 2015). *Predictors of success in a graduate clinical psychology program*. A poster presented at the annual meeting of the American Psychological Association, Toronto, ON.

Research

Dissertation Research George Fox University

Long-term Impact of Lifelong Fitness: Examining Longitudinal Exercise Behavior in College Students

- Multivariate Longitudinal cohort design examining long-term exercise behaviors
- Completed preliminary defense

George Fox University Nutrition Matters Initiative Newberg, OR

Research Assistant 09/2015- Present

- Assisted with longitudinal and other research on a wellness education program funded by the Bob and Charlene Moore Foundation

Advanced Training

American Psychological Association Advanced Training Institute. (June, 2017). Structural Equation Modeling in Longitudinal Research. Arizona State University, Tempe, AZ.

American Psychological Association Advanced Training Institute. (June, 2017). Big Data: Exploratory Data Mining in Behavioral Research. Arizona State University, Tempe, AZ.

George Fox University High Performance Leadership Development Training. (May, 2017). Developing Ways to Become a Leader. George Fox University, Newberg, OR.

Professional Associations

American Psychological Association	Member 2014 – Present
APA Division 47 – Society for Sport, Exercise, and Performance Psychology	Member 2015 – Present
APA Division 19 – Society for Military Psychology	Member 2016 – Present
Psy Chi	Member 2013 – 2014

Awards

Student Poster Award Finalist (August, 2017). APA Division 47 – Society for Sport, Exercise, and Performance Psychology

American Psychological Association Student Travel Award (August, 2017). APA Science Directorate

President's List – *4.0 semester-based GPA*

Dean's List – *3.5 or better semester-based GPA*

Military Officer Association of America Award (2013) – *Exceptional ROTC leadership, loyalty and academic performance*

Reserve Officer Association Award (2012)– *Top 10% ROTC, academic excellence*

Airborne Qualification Badge (2010) – *Certified paratrooper*

Army Service Ribbon (2010) – *Completion of Advanced Training*
National Defense Service Medal (2010) – *Enlisted during wartime*
Secret Level Government Clearance

Volunteer Work

American Psychological Association Annual Conference Washington, D.C.
Student Volunteer August 2017

- Distributed course materials, verified participants, and coordinated with APA and Continuing Education presenters to ensure smooth presentation

George Fox University Serve Day Newberg, OR
Volunteer 2014-2017

- Completed various service projects for community members during an annual service day

Bikes for Frisco Frisco, TX
Founder 12/2013-6/2014

- Collaborated with 9 schools in Frisco Independent School District to identify deserving bike recipients
- Organized and instructed volunteers on bike maintenance to refurbish and donate 40 bikes and new helmets to underprivileged children
- Fundraised over $2,500 from individuals and businesses

Young Life Volunteer Leader Frisco, TX
Volunteer Team Leader *7/2011-6/2014*

- Plan weekly gatherings of 100+ students with high-energy emphasis on acceptance, team-building, and compassion.
- Lead weekly small-group bible studies, develop and maintain personal relationships in unstructured personal time.

CEA Global Education Barcelona, Spain
Study Abroad Student *Fall Semester 2012*

- Extensive study of Spanish and Catalan cultures through university study and embedded host-family experience.
- Traveled extensively throughout Spain, France, and Morocco studying cultural norms and enhancing global awareness.
- Participated in bi-weekly language exchange programs to discuss differences in culture, politics, and society