ABSTRACT

“RAISING EXERCISE CONFIDENCE” OF COLLEGE STUDENTS:
THE DESIGN AND EVALUATION OF A HEALTH LITERACY MANUAL

by Ariel Marie Klingaman

The primary purpose of this study was to determine the effect of the “Raising Exercise Confidence” manual on constructs from a) the Theory of Planned Behavior (attitude, subjective norm, perceived behavioral control, and intention), b) Self-Determinism Theory (autonomy, competence, and relatedness), and c) Social Cognitive Theory (self-efficacy) relating to exercise at Miami University’s Recreational Center. Data from 346 Miami University students was collected to determine the effect of reading the manual on each theoretical construct. A 2 X 2 (Gender X Time) mixed-model MANOVA revealed a significant effect of the manual on all six constructs. This indicated that the manual was effective in increasing constructs relating to exercise behavior, thus serving as an effective resource for promoting exercise participation amongst college students. Limitations of the study and future directions are also discussed.
“RAISING EXERCISE CONFIDENCE” OF COLLEGE STUDENTS:  
THE DESIGN AND EVALUATION OF A HEALTH LITERACY MANUAL

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Table of Contents

CHAPTER | PAGE
---|---
1. Introduction | 1
   A. Statement of the Problem | 1
   B. Purpose of the Study | 1
   C. Significance of the Problem | 1
   D. Research Questions | 2
   E. Delimitations | 2
   F. Limitations of the Study | 2
   G. Assumptions | 3
   H. Definition of Terms | 4
   I. Summary | 5
2. Review of Literature | 6
   A. College Student Exercise Behavior | 7
      1. The Significance of Exercise to College Student Health and Well-Being | 7
      2. The Impact of College on Student Exercise Behavior | 10
   B. Theoretical Approaches to the Study of Exercise | 12
      1. The Theory of Planned Behavior | 12
      2. Self-Determinism Theory | 14
      3. Social Cognitive Theory | 15
   C. Health Literacy Materials | 17
      1. The Use of Health Literacy Materials in the Facilitation of Health Behavior Change | 17
      2. The Mode of Presentation of Health Literacy Materials | 18
      3. The Structure of Health Literacy Materials | 19
      4. The Evaluation of Health Literacy Materials | 20
   D. Manual Design | 21
      1. Research on Social Physique Anxiety as a Source of Exercise Intimidation | 21
      3. The Creation of the Manual | 25
3. Methodology | 27
   A. Participants | 27
   B. Procedures | 28
C. Instrumentation
   1. Demographics
   2. Theory of Planned Behavior Scale
   3. Basic Needs Satisfaction at Work Scale
   4. Exercise Regularity Scale
   5. Health Literacy Language Elements Scale

D. Statistical Analysis

4. Results
   A. Descriptive Statistics
   B. Preliminary Analyses
      1. Bivariate Correlations
      2. One-Way MANOVA
   C. Main Study Analyses
      1. Mixed-Model MANOVA

5. Discussion
   A. Contributions to the Research
   B. Limitations
   C. Future Research Directions

VI. References

6. Appendices
   A. Email to Professors
   B. Informed Consent Form
   C. Pre-Survey
   D. Post-Survey
   E. Coding Key for Survey Scales
   F. Qualitative Comments
List of Tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1.  Descriptive Data for Subscale Scores</td>
<td>68</td>
</tr>
<tr>
<td>Table 2.  Correlational analysis for Subscales (Pre)</td>
<td>69</td>
</tr>
<tr>
<td>Table 3.  Correlational analysis for Subscales (Post)</td>
<td>70</td>
</tr>
<tr>
<td>Table 4.  Follow-Up Descriptive Results for the Significant Gender and Time Main Effects</td>
<td>71</td>
</tr>
<tr>
<td>Table 5.  Univariate Follow-Up Results for the Significant Time Main Effect</td>
<td>71</td>
</tr>
</tbody>
</table>
CHAPTER 1
INTRODUCTION

Statement of the Problem

Although regular physical activity is widely recognized as a positive health behavior for individuals throughout the lifespan in terms of both physical health and psychological well-being, research has shown that college students as a group tend to exhibit decreased levels of exercise participation. Based on theories of behavior change, in addition to health promotion research showing health literacy materials to be effective in facilitating the adoption of positive health behaviors, a manual was created by the researcher entitled “Raising Exercise Confidence.” This study sought to evaluate the use of this manual as an intervention for increasing constructs from the Theory of Planned Behavior (attitude, subjective norm, perceived behavioral control, and intention), Self-Determinism Theory (autonomy, competence, and relatedness), and Social Cognitive Theory (self-efficacy) to promote exercise participation amongst college students.

Purpose of the Study

Based on the Theory of Planned Behavior, Self-Determinism Theory, and Social Cognitive Theory, the purpose of the current investigation was to evaluate the effect of the “Raising Exercise Confidence” manual on constructs that promote exercise participation amongst college students. By measuring the manual’s impact on the constructs of attitude, subjective norm, perceived behavioral control, intention, autonomy, competence, relatedness, and self-efficacy, this evaluative research project sought to determine the usefulness of the “Raising Exercise Confidence” manual as a health literacy material.

Significance of the Problem

Based on a review of literature on the exercise behavior of college students, exercise during this transitional period of life has been shown to have significant implications for the developmental and social factors that contribute to health behavior patterns in adulthood. Numerous studies have demonstrated that despite the importance of physical activity for college students, this population tends to display lower levels of exercise participation as compared to the general population and to their peers not attending college. Additionally, longitudinal research has shown that college students are less physically active as compared to the activity levels they displayed while in high school. In consideration of both the immediate and long-term effects that decreased exercise participation can have on the health and quality of life of college students.
students, the need exists for health literacy materials that are designed to facilitate exercise participation for this specific population.

Research Questions

To evaluate the effect of the “Raising Exercise Confidence” manual, the following research questions were proposed: What effect does the manual have on constructs from a) the Theory of Planned Behavior (attitude, subjective norm, perceived behavioral control, and intention), b) Self-Determinism Theory (autonomy, competence, and relatedness), and c) Social Cognitive Theory (self-efficacy) relating to exercise at Miami University’s Recreational Center? The overall purpose of the study was to determine the usefulness of the manual as a health literacy material, with the researcher hypothesizing that the manual would have a positive effect by increasing each of the constructs, therefore effectively promoting exercise participation for students using Miami University’s Recreational Center.

Delimitations

To limit and clarify the scope of the study, the researcher placed delimitations on the study that involved 1) the traits of the target population and 2) the timing of the data collection.

1) Although the evaluation of the “Raising Exercise Confidence” manual yielded results that are applicable to the general college population, the target population for the study was narrowed to include only students who were currently taking classes at Miami University. These students included those taking classes at Miami University’s main campus in Oxford, Ohio, in addition to the regional campuses of Miami University in Hamilton, Ohio and Middletown, Ohio. Since the manual was designed specifically for individuals using Miami University’s Recreational Center, only Miami University students were included in the research sample.

2) The researcher chose to restrict the time allotted for data collection to the first two weeks of the 2010 Summer Semester. Aside from convenience for the researcher, this decision also provided most study participants with two previous semesters of potential exposure to Miami University’s Recreational Center. The timing of the data collection, however, also excluded any Miami University students not electing to take a class during the summer.

Limitations of the Study

The limitations of the study were twofold:

1) Recruitment of Study Participants. Miami University students were recruited to participate in the current study based on their enrollment in specific summer classes. Professors
from a cross-section of disciplines and from all three local campuses (Oxford, Hamilton, and Middletown) were emailed with a solicitation from the researcher to collect data from their classes (Appendix A, p. 58). Only students whose professors responded affirmatively to the researcher’s request and were in attendance at the time of the researcher’s visit were given the option to participate in the study. No other factors, such as age, gender, major, primary campus, or grade level, were used as excluding factors.

2) Focus on Constructs Influencing Exercise Rather Than Actual Exercise Behavior. Since the study used a cross-sectional design to evaluate the usefulness of the manual, only the constructs shown to influence exercise, not the actual display of exercise behaviors, were measured. The evaluation was based on assessing the effect of the manual on constructs from the Theory of Planned Behavior, Self-Determinism Theory, and Social Cognitive Theory. This particular limitation, therefore, was not a concern for the current investigation. These theories lent themselves to the study of the internal thoughts and feelings generated by the manual, rather than focusing on the actual behavior that may have resulted. Further research could build off of the current study to look into behavioral change from print materials, although the focus of this study remained the influence of the manual on the constructs shown to influence exercise participation, which developed from the Theory of Planned Behavior (attitude, subjective norm, perceived behavioral control, and intention), Self-Determinism Theory (autonomy, competence, and relatedness), and Social Cognitive Theory (self-efficacy).

Assumptions

The assumptions of the current study involved: 1) the need for promoting exercise for college students; 2) the use of theory-based interventions; and 3) the usefulness of a printed health literacy material to facilitate behavioral change. Although all three assumptions have been based on research to be discussed in the review of literature, they were nonetheless assumptions made by the researcher regarding the type of approach that was believed to be appropriate for the current investigation.

1) Based on the findings of previous research showing the proclivity of college students to display decreased levels of exercise participation, the current study assumed that exercise should be increased for this particular population. Some potential exceptions may include those impaired by illness or disability, for whom physical or medical limitations may necessitate low levels of physical activity. Additionally, those college students with eating disorders who may
use excessive exercise as a means of purging to lose weight would not benefit from materials aimed at promoting exercise.

2) Research has suggested the importance of basing interventions on theoretical orientations, although the loss in this approach may involve de-emphasizing the lived experience of those for whom the intervention was targeted. Often theory and practice can become separated from each other, and theories may not be useful if they do not reflect the actual experiences of the target population.

3) Within the literature review, considerations have been discussed regarding the mode of presentation, the structure, and the evaluation of health literacy materials. Conscious choices were made during the development of the “Raising Exercise Confidence” manual. The researcher decided to create a non-tailored, printed manual that utilized meaningful pictures and concrete text. The purpose of this health literacy material was to inform students about exercise procedures relating to the use of the cardiovascular equipment available to them at Miami University’s Recreational Center.

Definition of Terms

Exercise

According to the Guidelines for Exercise Testing and Prescription (ACSM, 2010), “exercise is a type of physical activity consisting of planned, structured, and repetitive bodily movement done to improve or maintain one or more components of physical fitness” (p. 2).

Theory of Planned Behavior Constructs: Attitudes, Subjective Norm, Perceived Behavioral Control, and Intentions

According to Palmeira, Teixeira, Branco, Martins, Minderico, Barata, Serpa, and Sardinha (2007), intentions are determined by attitudes, subjective norms, and perceived behavioral control. Attitudes are the evaluation and beliefs towards the result of the behavior. Subjective norms involve the perceived pressure from significant others for the completion of the behavior. Perceived behavioral control is the degree of confidence perceived by the person regarding her/his ability to perform the behavior. Perceived behavioral control is influenced by the beliefs towards resources and opportunities (p. 2).

Self-Determinism Theory Constructs: Competence, Autonomy, and Relatedness

According to Reis, Sheldon, Gable, Roscoe, and Ryan (2000), basic psychological needs can be understood as follows: “The need for competence is fulfilled by the experience that one
can effectively bring about desired effects and outcomes, the need for autonomy involves perceiving that one’s activities are endorsed by or congruent with the self, and the need for relatedness pertains to feeling that one is close and connected to significant others” (p. 420).

Social Cognitive Theory Construct: Self-Efficacy

McAlister, Perry, and Parcel (2008) define the concept of self-efficacy, as “beliefs about personal ability to perform behaviors that bring desired outcomes” (p. 171).

Summary

Based on research concerning college student exercise behavior and a review of theoretical approaches to the understanding of behavior change, the current investigation was designed to evaluate the usefulness of the health literacy manual entitled, “Raising Exercise Confidence.” By evaluating the manual’s effect on the constructs from the Theory of Planned Behavior (attitude, subjective norm, perceived behavioral control, and intention), Self-Determinism Theory (autonomy, competence, and relatedness), and Social Cognitive Theory (self-efficacy) that have been shown to influence exercise participation, the current study sought to determine the usefulness of this manual in promoting exercise amongst college students. Based on these findings, this study has the potential to inform future health literacy interventions and may inspire the application of similar print materials to other contexts or behavioral changes.
CHAPTER 2
REVIEW OF LITERATURE

Within the field of public health, regular physical activity has presented a widely recognized positive health behavior for individuals throughout the lifespan (United States Department of Health and Human Services, 2008; Pate, Blair, Haskell, Macera, Bouchard, Buchner, Ettinger, Heath, & King, 2005). Numerous studies have identified the benefits of exercise to physical health and disease prevention (Fletcher, Blair, Blumenthal, Caspersen, Chaitman, Epstein, Falls, Froelicher, Froelicher, & Pina, 1992; Blair, Kohl, Barlow, Paffenbarger, Gibbons, & Macera, 1995), as well as the psychological benefits of exercise to emotional well-being (Kosma, Cardinal, & Rintala, 2002; Camacho, Roberts, Lazarus, Kaplan, & Cohen, 1991). The dangers of physical inactivity, including obesity, morbidity, and mortality, have been extensively researched as well (Blair, LaMonte, & Nichaman, 2004; Blair & Nichaman, 2002; Thompson, Buchner, Pina, Balady, Williams, Marcus, Berra, Blair, Costa, & Franklin, 2003; King, Dalsky, Clutter, Young, Staten, Cryer, & Holloszy, 1988), revealing the important contribution physical activity makes to quality of life. Out of this plethora of evidence supporting the value of regular physical activity to health and well-being, college students present a population often overlooked in the research (Lee & Loke, 2005). Although typically considered a healthy group overall, the apparent lack of research on college students marks this specific population as a demographic in need of health interventions to promote regular exercise participation.

The current investigation sought to evaluate the usefulness of a health literacy manual designed for college students using the cardiovascular equipment at Miami University’s Recreational Center. By evaluating the health literacy manual entitled, “Raising Exercise Confidence,” the purpose of the study was to determine the effect of the manual on the constructs from the Theory of Planned Behavior (attitude, subjective norm perceived behavioral control, and intentions), Self-Determinism Theory (autonomy, competence, and relatedness), and Social Cognitive Theory (self-efficacy) that have been shown to influence exercise participation. The significance of these findings relates to the applicability of such a material’s design for use in other exercise contexts or in the development of future behavioral change interventions. Through a review of literature on the exercise behavior of college students, the theoretical approaches to studying exercise cognitions and behaviors, and the role of health literacy
materials in promoting positive behavior change, evidence will emerge in support of the health-enhancing implications of the current study.

College Student Exercise Behavior

Although research in the area of exercise promotion has tended to focus on populations traditionally considered at-risk, such as the elderly (Sato, Kaneda, Wakabayashi, & Nomura, 2007; Lopopolo, Greco, Sullivan, Craik, & Mangione, 2006) or patients with chronic diseases (Kujala, 2009; Stuart, Chard, & Roettger, 2008), young adults transitioning into college face a unique set of developmental and environmental circumstances that increase the likelihood of becoming physically inactive (Kwan, Bray, Woodgate, & Gyurcsik, 2007; Sinclair, Hamlin, & Steel, 2005; Lee & Loke, 2005). According to the World Health Organization (as cited by Lee & Loke, 2005), since young adults are considered to be relatively healthy based on their age, they have tended to be neglected by prior research and have not presented a priority to health promoters or researchers (p. 209). By examining the previous research that does exist in the area of college student exercise behavior, a review of the research literature will show that the college transition is associated with declines in physical activity, thus revealing the need for interventions to address this health disparity.

The Significance of Exercise to College Student Health and Well-Being

As cited previously, regular physical activity affords benefits to both the physical health and emotional well-being of individuals across the lifespan. There are unique circumstances relating to the transition from high school to college, however, that make this developmental period a pivotal time for the formation of positive exercise behaviors. Typically characterized by a move away from the structured life of a home environment, students in college face new responsibilities in making decisions for their own health. The stress of moving to a more independent environment, along with the added pressure of meeting new people and performing well academically, makes college a challenging period in life, particularly in the formation of positive health behaviors.

Developmentally, the transition into college life can prove to be an imperative time in forming positive health behaviors that impact the individual not only in the present circumstances, but also in terms of future health outcomes. In reference to college students, Lee and Loke (2005) explain, “their health-promoting practices and psychological well-being not only impact their immediate health status but also have long-term health consequences. Many
young people engage in a wide range of unhealthy habits (such as inadequate nutritional intake, rest, and exercise) and risk behaviors (such as tobacco and drug use) that lead to adverse health outcomes” (p. 210). These researchers go on to discuss the importance of developing positive health behaviors during these initial independent years of young adulthood, noting the difficulty in trying to later change the habits formed during this crucial period. They conclude that “many of the factors that contribute to health risks in older adults are preventable if identified and changed at an earlier stage. Early interventions can alter behavior patterns that would place young people at health risk in later life” (p. 210). This stance is supported by Bray and Born (2004), who note that “a decline in physical activity experienced during the first few months of university may lead to a pattern of inactivity that persists throughout one’s university years and beyond” (p. 181).

Further supporting the influence that exercise habits formed in college can have on health outcomes later in life, a study by Kwan, Bray, Woodgate, and Gyurcsik (2007) looked at the specific personality trait of “consideration of future consequences (CFC),” or the degree to which an individual considers distant versus immediate consequences of a potential behavior. The researchers found that students with high-CFC were more physically active than those with low-CFC. Additionally, those who focused more on the distant consequences of their behaviors, the high-CFC group, were shown to have more positive attitudes towards exercise, greater perceived behavioral control, and higher intentions to exercise than the low-CFC group. The authors concluded that “students who are willing to sacrifice immediate benefits to achieve more desirable future states viewed physical activity as more positive, had greater control over, had stronger intentions to engage in, and were subsequently more active” (p. 177). This finding confirms the importance of the exercise habits formed during college. If students have a positive attitude towards exercise and feel in control of their decisions and behaviors, then they are forming life-long habits that will serve to promote their health into the future.

Along with the developmental significance of college and its impact on exercise behavior, another influence associated with the unique circumstances of being a college student involves the social environment. As a crucial time for social development, the college years provide opportunities to form social bonds that may influence a student’s self image and dictate the decisions a student makes in terms of appearance or behaviors. According to the findings of Sinclair and colleagues (2005), “social factors had a more significant impact on the decision to
engage in physical activity than did the availability of exercise machines, free weights, and similar exercise paraphernalia” (p. 41). Because of the great importance placed on peer support and acceptance, the exercise environment on a college campus presents a potentially stressful context for students. The exercise environment has been shown to influence self-presentational concerns and self-efficacy (Lamarche, Gamage, & Strong, 2007; Gammage, Martin Ginis, & Hall, 2004), which can lead to a critical social environment, made further intimidating by the added pressure of social acceptance associated with college life.

One study by Lindwall and Martin Ginis (2006) looked further at the impact of college’s social context on perceptions of exercisers and the self-presentation strategies that are utilized in such an environment. As defined by the authors, self-presentation consists of two discrete processes, impression management, through which “people are motivated to control the impressions they make on others” (p. 209), and impression construction, which involves “choosing an impression to construct and utilizing strategies to convey that impression” (p. 209). The authors found that those described as regular exercisers or as living active lifestyles were rated more favorably by college students in terms of both personality attributes and physical attractiveness, with those described as excessive exercisers scoring the lowest on personality attributes and those described as non-exercisers scoring lowest on physical attractiveness. These findings confirm the presence of an exercise stereotype that influences how others perceive someone who exercises. According to the authors, “a significant foundation for this exercise stereotype probably is the positive value attached to a regular active lifestyle communicated on a daily basis by mass media, national health organizations and researchers” (p. 215). Based on this study, the college exercise environment presents added pressures to portray oneself in a socially desirable way, and could therefore intimidate those unfamiliar with a fitness center’s equipment or cause those who do not feel comfortable in such a highly critical environment to avoid exercise.

Besides the negative influences that are potentially present in a highly evaluative social environment, such as a university’s recreational center, another social factor impacting the exercise behavior of college students involves peer support. Exercise behavior and social support appear to have a reciprocal relationship in that students with social support are more likely to exercise, and those who exercise are more likely to prefer exercising with others. In a study by Shapcott, Burke, Carron, and Eyes (2007), college students were asked to rate their preferred
exercise context, with both males and females preferring to exercise with others outside of a structured class. Males least preferred exercising in a structured class, while females least preferred exercising completely alone (p. 201). The factors found to most influence these preferences were “personal control, increased motivation, and presence of friends” (p. 202).

Further supporting the value of social support in the exercise context, a study by Burke, Cannon, and Eyes (2006, p. 2) referenced the works of other researchers who found that an individual’s inherent need to belong acts as a driving force behind interactions (Baumeister & Leary, 1995, p. 497). Additionally, the authors cite that exercise non-adherence has been found to be associated with exercising alone and positive social outcomes have been shown to be related to exercising with others (Franklin, 1988; Carron, Hausenblas, & Mack, 1996; Dishman & Buckworth, 1996). Based on these findings, the authors confirm the context of exercising with others as the most preferred, and offer self-determination theory as an explanation for the dislike of structured classes or exercising alone. The value of social support for a college student in the exercise environment, therefore, is clear, with those who lack social support being at risk for not maintaining or ever starting an exercise routine.

**The Impact of College on Student Exercise Behavior**

For both the developmental and social consequences discussed previously, exercise has been shown to be particularly critical in the lives of young adults transitioning into college. The formation of health-promoting habits during these initial years of young adulthood have the potential to significantly impact not only future health outcomes, but also quality of life for a college student in terms of physical health and emotional well-being. Numerous studies have found college students to be less active as compared to the general population. Additionally, research has shown that the transition from high school to college tends to coincide with a significant decrease in physical activity levels. This decline has been found across the globe, with researchers confirming the presence of this phenomenon in New Zealand (Sinclair, et al. 2005), China (Abdullah, Wong, Yam, & Fielding, 2005; Lee & Loke, 2005), and Canada (Irwin, 2007; Bray & Born, 2004).

Looking at the health-promoting behaviors of Chinese young adults, Lee and Loke (2005) conducted a study that found only 26.2% of males and 9.3% of females exercised vigorously for 20 minutes or more at least three times a week (p. 213). Additionally, although 58% of young people in Hong Kong reported exercising regularly, when compared to those who
were in college, only 23.4% of males and 6.4% of females followed a regular exercise program (p. 217). Similarly, the findings of Sinclair and colleagues (2005) indicated that only 40% of university students in their study met the physical activity guidelines issued by the New Zealand Ministry of Health, as compared to 70% of the general population of 18- to 24-year-olds (p. 40). These studies show that living in a university environment as a college student is associated with lower levels of physical activity as compared with those in the general population.

Along with the lower levels of physical activity found in college students compared to the population as a whole, longitudinal studies have also found that individuals tend to be less physically active in college than they had been during high school. A study by Bray and Born (2004) compared physical activity levels during the first two months of college to the levels of physical activity displayed during the last two months of high school. The study found a significant decline over this transition period, with study participants averaging 3.32 exercise sessions per week during high school compared to 2.68 sessions per week during college. These findings also indicated that although 66.2% of the participants reported scores that classified them as “active” during high school, that number declined to 44.1% of the participants remaining physically active during college.

Further looking at the negative influence that transitioning into college can have on exercise behavior, students in another study (Sinclair et al., 2004) were asked about sports club membership. The authors found that 47% of respondents had ceased all involvement in at least one club sport or recreational activity following the transition into college (p. 40). The authors also found that students belonging to a club averaged 702 minutes exercising per week as compared to 401 minutes per week for those not involved in clubs. This shift in membership indicated a significant decline in the amount of time spent exercising. Additionally, Irwin (2007) found that only 35% of Canadian college students were able to maintain physical activity at the necessary duration and intensity levels needed to gain health benefits for a 1-month period (p. 38).

In consideration of the evidence provided demonstrating the impact of college on the exercise behavior of students, several researchers have speculated as to the potential barriers that may cause this phenomenon. According to Bray and Born (2004), “high school to the freshman year of university represent critical life changes that are associated with increased stress, threats to self-esteem, lowered social support, and an abundance of increased health risk factors” (p.
Additionally, Abdullah and colleagues (2005) found “no time, no interest, tired/sickness” (p. 613) as the top-rated reasons for not exercising. Other variables, including increased time pressures, social pursuits, course workload, job obligations, environmental conditions in terms of weather (Sinclair, et al, 2004), in addition to the change, ambiguity, and adjustment associated with the college transition (Bray & Born, 2004; Lee & Loke, 2005), have been suggested as well. Although the research data is clear in showing a definite decline in the physical activity levels of students when they transition into college, a simple explanation for the cause of this phenomenon does not exist. The individual decision to engage in exercise is determined by a complex interaction of various personal and social factors, therefore, multiple theories of behavior change will be explored to gain a better understanding of how an individual’s thoughts, feelings, and behaviors relating to exercise are shaped.

Theoretical Approaches to the Study of Exercise

Since the modification of health-related behaviors has been a major focus within the field of health promotion, there now exists an abundance of theoretical approaches and models to guide this field of inquiry. Several researchers in the study of health-promoting behaviors ground their work in specific theoretical orientations and many utilize multiple theories in their studies (Palmeira, et al, 2007; Chatzisarantis, Hagger, Wang, & Thogersen-Ntoumani, 2009; Hagger, Chatzisarantis, & Harris, 2006). The purpose of the current study was to evaluate a health literacy manual designed to promote the use of the cardiovascular equipment at Miami University’s Recreational Center. In both the design of the manual and the development of its assessment, theoretical orientations were used that best met the goals of the intervention. This section of the literature review will overview the three significant approaches to health behavior inquiry and change that shaped the current investigation. Through a discussion of the Theory of Planned Behavior, Self-Determinism Theory, and Social Cognitive Theory, key constructs will emerge that guided the development and evaluation of the “Raising Exercise Confidence” manual.

The Theory of Planned Behavior

As an expansion on the Theory of Reasoned Action (Ajzen & Fishbein, 1980), the Theory of Planned Behavior (TPB) was used as a framework for understanding health behavior. TPB outlines behavior as a result of one’s intentions and perceived behavioral control (PBC). According to Palmeira and colleagues (2007), these main constructs of TPB can be understood
as follows: “PBC is the degree of confidence perceived by the person regarding her/his ability to perform the behavior, and it is influenced by the beliefs towards resources and opportunities. Intentions are determined by PBC, attitudes, and subjective norms, where attitudes are the evaluation and beliefs towards the result of the behavior, and the subjective norms the perceived pressure from significant others for the completion of the behavior” (p. 2).

A meta-analysis by Armitage and Conner (2001) found TPB to predict about 20% of actual exercise and nutrition behaviors. Furthermore, a meta-analysis by Hagger et al. (2002) found 44.5% of variance in physical activity intentions to be explained by attitude, subjective norms, and perceived behavioral control, with 27% of variance in physical activity behavior being accounted for by intentions and perceived behavioral control (Wing Kwan, Bray, & Martin Ginis, 2009, p. 46). By showing the applicability of the constructs of the Theory of Planned Behavior in predicting health behavior outcomes, these studies demonstrate the usefulness of this theory as a framework for the current study.

A number of researchers have utilized the Theory of Planned Behavior (TPB) in the study of exercise behaviors. Vallance, Courneya, Taylor, Plotnikoff, and Mackey (2008) used the TPB to study exercise as a health intervention to promote quality of life for breast cancer survivors. In their first study, the authors used TPB to develop a theory-based physical activity guidebook for breast cancer survivors. In their second study, also in 2008, they found their guidebook to be effective in generating positive changes in TPB constructs and beliefs. The results of this work found “preliminary support for the use of the TPB and related salient beliefs as a framework for developing, implementing, and evaluating PA behavior change interventions in breast cancer survivors” (p. 155). This evidence supports the value of TPB in promoting exercise behavior change in a specific population, with further studies looking at its use in understanding the college student population.

In using the theory to predict the physical activity levels of first-year college students, Wing Kwan, Bray, and Martin Ginis (2009) found that the TPB was useful in predicting student intentions towards physical activity since 37% of variance in physical activity intentions was predicted by attitudes, subjective norms, and perceived behavioral control (p. 49). Although the TPB was found to be a useful framework for predicting exercise intentions, it did not accurately predict actual exercise behavior (p. 49). Thus, the TPB has proven useful to the understanding and study of behavioral intentions, yet a shortcoming exists in its inability to necessarily account
for performance of the behavior. This discrepancy led to the need for constructs from additional theories to support the current study.

**Self-Determinism Theory**

Just as health promotion researchers have drawn on the Theory of Planned Behavior (TPB) to study health behavior change, many researchers have also utilized Deci and Ryan’s (1985) Self-Determinism Theory (SDT) in this area of inquiry. Differentiating between the TPB and SDT, Hagger, Chatzisarantis, and Harris (2006) explain, “while the theory of planned behavior examines the immediate belief-based constructs thought to determine behavioral engagement, self-determination theory focuses on the quality of an individual’s motivation in a given context and the environmental factors that affect motivation in that context” (p. 308). According to Edmunds, Ntoumanis, and Duda (2006), “SDT proposes that human motivation varies in the extent to which it is autonomous/self-determined versus controlling” (p. 889). Furthermore, SDT suggests that “individuals move along a continuum of behavioral regulation, ranging from amotivation at the near end to intrinsic motivation at the far end of the continuum. Between the two extremes lie different levels of extrinsic motivation, reflecting progressively greater levels of self-determination” (Levy & Cardinal, 2004, p.345). As a motivation theory, SDT identifies three distinct needs that dictate the placement of one’s position on the motivational continuum. These needs include competence, autonomy, and relatedness, which according to Reis, Sheldon, Gable, Roscoe, and Ryan (2000), can be understood as follows: “The need for competence is fulfilled by the experience that one can effectively bring about desired effects and outcomes, the need for autonomy involves perceiving that one’s activities are endorsed by or congruent with the self, and the need for relatedness pertains to feeling that one is close and connected to significant others” (p. 420).

Looking to past research that used Self-Determinism Theory (SDT) as a guiding framework, a number of studies have employed constructs of the theory to evaluate exercise behavior. In the exploration of exercise behavior in adults, researchers often chose to pair SDT with an additional theory, such as the Theory of Planned Behavior (Chatzisarantis, Hagger, Wang, & Thogersen-Ntoumani, 2009; Hagger, Chatzisarantis, & Harris, 2006) or the Transtheoretical Model (Daley & Duda, 2006; Mullan & Markland, 1997). In terms of young people, Daley and Duda (2006) reported the findings of past research as showing that “self-determined identified and intrinsic regulations are positively related to future intention to
exercise, current exercise behavior, and physical fitness in adults and young people in both exercise and leisure contexts” (p. 232). Furthermore, in a study by Daley and Maynard (2003) that compared the effect produced by either autonomous or controlled exercise, “exercisers reported positive changes in affective responses during and after exercise when given the opportunity to be self-determined in the selection of their mode of exercise” (Daley & Duda, 2006, p. 232).

Connecting degree of self-determinism with readiness to adopt regular physical activity patterns, both Daley and Duda (2006) and Mullan and Markland (1997) found a positive correlation between these two factors, suggesting the importance of self-determinism to the performance of exercise behavior. A study by Palmeira and colleagues (2007), which looked at weight loss using four popular behavioral change theories, found that although variables related to SDT, such as intrinsic motivation, were strong predictors of weight reduction in the study, the best predictor of the behavior change was self-efficacy, a construct related to Social Cognitive Theory. Valuable insight into understanding exercise intentions and behaviors may be gained from combining the Theory of Planned Behavior and Self-Determinism Theory, therefore, in conjunction with Social Cognitive Theory.

Social Cognitive Theory

As a frequently used paradigm in the development of weight loss and physical activity interventions (Palmeira et al., 2007, p. 2), Social Cognitive Theory (SCT) is based on the concept of a triadic reciprocal causation, in which “interpersonal factors in the form of cognitive, affective and biological events; behavioral patterns, and environmental events all operate as interacting determinants that influence one another bidirectionally” (Bandura, 1999, p. 23). In reference to this concept within SCT, McAlister, Perry, & Parcel (2008) focus on the dynamic, changeable nature of the interrelationship between a person, the environment, and his or her behavior to provide support for health programming informed by this theoretical perspective. Key concepts include outcome expectations, both social and self-evaluative, which have been defined as “beliefs about the likelihood of various outcomes that might result from the behaviors that a person might choose to perform, and the perceived value of those outcomes” (McAlister et al., 2008, p. 172). Although both types of outcome expectations involve subjective perceptions of reality, social outcome expectations relate to how perceptions of others’ judgments impact an individual’s actions, while self-evaluative outcome expectations reflect self-conscious critiques.
Perhaps the most widely referenced construct, however, is self-efficacy, or beliefs about one’s ability to perform a task. As cited by Tsai and Coleman (2009), “self-efficacy focuses on individuals’ capabilities to mobilize their motivation, cognitive resources, and courses of action to meet restrictive situational demands, and represents people’s confidence in organizing and executing actions to perform a behavior in the face of salient barriers” (p. 366). Supported by the work of previous research studies that have utilized these constructs from SCT to examine various health behaviors, including exercise behavior, this theory provided a valuable framework for the current investigation.

Several studies on exercise have used Social Cognitive Theory as a framework (Tsai & Coleman, 2009; Wilson, Evans, Williams, Mixon, Sirard, & Pate, 2005; Rovniak, Anderson, Winett, & Stephens, 2002; Shields, Spink, Chad, Muhajarine, Humbert, & Odnokon, 2008). A study by Duncan and McAuley (1993) found high levels of self-efficacy to be positively related to higher likelihood of maintaining sufficient levels of exercise. Additionally, Tsai and Coleman (2009) found self-efficacy to be an important force in active recreation behaviors of students, emphasizing the significance of self-efficacy in the physical activity context since “people desire activities that they feel capable of performing, and that confidence in activity mastery increases individuals’ motivation to participate in sport” (p. 377). Furthermore, the usefulness of each construct of SCT in predicting exercise behavior has been explored (Rovniak et al., 2002), with researchers finding self-efficacy to have the greatest total effect on physical activity because it was shown to lead to greater use of self-regulatory strategies (p. 153). In addition, the overall conclusion of the study by Rovniak and colleagues (2002) found that components of SCT accounted for 55% of the variance observed in physical activity behaviors of college students. Therefore, SCT has shown to be an effective approach to not only understanding, but also modifying exercise behavior.

Out of the preceding overviews of the Theory of Planned Behavior (TPB), Self-Determinism Theory (SDT), and Social Cognitive Theory (SCT) within the exercise research literature, the value of using theoretical frameworks to shape the current investigation has emerged. According to one of the researchers cited previously (Rovniak et al., 2002), “an understanding of the processes that lead to regular physical activity could be used to design and implement more effective exercise interventions for young adults” (p. 153). To evaluate the usefulness of a health literacy manual for college students, therefore, several key constructs have
been drawn upon from each of the three theories. From the TPB, the focus on exercise intentions has shaped the direction of the manual evaluation, with attitudes, subjective norms, and perceived behavioral control beliefs influencing these intentions based on the confidence of the manual user. The three basic psychological needs identified in SDT have also been useful to the evaluation of the manual’s influence on exercise motivation, with attention being placed on exercise-related autonomy, competence, and relatedness. Out of SCT, the self-efficacy to perform an exercise has been shown to shape one’s behavior in an exercise environment. Out of these theoretical constructs, the “Raising Exercise Confidence” health literacy manual developed and has been evaluated through the current investigation. By discussing the significance of health literacy materials to the field of health promotion, including how they are used, presented, structured and evaluated, a framework for understanding the need for the current study will proceed.

Health Literacy Materials

Health literacy is defined as “the wide range of skills and competencies that people develop to seek out, comprehend, evaluate, and use health information and concepts to make informed choices, reduce health risks, and increase quality of life” (Zarcadoolas, Pleasant, & Greer, 2006, pp. 5-6). Health literacy has presented a potential point of disparity between those who can access and understand health information and those who remain limited in their abilities to navigate health decision-making due to low health literacy. A common approach within the field of health promotion has involved the use of health literacy materials to empower users to make informed health decisions and facilitate specific behavior changes. Emerging from the literature outlining the need for exercise interventions for college students and the need for a theory-based approach in the design of such an intervention, health literacy materials present a means to promote the exercise participation of college students. By exploring not only the ways in which health education materials have been used to foster behavioral change, but also how health promoters have evaluated the usefulness of such materials, the proceeding section will provide information on the development and evaluation of the “Raising Exercise Confidence” manual.

The Use of Health Literacy Materials in the Facilitation of Health Behavior Change

In reviewing the literature on the application of health literacy materials to the facilitation of health behavior change, a wide range of topic areas emerged. Materials designed to raise
health literacy have been developed for physician-patient interactions (Tigert, Chaloner, Scarr, & Webster, 2005), cancer screenings (Schapira & Van Ruiswyk, 2000; Ilic, Egberts, McKenzie, Risbridger, & Green, 2008), breast self-exams (Meyerowitz & Chaiken, 1987; Howe, 1981), testicular self-exams (Finney, Weist, Friman, 1995), surgery (Moore, 1996), substance abuse (Werch, Moore, DiClemente, Bledsoe, & Jobli, 2005; Di Noia, Schwinn, Dastur, & Schinke, 2003), HIV/AIDS (Wells, 1994), and nutrition (Silk, Sherry, Winn, Keesecker, Horodynski, Sayir; 2008). The use of health literacy materials, most commonly in the form of a pamphlet or brochure, has thus been implemented within the field of health promotion for many years and in relation to a vast range of health topics. Particularly relevant to the current study, a number of materials have been developed and implemented to facilitate exercise behavior change (Kliman & Rhodes, 2008; Levy & Cardinal, 2004; Bull, Jamrozik, & Blanksby, 1999; Plotnikoff, Brunet, Courneya, Spence, Birkett, Marcus, & Whiteley, 2007; Ball, Salmon, Leslie, Owen, & King, 2005; Marshall, Leslie, Bauman, Marcus, & Owen, 2003; Silk, Sherry, Winn, Keesecker, Horodynski, & Savir, 2008). An examination of the findings from these exercise-focused interventions will reveal the importance of the mode of presentation, the structure of the material, and the need for evaluation to occur.

The Mode of Presentation of Health Literacy Materials

One consideration regarding the presentation of health literacy materials involves the mode of presentation. One study by Kliman & Rhodes (2008) evaluated cognitions relating to physical activity after exposure to Canada’s Physical Activity Guide to Healthy Active Living (CPAG). Another study by Levy & Cardinal (2004) evaluated the effect of a mail-mediated intervention on the exercise behavior of adults. Both of these studies determined that interventions sent by mail tended to have a low compliance rate in terms of completing questionnaires. These findings indicated that mail-mediated materials may be too passive for users and “more intensive interventions” (Levy & Cardinal, 2004, p. 345) may be needed to enact behavior change. More interactive approaches to health behavior change have been explored by researchers, including therapist guided (Friedrich, Cermak, & Maderbacher, 1996), website-based (Silk et al., 2008; Marshall et al., 2003), and telephone-mediated (Ball et al., 2005). In a comparison of print, website, and game modalities on increasing literacy about nutrition, Silk and colleagues (2008) found benefits to the use of website and print materials, citing “media such as Web sites and traditional print allow users to spend as much time as
needed learning information. The ease of learning, plus past experience with these media, likely resulted in better learning outcomes” (p. 8).

Furthermore, although electronic-based information was preferred by study participants for both nutrition information (Silk et al., 2008, p. 3) and exercise information (Marshall et al., 2003, p. 93), recall and actual use of health literacy materials were higher for the print format than for the website in both studies. Additionally, print materials combined with therapist instruction (Friedrich, Cermak, & Maderbacher, 1996) and in conjunction with telephone follow-ups (Ball et al., 2005) have been shown to positively impact exercise behaviors. These studies indicate that although a number of modes are available for presenting health literacy materials, print-based media has remained a reliable method of providing information both in conjunction with other modes and on its own. Based on this research, evidence has been found to support the creation of the “Raising Exercise Confidence” manual as a printed material to promote exercise participation amongst college students.

The Structure of Health Literacy Materials

Another consideration relating to the presentation of health literacy materials involves the structure of the content. Message framing, which refers to the emphasis in the message on the positive or negative consequences of adopting or failing to adopt a particular behavior (Rothman & Salovey, 1997; Salovey & Williams-Piehota, 2004), contributes to how effective a health literacy material is in persuading a user to modify his or her behaviors. In terms of message framing for health behavior change, Pelletier and Sharp (2008) found that “framing messages systematically in terms of intrinsic gains or losses (i.e., health, well-being) as opposed to extrinsic gains or losses (i.e., make or save money, comfort, prestige, and fame) should not only enhance the level of self-determined motivation, but it should also facilitate the maintenance of the behaviors that people adopt over time” (p. 215). This study by Pelletier and Sharp (2008) not only confirmed the inclusion of self-determinism theory in the current study’s framework, but also provided support for health literacy materials to focus on intrinsic gains.

Along with message framing, another structural consideration involves message tailoring, in which “individuals can be given behavior change information relevant to their stage in the decision process, whereas information not likely to be helpful at that stage can be omitted” (Campbell, DeVellis, Strecher, Ammerman, DeVelis, & Sandler, 1994, p. 784). In a comparison of physical activity changes resulting from either a standard pamphlet or a computer-generated,
tailored pamphlet, Bull and colleagues (1999) found no significant difference. The authors attributed these findings to both the high quality of the standard pamphlet used in the study and the homogeneity of subjects in terms of the variables under consideration for tailoring (p. 237). Similarly, Plotnikoff and colleagues (2006) found no difference in physical activity changes resulting from either tailored or standard materials. Based on this data, tailoring to specific individuals was not utilized in the design of the “Raising Exercise Confidence” manual since the audience for this health literacy material was homogenous in terms of their status as students at a specific university. Through this design, the manual remained general enough to reach an entire student population, but specific enough to relate to an individual student’s identification with Miami University.

The Evaluation of Health Literacy Materials

Aside from the considerations relating to material presentation, another area of interest emerging from this research involved the evaluation of health literacy materials in terms of both design and efficacy. Looking at the design of informational pamphlets, researchers have sought to evaluate cost-effectiveness (Paul, Redman, & Sanson-Fisher, 2004) and recall based on text and graphics (Clark, AbuSabha, Von Eye, & Achterberg, 1999), along with readability and suitability (Shieh & Hosei, 2008). Looking at cost-effectiveness of different pamphlets based on literature characteristics, behavioral strategies, or marketing strategies, Paul and colleagues (2004) found the behavioral strategies pamphlet to be the most cost-effective, indicating the benefit of applying the theoretical orientations discussed previously to the development of health literacy materials. Additionally, materials were found to be more effective in the facilitation of information coding, retrieving, and recalling when the text and graphics were concrete rather than abstract (Clark et al., 1999, p. 561). Meaningful graphics and pictures that relate to the text were shown to assist in textual memory retention since these characteristics facilitated the coding of information, both verbally and visually (Clark et al., 1999; Paivio, 1991). These findings provided guidance for the current manual, “Raising Exercise Confidence,” since past research confirmed the value of using concrete text and meaningful images to facilitate learning.

Health literacy materials have been shown to be valuable as behavior change tools across a variety of health promotion contexts. Specifically considering the health literacy material developed in the current study to address the disparity in exercise participation of college students, “Raising Exercise Confidence” had been designed as a printed material using theory-
based message framing to target the student population of Miami University. To evaluate the usefulness of the manual as a health literacy material, scales were used that measured the effect of the manual on constructs from the TPB (Rhodes, Blanchard, & Matheson, 2006), SDT (Van Den Broeck, Vansteenkiste, De Witte, Soenens, & Lens, 2010), and SCT (Lorig, Stewart, Ritter, González, Laurent, & Lynch, 1996), in addition to the language elements of the manual (Ubbes, 2008). The value of “Raising Exercise Confidence” as a health literacy material in promoting exercise amongst college students will be discussed in Chapter 5.

Manual Design

The conceptualization, development, and creation of the “Raising Exercise Confidence” manual emerged out of a final project in a graduate-level course on health communication and education. Within this course, students were provided with the opportunity not only to learn how health literacy shapes health decisions and outcomes, but were also required to create an innovative project reflective of the need to increase health literacy. Defined as “the wide range of skills and competencies that people develop to seek out, comprehend, evaluate, and use health information and concepts to make informed choices, reduce health risks, and increase quality of life” (Zarcadoolas, Pleasant, & Greer, 2006, pp. 5-6), health literacy presents a potential point of disparity between those who can access and understand health information and those who remain limited in their abilities to navigate health decision-making due to low health literacy. Based on the intimidation felt by inexperienced exercisers or those not familiar with the cardiovascular equipment available at Miami University’s Recreational Center, the need emerged for a health literacy material that provided information to empower users to feel confident in their abilities to exercise in this specific environment.

Research on Social Physique Anxiety as a Source of Exercise Intimidation

In developing the manual, research was completed in the areas believed by the researcher to most influence feelings of inadequacy or discomfort in an exercise context. The pressures to conform to the expectations of the evaluative exercise environment and to present a favorable image to others has been associated with a specific type of anxiety found in the exercise context known as “social physique anxiety” (Berry & Howe, 2004; Focht & Hausenblas, 2004; Katula, McAuley, Mihalko, & Bane, 1998; Marquez & McAuley, 2001). Defined as “the disposition to experience apprehension in response to the presence or prospect of negative physique evaluation” (Focht & Hausenblas, 2004, p. 361), this type of anxiety causes people to worry
about how others will perceive their bodies and competencies, in turn limiting the comfort or enjoyment experienced in the exercise environment. This phenomenon of social physique anxiety attests to the evaluative nature of many fitness facilities in which exercisers worry about how their physical appearances and abilities to perform exercise-related tasks will be perceived and judged by others. As found in a study by Katula and colleagues (1998), “the primary reason for avoiding exercise in social environments was the anxiety associated with being evaluated by others” (pp. 320-321).

Through self-presentation, a form of impression management that refers to "how people attempt to control the impressions they make on others" (Berry & Howe, 2004, p. 3), people may develop strategies to cope with the pressures of an evaluative exercise environment. By making a concerted effort through self-presentation to project the socially acceptable and idealized image of an exerciser, people strive to portray themselves according to the standards of perfection that they believe to be expected of them as exercisers (Berry & Howe, 2004; Focht & Hausenblas, 2004; Lindwall & Martin Ginis, 2006). Because those perceived as regular exercisers tend to be judged more favorably in terms of physical attributes, such as “fitter, stronger, healthier, more muscular and more physically attractive” (Lindwall & Martin Ginis, 2006, p. 209), and non-physical attributes, including “self confidence, sociability, self-control and being a hard worker” (p. 209) as compared to those who do not workout regularly, many exercisers cite improvement of their social image as a major motivation for working out (Marquez & McAuley, 2001, p. 649). As a result, those who lack the experience or knowledge of how to properly use exercise equipment may feel intimidated and lack the self-confidence that would enable them to reap the health benefits of regular physical activity. This gap in exercise-efficacy can be viewed as a result of limited health literacy for those who allow their insufficient knowledge of exercise equipment to limit their ability to access exercise.

Just as Marquez & McAuley (2001) have concluded from social physique anxiety research that “the evaluative potential of a situation can have an effect on an individual’s self-efficacy, adherence to exercise, and where an individual chooses to exercise” (p. 650), a study by Katula et al. (1998) also found that “as physique anxiety increased, individuals’ confidence in their abilities to exercise decreased” (pp. 329-330), suggesting the dynamic interaction between a person, his or her behaviors, and the environment. Because “improved physical self-concepts will lead to improved exercise behavior, and improved exercise behavior will lead to better
physical self-concepts” (Marsh, Papaioannou, & Theodorakis, 2006, p. 326), the need for an approach to combat the detrimental effects of the evaluative environment and the low self-confidence that results led to the development of “Raising Exercise Confidence” as a guide for students in navigating Miami University’s Recreational Center. From the literature on environmental pressures and the resulting impact on self-concepts, the theoretical framework of Social Cognitive Theory was utilized to better understand this problem and to help inform a solution in the form of a health literacy manual.


From an understanding of the effects that the highly-evaluative nature of an exercise environment can have on the creation of social physique anxiety and the necessitation of self-presentation strategies, Social Cognitive Theory was chosen to both investigate this health literacy problem and craft an effective solution, leading to the development of the “Raising Exercise Confidence” manual. Focusing on the interaction of individuals, their environments, and the resulting behaviors, Social Cognitive Theory recognizes a triadic reciprocal causation, in which “interpersonal factors in the form of cognitive, affective and biological events; behavioral patterns, and environmental events all operate as interacting determinants that influence one another bidirectionally” (Bandura, 1999, p. 23). Within the exercise context, an evaluative environment interacts with an individual’s self-conceptions, which then in turn interacts with his or her health behaviors in choosing whether to exercise within the social atmosphere. Although the exercise environment identified within the literature has the potential to limit health behavior by creating a sense of anxiety within the individual, this theory provides hope for a solution by focusing not only on the current reciprocal determinism of these three dimensions, but also “people’s potential abilities to alter and construct environments to suit purposes they devise for themselves” (McAlister, Perry, & Parcel, 2008, p. 170). The dynamic, changeable nature of the interrelationship between person, environment, and behavior provided support for the creation of a manual that informed individuals in order to improve their health behavior and ultimately decrease the intimidation that may develop out of an evaluative exercise environment.

Within Social Cognitive Theory, key concepts relate to the evaluative exercise environment, the intimidation felt by exercisers, and the potential for behavior change through health information acquisition. Reflective of the effects of the exercise environment on social physique anxiety and self-presentation strategies, Social Cognitive Theory discusses outcome
expectations, both social and self-evaluative, as “beliefs about the likelihood of various outcomes that might result from the behaviors that a person might choose to perform, and the perceived value of those outcomes” (McAlister, et al., 2008, p. 172). Although both types of outcome expectations involve subjective perceptions of reality, social outcome expectations relate to how perceptions of others’ judgments impact individual actions, while self-evaluative outcome expectations reflect self-conscious critiques. Within the exercise context, the intimidation experienced by many people can be viewed as a result of these outcome expectations, with social physique anxiety emerging from social outcome expectations and self-presentational strategies a result of a self-evaluative outcome expectation to conform to social norms.

Besides the application of Social Cognitive Theory to the effects of the evaluative exercise environment, the concept of self-efficacy also appears both in the theory and in the research literature on exercise behavior. Self-efficacy, “beliefs about personal ability to perform behaviors that bring about desired outcomes” (McAlister, et al., 2008, p. 171), presents a connection between the “individual” dimension in the triadic reciprocism of Social Cognitive Theory and the internalization of intimidation that may result from the exercise context. Although the evaluative atmosphere of fitness facilities presents an environmental influence, the realization of these self-concepts in the form of lowered self-confidence leads to the problem of low exercise self-efficacy. When an individual does not feel confident or competent, he or she may become reluctant to engage in activities that seem overwhelming. The concept of self-efficacy, therefore, provides rationale for the non-adherence to exercise that often results when people feel uncomfortable and incapable within an intimidating exercise atmosphere.

An additional concept within Social Cognitive theory, observational learning, helped to craft a solution for increasing exercise confidence. Observational learning presents an effective method for learning new behaviors and skills that can aid an individual in overcoming self-efficacy deficiencies, such as reduced exercise confidence. Through “exposure to interpersonal or media displays” (McAlister et al., 2008, p. 171) of the desired actions, particularly through “peer modeling” (p. 173), observers can relate to those demonstrating the behavior and in turn develop a sense of confidence in their own abilities to perform the specific tasks. In order to raise the exercise confidence of students, the manual focused on utilizing images of real students successfully using the cardiovascular equipment at Miami University’s Recreational Center. By observing a pictorial display of a variety of students who were diverse in terms of gender,
ethnicity, body shape and/or perceived athletic ability, the manual used peer models to inform others about the procedures for using the exercise equipment at the recreational center.

The Creation of the Manual

Based on the need for health literacy materials promoting exercise for college students, the researcher first conceptualized and then designed “Raising Exercise Confidence.” This specific title was chosen to reflect both the purpose of the manual and because of the acronym “REC,” which served as an abbreviation commonly given to Miami University’s Recreational Center, or the REC. The researcher gathered information from Miami University’s Recreational Center regarding the types of cardiovascular equipment available, along with the procedures for how to reserve, use, and clean the machines. The focus of the manual involved the cardiovascular equipment, as opposed to other areas of the recreational center, in order to make the manual concise and manageable for users. Based on the results of the current investigation, future print materials could be created to focus on other types of exercise, including weight training or group fitness classes.

To create the manual, the researcher recruited participants at Miami University’s Recreational Center to appear in the manual as visual examples of how to use the cardiovascular equipment. The students asked to participate were selected based on the type of equipment they were currently using for exercise and/or based on the need to represent a diverse student population in terms of gender, race/ethnicity, and body type. Participation was voluntary and each student photographed for the manual first signed an informed consent form (Appendix B, p. 59). The researcher used a digital camera to photograph each participant while using the exercise equipment. Photographs were also taken of Miami University’s Recreational Center’s exterior, the cardiovascular area, the sign-up station for using the cardiovascular equipment, a station for cleaning the cardiovascular equipment, and the screens of each of the cardiovascular machines. These photographs were used to enhance the usefulness and accessibility of the exercise manual to a variety of students. The design of the manual took into account visual and textual considerations learned in health communication and education coursework, in addition to information gained by the researcher through attendance at a workshop focusing on health literacy material development. The finished manual was presented to graduate students and the faculty instructor at the end of the health promotion course. The same health literacy manual then
became the focus of the current investigation to evaluate its usefulness to the college student population.
CHAPTER 3
METHODOLOGY

Based on research in the areas of college student exercise behavior, theoretical approaches to the study of exercise, and the use of health literacy materials, the current study was designed to evaluate the usefulness of the “Raising Exercise Confidence” manual. The investigation sought to determine the effect of the manual on the constructs from the Theory of Planned Behavior (attitude, subjective norm perceived behavioral control, and intentions), Self-Determinism Theory (autonomy, competence, and relatedness), and Social Cognitive Theory (self-efficacy) that have been shown to influence exercise participation. The researcher hypothesized that the manual would have a positive effect by increasing each of these constructs, therefore effectively promoting exercise participation for students using Miami University’s Recreational Center.

Participants

Study participants included 346 Miami University male (n = 155) and female (n = 190) students, ranging in age from 17 to 65 years (M=25.39; SD=8.70), who were currently attending a Miami University class during the 2010 Summer Semester. The sample included students from all three Miami University campuses: Oxford (n=167), Hamilton (n=123), and Middletown (n=44). Participants also represented different grade levels, including first years (n=53), sophomores (n=67), juniors (n=88), seniors (n=144), fifth years (n=6) and an "other" category (n=9), which included graduate students or non-degree seeking students. Although 83.5% of the sample identified as white (n=279), individuals from other races or ethnicities were represented as well. This included those identifying as black (n=27), Asian (n=9), Latino/Hispanic (n=7), mixed race (n=9), Indian (n=2), and Middle Eastern (n=1). Participants in the study also represented 70 different academic majors, with the most frequently occurring being nursing (10.9%, n=35) and integrative studies (9.3%, n=30).

To better understand the current exercise behaviors of participants, they were asked to indicate if they had been or were currently involved in a university-sponsored sport, defined as either varsity or club, but excluding intramurals. Although 93.1% indicated that they were not college athletes (n=322), there were 6.9% (n=24) of subjects who did identify as current collegiate athletes. When asked how many hours they exercised in a typical week, participant responses ranged from 0 to 40 hours per week (M=5.31, SD=5.12). Of the time spent exercising,
students indicated the percentage of time they spent participating in various types of exercise, which included aerobic exercise using cardio machines (M=23.7, SD=31.0), aerobic exercise without the use of cardio machines (M=35.5, SD=36.3), weight lifting (M=20.0, SD=28.1) and other types of activities (M=12.3, SD=26.7). Additionally, participants were asked if they had ever been to Miami University’s Recreational Center, with 44.8% (n=155) indicating that they had visited the REC on at least one occasion, while 53.2% (n=184) had never been to the REC. Of the students who had exercised at the REC previously, the average number of times per week that they visited the REC ranged from 0 to 12 times per week (M=1.59, SD=2.03).

**Procedures**

Data collection procedures included receiving IRB approval, recruiting professors to allow the researcher to make classroom visits, and then distribution and collection of survey materials by the researcher to potential study participants in attendance when the researcher made each classroom visit. Through Miami University’s Office for the Advancement of Research and Scholarship, the researcher received training and certification to conduct research involving human subjects. The online CITI training (Collaborative Institutional Training Initiative) was completed on February 7, 2009 and the Miami University Institutional Review Board (IRB) Application Training was completed on February 17, 2009.

Since the purpose of the current study was to evaluate the usefulness of the “Raising Exercise Confidence” manual for the college student population, the researcher sought to recruit students who were currently attending Miami University. To gain access to groups of enrolled students, the researcher contacted professors from a cross-section of disciplines and from all three local campuses, including Oxford, Hamilton, and Middletown. The researcher utilized Miami University’s online course list to search for summer classes being offered during the upcoming semester. Professors who were teaching classes during the 2010 Summer Semester at Miami University received an email from the researcher with an explanation of the current research study and a request for approval to make a visit to their classrooms to collect data from their students (Appendix A, p. 58).

Once professors responded to the researcher via email, classroom visits were scheduled. Only students whose professors responded affirmatively to the researcher’s request and were in attendance at the time of the researcher’s visit were given the option to participate in the study. Participants were not excluded from the study based on gender, race, ethnicity, nationality,
sexual orientation, religion, disability, physical appearance or any other characteristics unrelated to their status as currently enrolled students at Miami University. When visiting a classroom, the researcher would explain the purpose of the study to the students and then distribute an envelope to each student. Each envelope contained a pre-survey printed on a yellow sheet of paper, the “Raising Exercise Confidence” manual, and a post-survey printed on a blue sheet of paper. Students were instructed to first remove the yellow pre-survey (Appendix C, p. 60), complete it, and then return it to the envelope. Next, students would remove the manual, read through it, and then return it to the envelope. Finally, students would remove the blue post-survey (Appendix D, p. 62), complete it, and then return it to the envelope with all of the other materials. The researcher indicated that participation was completely voluntary and would have no influence on a student’s class performance. The researcher left the room or was seated away from the students during their participation, with the envelopes being collected once all students had finished. All pre- and post-surveys were numbered with a subject ID so that they could remain paired, but no other identifying information was collected beyond the demographic questions listed at the top of the pre-survey. The classroom visits occurred over a two-week period of time during the 2010 Summer Semester, with each visit lasting approximately 15-25 minutes.

Instrumentation

To evaluate the “Raising Exercise Confidence” manual in terms of its usefulness to college students in using the cardiovascular equipment at Miami University’s Recreational Center, a pre-survey (Appendix C, p. 60) and a post-survey (Appendix D, p. 62) were designed. The surveys sought to evaluate any change that occurred from reading the manual in terms of the main study questions relating to the three theories discussed within the literature review. Specifically, the surveys were used to determine the effect of the manual on constructs from a) the Theory of Planned Behavior (attitude, subjective norm, perceived behavioral control, and intention), b) Self-Determinism Theory (autonomy, competency, and relatedness), and c) Social Cognitive Theory (self-efficacy) in relation to the exercising at Miami University’s Recreational Center. Scales that had already been used by other researchers using the Theory of Planned Behavior (Rhodes, Blanchard, & Matheson, 2006), Self-Determinism Theory (Van Den Broeck, Vansteenkiste, De Witte, Soenens, & Lens, 2010), and Social Cognitive Theory (Lorig, Stewart, Ritter, González, Laurent, & Lynch, 1996) were used. Additionally, the pre-survey included questions to collect demographic information, while the post-survey included a language
elements scale (Ubbes, 2008) to evaluate the perceived usefulness of the manual as a health literacy material. The coding key for the scales used in the surveys can be found in Appendix E (p. 64).

**Demographics**

Included on the pre-survey, questions were asked regarding each participant’s demographic information, including age, gender, race/ethnicity, year in school, academic major, and primary campus. Questions relating to exercise participation were also asked, which included sports team membership, average number of hours spent exercising per week, and the percentage of exercise time spent on specific types of exercise, which included aerobic exercise using cardio machines, aerobic exercise not using cardio machines, weight lifting, and other activities. Additionally, participants were also asked to identify if they had ever been to Miami University’s Recreational Center, and if so, how many times per week on average they go there to exercise. For the remainder of the survey, participants were instructed to answer based on previous experience if they had been to the REC, or to answer based on how they would expect to perceive the experience if they had never been to the REC.

**Theory of Planned Behavior Scale**

In adapting TPB to the current investigation, the researcher found that “the theory of planned behavior is in the public domain. No permission is needed to use the theory in research, to construct a TPB questionnaire, or to include an original drawing of the model in a thesis, dissertation, presentation, article, or book” (Ajzen, 2011). To test the impact of the manual on the constructs relating to the Theory of Planned Behavior, the researcher modified questions from a scale used previously by Rhodes, Blanchard, and Matheson (2006). The fixed, graded 7-point scale measured the attitudes, subjective norms, perceived behavioral controls, exercise intentions, and exercise behaviors of the subjects. In assessing the scale, the Rhodes et al. (2006) found all interscale correlations between constructs to be significant (p<.01), with composite reliability for each construct to be .74 for affective attitude, .75 for instrumental attitude, .63 for subjective norm, .68 for perceived behavioral control, and .97 for intention. A pilot study of the scale by the researchers further showed the items to be clear and valid.

The researcher developed questions to assess participant attitude, subjective norm, perceived behavioral control, and intention. To access attitude, questions 11-18 on the pre-survey and questions 1-8 on the post survey asked participants to respond based on the following
instructions: “Please circle the response for each question on the continuum that best describes your experience in the past or how you anticipate you would feel in this situation.” Participants were then asked to consider each question in the context of the following: “For me, using the cardio machines while exercising at the REC has been or would be…” Response choices were presented as a continuum between two opposing attitudes, which included unenjoyable/enjoyable, useless/useful, unpleasant/pleasant, boring/interesting, harmful/beneficial, difficult/easy, confusing/clear, and intimidating/accessible. Participants could respond towards the negative attitude with ”extremely”=1, “moderately”=2, “slightly”=3, between the two attitudes with “neutral”=4, or towards the positive attitude with “slightly”=5, “moderately”=6, and “extremely”=7. The sum of the scores for all eight of the attitude items resulted in a total attitude score for each participant on both the pre-survey and the post-survey.

Continuing in the measurement of constructs from the Theory of Planned Behavior, the next set of questions on both the pre-survey and the post-survey asked participants to respond based on the following instructions: “For each statement, please circle the response that best represents the extent to which you believe it to be true for you based on your past experience or according to how you would expect to perceive the experience.” Participants were then asked to consider each question using a scale of 1-7, with 1=“Not at all true,” 4=“Somewhat true,” and 7=“Very true.” Question 19 on the pre-survey and question 9 on the post-survey accessed subjective norm by asking them to respond to the statement: “Most people who are important to me would want me to use the cardio machines at the REC.” Question 20 on the pre-survey and question 10 on the post-survey accessed perceived behavioral control by asking them to respond to the statement: “I feel that I have control over my use of the cardio machines while exercising at the REC.” Question 21 on the pre-survey and question 11 on the post-survey accessed intention by asking them to respond to the statement: “I intend to use the cardio machines at the REC regularly over the next two weeks.” A total score for the Theory of Planned Behavior constructs was gained by adding the scores of questions 11-21 on the pre-survey and questions 1-11 on the post-survey. A higher score indicated that according to the Theory of Planned Behavior, a participant would be more inclined towards using the cardio machines at the Miami University’s Recreational Center, while a lower score indicated a lower likelihood.
Basic Needs Satisfaction at Work Scale

In adapting Self-Determinism Theory to the current investigation, the researcher found that questionnaires developed for research on Self-Determinism Theory are copyrighted and require permission to be used for commercial purposes, but are able to be used for research projects (Deci & Ryan, 2011). To determine the impact of the manual on satisfying the basic psychological needs, identified in Self-Determinism Theory as autonomy, competence, and relatedness, the researcher referenced the Basic Needs Satisfaction at Work Scale (Deci, Ryan, Gagné, Leone, Usunov, & Kornazheva, 2001; Ilardi, Leone, Kasser, & Ryan, 1993; Kasser, Davey, & Ryan, 1992), although a modified version was adapted to rephrase the “work environment” as an “exercise environment”. The scale uses a 7-point scale and has 21 items total, with 7 items per construct. In evaluating the Basic Needs Satisfaction at Work Scale, Van Den Broeck, Vansteenkiste, De Witte, Soenens, and Lens (2010) reported that “the intercorrelations between autonomy and competence ranged from .29 to .51, between autonomy and relatedness from .47 to .50, and between competence and relatedness from .16 to .35” (p. 12). Additionally, the researchers found that “the reliability of the autonomy, competence, and relatedness satisfaction scales ranged from .77 to .84, from .79 to .90, and from .76 to .84, respectively” (p. 12), and that the three needs displayed the expected correlations with each of the criterion-related variables (p.14).

The researcher developed questions to access autonomy, competence, and relatedness of participants in the context of the exercise environment at Miami University’s Recreational Center. To access these constructs from Self-Determinism Theory, questions 22-33 on the pre-survey and questions 12-23 on the post-survey asked participants to respond based on the following instructions: “For each statement, please circle the response that best represents the extent to which you believe it to be true for you based on your past experience or according to how you would expect to perceive the experience.” Participants were then asked to consider each question using a scale of 1-7, with 1=“Not at all true,” 4=“Somewhat true,” and 7=“Very true.” On the pre-survey, questions 24 (reverse coded), 27, 30, and 32 measured autonomy, questions 23 (reverse coded), 28, 29, and 31 (reverse coded) measured competence, and questions 22, 25, 26 (reverse coded), and 33 measured relatedness. On the post-survey, questions 14 (reverse coded), 17, 20, and 22 measured autonomy, questions 13 (reverse coded), 18, 19, and 21 (reverse coded) measured competence, and questions 12, 15, 16 (reverse coded), and 23 measured...
relatedness. Adding the responses to each set of questions provided a score for each construct, while adding all three of these scores provided a total basic psychological needs score. A higher score indicated that according to Self-Determinism Theory, participants would be more motivated to exercise at Miami University’s Recreational Center since their basic psychological needs were being met, while a lower score indicated a lower likelihood that these needs would be met, with participants therefore feeling less motivated to exercise.

Exercise Regularity Scale

In adapting Social Cognitive Theory to the current investigation, the researcher found that materials for measuring self-efficacy were able to be copied for personal scholarly use accompanied by proper citation (Bandura, 2008). To evaluate the impact of the manual on self-efficacy relating to exercise, the current study turned to variations of an exercise-specific self-efficacy scale used by previous researchers (Poag-DuCharme & Brawley, 1993; Bray, Gyurcsik, Culos-Reed, Dawson & Martin, 2001; Schwarzer & Renner, 2000). In a study examining self-efficacy in fitness class participants (Poag-DuChamre & Brawley, 1993), subjects were presented with six statements representing behaviors common to the fitness class and asked to rate on 0% to 100% confidence scales their ability to complete each stated task (p. 185). Similarly, Gyurcsik, Culos-Reed, Dawson & Martin (2001) used the same type of exercise-efficacy scale to measure confidence in performing fitness class-related tasks and also distinguished this measurement from other forms of efficacy relating to barriers, scheduling, or confidence in the fitness instructor. The evaluation of this modified scale resulted in adequate internal consistency for total measure of self-efficacy with alpha of 0.76 for exercise self-efficacy. Furthermore, in a meta-analysis of self-efficacy scales relating to health behaviors, Schwarzer and Luszczynska (2010) report that “perceived exercise self-efficacy has been found to be a major instigating force in forming intentions to exercise,” and go on to discuss the framing of questions measuring exercise self-efficacy as relating to either a specific task or an explicit barrier. Drawing from the exercise-efficacy scales found in previous research, specifically the Exercise Regularity Scale (Lorig, Stewart, Ritter, González, Laurent, & Lynch, 1996), the current investigation used a 7-item, 10-point scale to assess confidence in tasks specific to using the cardiovascular equipment at Miami University’s Recreational Center.

The researcher developed questions to assess participant confidence regarding the ability to complete specific tasks involved in the use of the cardiovascular equipment at Miami
University’s Recreational Center. To access this exercise-specific self-efficacy, questions 34-40 on the pre-survey and questions 24-30 on the post survey asked participants to respond based on the following explanation: “The following questions will ask you to consider how confident you are or would be in your ability to perform specific tasks while exercising at the REC.” Participants were then asked to consider each question in the context of the following: “How confident are you that you can or would be able to…” The questions were based on a scale of 1-10, with 1=“Not at all confident,” 5=“Somewhat confident,” and 7=“Completely confident.” The specific questions asked participants to consider their confidence in locating the Martin Fitness Center within the REC, signing up for a cardio machine, understanding how to input information onto the screen of a cardio machine, properly using the equipment, understanding the feedback on the screen of the cardio machine upon completion of an exercise session, properly cleaning a cardio machine, and using any of the cardio machines available to them at the REC. The total scores for all seven of the self-efficacy items resulted in a total self-efficacy score for each participant on both the pre-survey and the post-survey, with higher scores indicating higher feelings of self efficacy in a participant’s ability to access exercise at Miami University’s Recreational Center and lower scores indicating lower feelings of this exercise-related self-efficacy.

**Health Literacy Language Elements Scale**

Lastly, to evaluate the usefulness of “Raising Exercise Confidence” as a health literacy material, a language elements scale developed by Ubbes (2008, p. 126) was administered to participants as part of the post-survey. The scale was specifically designed for printed materials, with the purpose of determining the usefulness of language elements of materials designed to increase health literacy. To access the usefulness of the “Raising Exercise Confidence” manual in increasing health literacy, questions 31-36 on the post survey asked participants to respond based on the following: “The final set of questions will ask you to evaluate the usefulness of specific elements within the “Raising Exercise Confidence” manual. For each question, please circle the response that best represents your opinion.” Participants were then asked to consider each question in the context of the following: “To what extent do the following elements make it more likely that you will use the cardio machines at the REC…” The questions were based on a scale of 1-5, with 1=“Not likely,” 2=“Somewhat likely,” 3=“Not sure,” 4=”Likely,” and 5=“Very Likely.” The specific questions asked participants to consider the language elements.
displayed in the manual, which included pictures, body language, written explanations, numbered sequential steps, rhythm or flow, and environmental cues (e.g. location, setting, place). Adding the total score for all six items resulted in health literacy score, with higher scores indicating greater perceptions of the manual as being useful in increasing health literacy and lower scores indicating lower perceptions of the manual as being useful.

Statistical Analysis

Once all of the survey data were collected, the researcher entered the data into SPSS for analysis. Descriptive statistics for all relevant study variables were computed and screened for linearity and normality. Preliminary statistics were conducted for all subscale variables, with bivariate correlational analyses used to examine the degree of correlation between the variables in each theory’s scale (TPB, SDT, and SCT) so that any multicollinearity issues could be identified prior to conducting the main study analyses. A one-way MANOVA was conducted to determine whether males and females differed on their pre-test scores. Additionally, independent t-tests were used to examine the language elements of the manual for different groups based on gender, athletic affiliation, and previous exposure to Miami University’s Recreational Center. To test the main study hypothesis regarding the effect of the manual on each of the constructs, a 2 X 2 (Gender X Time) mixed-model MANOVA with repeated measures on the second factor was used. This main study analysis sought to determine if study participants' subscale scores on the three scales changed from pre- to post-timeline (i.e., from before the manual was presented to them as compared to after they read it).
CHAPTER 4
RESULTS

The current investigation sought to evaluate the usefulness of a health literacy manual designed to promote exercise participation of college students using the cardiovascular equipment at Miami University’s Recreational Center. By evaluating the health literacy manual entitled, “Raising Exercise Confidence,” the purpose of the study was to determine the effect of the manual on constructs from the Theory of Planned Behavior (attitude, subjective norm, perceived behavioral control, and intention), Self-Determinism Theory (autonomy, competence, and relatedness), and Social Cognitive Theory (self-efficacy) in relation to exercise participation. The overall purpose of the study involved determining the usefulness of the manual as a health literacy material, with the researcher hypothesizing that the manual would have a positive effect on each of the exercise-related constructs.

To examine the primary study purpose, a variety of statistical procedures were used. The results of these analyses are presented in the following sections. In the first section, descriptive statistics are presented. In the second section, the results from preliminary analyses are described. Finally, in the third section, the main study analyses are presented.

Descriptive Statistics

Descriptive statistics were computed for all of the study variables at both pre- and post-survey time points. These results are presented in Table 1 (p. 68). Inspection of this data shows that for the constructs related to the Theory of Planned Behavior, all subscales increased from the pre-survey time point (i.e., data collected prior to participants reading the “Raising Exercise Confidence” manual) to the post-survey scores (collected after participants read the manual). These results included increases in total attitude (M=41.46, SD=8.9) pre-survey to (M=45.13, SD=9.32) post-survey, average attitude (M=5.23, SD=1.08) pre-survey to (M=5.68, SD=1.09) post-survey, subjective norm (M=4.21, SD=3.89) pre-survey to (M=4.52, SD=1.92) post-survey, perceived behavioral control (M=5.05, SD=1.63) pre-survey to (M=5.52, SD=1.40) post-survey, and intention (M=2.61, SD=2.02) pre-survey to (M=3.07, SD=2.13) post-survey. The total score for the Theory of Planned Behavior constructs increased as well, with (M=16.72, SD=5.95) pre-survey to (M=18.26, SD=4.84) post-survey. These results indicated that participants' scores on all constructs from the Theory of Planned Behavior did increase from pre- to post-survey time points.
Descriptive statistics for the Self-Determinism Theory constructs, which included autonomy, competence, and relatedness, revealed increases in each of these variables from pre-survey to post-survey. These results included increases in autonomy (M=18.60, SD=5.66) pre-survey to (M=20.21, SD=6.20) post-survey, relatedness (M=15.12, SD=4.71) pre-survey to (M=16.57, SD=4.08) post-survey, and competence (M=18.49, SD=4.57) pre-survey to (M=20.00, SD=4.16) post-survey. The total score for the Self-Determinism Theory constructs increased as well, from (M=52.06, SD=12.95) pre-survey to (M=56.62, SD=11.61) post-survey. Again, these results revealed consistent increases from pre- to post-survey in all constructs from Self-Determinism Theory. Additionally, self-efficacy, a construct from Social Cognitive Theory, was shown to increase after participants read the “Raising Exercise Confidence” manual, with (M=49.19, SD=17.21) pre-survey to (M=60.22, SD=11.70) post-survey. Study participants' perceptions of the usefulness of the manual as a health literacy material were also evaluated. These descriptive results (bottom of Table 1) showed a mean of 20.67 (SD=6.64) out of a possible score ranging from 6-30.

Preliminary Analyses

Bivariate Correlations

Preliminary bivariate correlational analyses were conducted to examine the degree of correlation between the variables in each theory’s scale (TPB, SDT, and SCT) so that any multicollinearity issues could be identified prior to conducting the main study analyses. The results for the pre-survey analyses are presented in Table 2 (p. 69), and the corresponding correlational coefficients for the post-survey are in Table 3 (p. 70). Examination of these correlational coefficients revealed relatively low association between the subscales from the TPB (attitudes, subjective norm, perceived behavioral control, and intention). Specifically, coefficients for these variables ranged from .13 to .30 on the pre-survey and .23 to .41 on the post-survey. Total attitude and average attitude subscales, however, were found to be highly correlated, with r-values of .91 on the pre-survey and .92 on the post-survey.

Examination of the correlation between the subscales from Self-Determinism Theory revealed moderate correlation, with coefficients ranging from .52 to .65 on the pre-survey and .35 to .45 on the post-survey. The total Self-Determinism subscale score was very highly correlated with each of the individual subscales, with coefficients ranging from .81 to .89 on the pre-survey and .69 to .84 on the post-survey.
The data presented in Table 2 (p. 69) and Table 3 (p. 70) also show the degree of correlation that existed between the total subscale scores from each of the three theories. That is, correlations between the Theory of Planned Behavior total score and the Self-Determinism total score were .35 pre-survey and .52 post-survey. Correlations between the Theory of Planned Behavior total score and self-efficacy were .52 pre-survey and .49 post-survey. Correlations between the Self-Determinism total score and self-efficacy were .52 pre-survey and .50 post-survey. These results indicated some association between the constructs from the three different theories, but because the correlational coefficients were only moderate in nature, no evidence of multicollinearity existed.

Based on the results obtained from these preliminary correlational analyses, it was deemed necessary to use all subscale scores from the Theory of Planned Behavior in the main study analyses because individual subscale scores were not found to be highly correlated with each other. However, because a high correlation (.91) was found between the total attitude and average attitude scores, it was decided to use just the average attitude subscale score in the main study analyses. In regard to the constructs from Self-Determinism Theory, it was decided to use just the total Self-Determinism subscale score in the main study analyses (to represent the overall construct of “self-determinism”) because each of the individual subscales of autonomy, competence, and relatedness were all found to be moderately correlated with each other, and (more importantly) each of these subscales was highly correlated with the total Self-Determinism score.

One-Way MANOVA

To determine whether males and females differed on their pre-survey scores, a one-way MANOVA was used. This preliminary analysis was deemed necessary because previous research has shown evidence of gender differences in the constructs from the Theory of Planned Behavior, Self-Determinism Theory, and Social Cognitive Theory. For this one-way MANOVA, the independent variable was gender (with two levels) and the six dependent variables included the four scores from the TPB (average attitude, subjective norm, perceived behavioral control, and intention), the single total score from SDT, and the single score for self-efficacy. The results of this one-way MANOVA revealed a significant Box's M test, suggesting that the covariance matrices for the dependent variables were not equal across groups. Thus, the main effect for gender was examined using Pillai's Trace rather than Wilk's lambda. Examination of these
results revealed a significant main effect for gender, Wilks' Trace = .07, \( F(6, 304) = 3.97, p < .00, \eta^2 = .07 \), suggesting that the male and female study participants did differ significantly at the pre-survey time point in their scores on the study constructs. Based on these results, it was determined that all subsequent main analyses should be conducted using gender as an individual difference factor.

**Manual Evaluation**

In evaluating the usefulness of the manual as a health literacy material, the total score for the language elements scale revealed that the study participants as a group viewed the manual as fairly useful (\( M=20.76, SD=6.64 \)) with a minimum score of 6 and a maximum score of 30. The mean score of 20.76 indicated an average score of 3.46, placing the average response between “Not Sure”=3 and “Likely”=4. Independent \( t \)-tests were also performed to determine differences in the usefulness of the manual across gender, athletic status, and previous exposure to Miami University’s Recreational Center. The usefulness rating for males (\( M= 19.82, SD=6.79 \)) was lower than the rating for females (\( M= 21.52, SD=6.45 \)), which was significant, \( t(314)= -2.29, p<.05 \). The usefulness rating for athletes (\( M= 18.29, SD=6.85 \)) was lower than the rating for non-athletes (\( M= 20.94, SD=6.60 \)), however this was not significant, \( t(315)= -1.77, p>.05 \). The usefulness rating for those who had been to the REC previously (\( M= 19.45, SD=6.65 \)) was lower than for those who had never been to the REC (\( M= 21.87, SD=6.44 \)), which was significant, \( t(309)= -3.25, p<.01 \). Based on these results, the manual tended to be perceived as a fairly useful health literacy material, with a greater impact being made particularly amongst females and for students who had never been to Miami University’s Recreational Center. In addition to the quantitative data used for evaluation, qualitative data in the form of participant comments were also collected, and can be found in Appendix F (p. 66).

**Main Study Analyses**

**Mixed-Model MANOVA**

To test the main study hypothesis that study participants' exercise-related constructs would change after reading the manual, a 2 X 2 (Gender X Time) mixed-model MANOVA with repeated measures on the second factor was used. The independent variables were gender (males versus females) and time (pre-survey and post-survey). The dependent variables included six subscale scores: attitude, perceived behavioral control, subjective norm, intention, self-determinism total, and self-efficacy (see Table 4, p. 71, for descriptive results corresponding to
this analysis). The results of this mixed-model MANOVA revealed a significant main effect for Gender, Wilks' $\lambda = .91, F(6, 276) = 4.50, p < .00, \eta^2 = .09$. In addition, a significant main effect was found for Time, Wilks $\lambda = .51, F(6, 276) = 43.82, p < .00, \eta^2 = .49$. However, the Gender by Time interaction effect was not found to be significant ($p = .17$). These multivariate results indicated, then, that study participants' scores on the six subscales did change significantly from pre- to post-survey, and that males and females differed in their scores on the dependent variables. However, the lack of a significant interaction effect revealed that males and females did not differ from each other across time (i.e., males and females showed similar changes in their scores from pre- to post-survey).

As a follow-up to the significant multivariate gender main effect, the univariate F-values for each of the six dependent variables were examined. These results show that males and females differed significantly on three variables. These included: average attitudes, $F(1, 281) = 4.57, p = .03, \eta^2 = .02$; subjective norm, $F(1, 281) = 8.29, p = .00, \eta^2 = .03$; and self-efficacy, $F(1, 281) = 4.50, p = .04, \eta^2 = .02$. No gender differences were found for the three other variables: perceived behavioral control, intention, and self-determination total score. Examination of the mean values for the three variables that showed significant gender differences indicated that females scored higher than did males on average attitudes and subjective norm but lower than did males on self-efficacy.

The univariate $F$-values for the time main effect are presented in Table 5 (p. 71) and show that there was a significant time effect for all six of the variables. In particular, participants' scores on all six subscales increased from pre-survey to post-survey. Additionally, the effect size (presented in the last column of Table 5, p. 71) indicated moderate to large effects ($\eta^2$ ranging from .07 to .39). Based on these results, it can be concluded that the manual had a significant effect on all of the dependent variables, but that it also had its greatest impact on participants' levels of self-efficacy and their average attitudes.
CHAPTER 5
DISCUSSION

Although regular physical activity is widely recognized as a positive health behavior for individuals throughout the lifespan in terms of both physical health and psychological well-being, research has shown that college students as a group tend to exhibit decreased levels of exercise participation. Exercise during this transitional period of life has been shown to have significant implications for the developmental and social factors that contribute to health behavior patterns in adulthood, yet numerous studies have demonstrated that despite the importance of physical activity for college students, this population tends to display lower levels of exercise participation as compared to the general population and to their peers not attending college. Additionally, longitudinal research has shown that college students are less physically active as compared to the activity levels they displayed while in high school. Out of past research on the exercise behaviors of college students, therefore, the need emerged for an intervention to address this health disparity amongst the college student population. The “Raising Exercise Confidence” manual developed out of graduate-level coursework in the field of health promotion to increase the exercise-specific health literacy of college students. Specifically, the manual was designed to promote exercise participation amongst Miami University students by informing them of the procedures regarding the use of the cardiovascular equipment available at Miami University’s Recreational Center.

Looking to theories of behavior change to better understand the thoughts, feelings and actions of college students in regards to exercise participation, guidance was found through the Theory of Planned Behavior (TPB), Self-Determinism Theory (SDT), and Social Cognitive Theory (SCT). From the TPB, a focus on the thoughts and feelings that shape an individual’s intention to perform a behavior informed the current investigation. From this theory, the constructs of attitude, subjective norm, perceived behavioral control, and intention were considered in the evaluation of the manual. Out of SDT, three basic psychological needs were identified as influencing the motivation of an individual to perform a behavior. These constructs, which included autonomy, competence, and relatedness, also helped to guide the investigation. SCT, by focusing on the interaction of the individual, his or her environment, and the resulting behavior, provided the construct of self-efficacy. These three theories (TPB, SDT, and SCT) not only grounded the current study in past research on theoretical approaches to exercise, but also
informed the assessment of the “Raising Exercise Confidence” manual by identifying constructs that serve to promote exercise participation. Specifically, the investigation sought to determine the effect of the manual on the constructs from the Theory of Planned Behavior (attitude, subjective norm perceived behavioral control, and intentions), Self-Determinism Theory (autonomy, competence, and relatedness), and Social Cognitive Theory (self-efficacy) because these constructs have been shown to influence exercise participation. The researcher hypothesized that the manual would have a positive effect by increasing each of these constructs, therefore effectively promoting exercise participation for students using Miami University’s Recreational Center.

In looking at the main study results, six variables were evaluated to test the effect of the manual on the theoretical constructs under investigation. These variables included those from the Theory of Planned Behavior (attitude, subjective norm, perceived behavioral control, and intention), Self-Determinism Theory (total score combining autonomy, competence, and relatedness), and Social Cognitive Theory (self-efficacy). To test any changes in constructs from before reading the manual to after reading the manual, a 2 X 2 (Gender X Time) mixed-model MANOVA was used. These main study results indicated that study participants' scores on the six subscales did change significantly from pre- to post-survey, and that males and females differed in their scores on the dependent variables. However, since there was a lack of a significant interaction effect of gender by time, males and females did not differ from each other across time (i.e., males and females showed similar changes in their scores from pre- to post-survey). The relationship between gender and the study variables revealed that females scored higher than did males on average attitudes and subjective norm but lower than did males on self-efficacy. No gender differences were found for the three other variables: perceived behavioral control, intention, and self-determination total score.

Drawing from previous research, gender differences relating to exercise have been identified in terms of preferred exercise context (Shapcott et al., 2007), perceptions of the environment (Bengoechea, Spence, & McGannon, 2005), barriers to exercise participation (Sorensen & Gill, 2008), and actual exercise participation (Lee & Loke, 2005; Sinclair et al., 2005). In relation to the lack of gender differences found in the current study for the variables of perceived behavioral control, intention, and self-determinism, these findings do not support previous research. Particularly regarding the tendency of women to display lower levels of
physical activity, perceive more barriers, and feel more intimidated within an exercise
environment, gender differences had been expected to exist across all constructs evaluated in the
study. The finding that males and females differed on three of the six variables did support the
gender differences found by previous researchers, particularly in regards to the lower self-
efficacy score of women. This finding supports the research by indicating that females remain
less likely to feel comfortable or confident in an exercise context, therefore necessitating the
need for ongoing exercise interventions, particularly for women.

Aside from the gender effect, the most significant finding of the study relates to the effect
of the manual over time from the pre- to post-survey. The Gender X Time MANOVA revealed a
significant relationship between time and all six of the study variables, with effect size indicating
moderate to large effects ($\eta^2$ ranging from .07 to .39). From the pre-survey scores taken prior to
participants reading the “Raising Exercise Confidence” manual to the post-survey scores
recorded after exposure to the manual, all variables increased (Table 5, p. 71). Total pre-survey
and post-survey scores for attitude (pre-M=5.26, SD=1.04; post-M=5.69, SD=1.07), subjective
norm (pre-M=4.00, SD=1.88; post-M=4.50, SD=1.91), perceived behavioral control (pre-
M=5.14, SD=1.53; post-M=5.56, SD=1.37), intention (pre-M=2.61, SD=2.03; post-M=3.05,
SD=2.13), Self-Determinism (pre-M=53.65, SD=11.16; post-M=57.21, SD=10.87), and self-
efficacy (pre-M=50.03, SD=16.76; post-M=60.72, SD=11.26) all indicate that the manual had a
positive effect on each study variable. Based on these findings, the manual was found to have a
significant effect on all of the dependent variables, but its greatest impact was on participants' levels of self-efficacy and their average attitudes.

In reviewing the research literature on theories of behavior change, previous studies
(Vallance et al., 2008; Kwan et al. 2009) had found constructs from the Theory of Planned
Behavior to be useful in predicting intention to exercise, yet limited in predicting actual exercise
behavior. The results of the manual’s effect on the constructs of attitude, subjective norm,
perceived behavioral control, and intention reveal that manual had the greatest impact on
attitude. Additionally, researchers have examined the relationship between degree of self-
determinism with readiness to adopt regular physical activity patterns (Daley & Duda, 2006;
Mullan & Markland, 1997), finding a positive correlation between these two factors that suggests
the importance of self-determinism to the performance of exercise behavior. The current study
found self-determinism total score to increase from pre- to post-survey, indicating an increased
likelihood of participants adopting regular exercise habits regarding the use of Miami University’s Recreational Center. Finally, research that has used Social Cognitive Theory as a framework found self-efficacy to present a significant influence over the performance of a behavior (Palmeira et al., 2007; Rovniak et al., 2002; Duncan & McAuley, 1993). Since the results of the current study found the manual to have the greatest impact on self-efficacy, the usefulness of the manual in promoting exercise participation in college students is supported.

Contribution to the Research

Despite support within the field of public health for the value of regular exercise to health and well-being, college students have presented a population often overlooked in the research (Lee & Loke, 2005). Although typically considered a healthy group overall, the apparent lack of research on college students has marked this specific population as a demographic in need of health interventions to promote regular exercise participation. The current investigation, therefore, has contributed to this health literacy disparity by evaluating a manual designed to promote exercise participation amongst the college student population. By collecting data from 346 students at Miami University and analyzing the effect of the “Raising Exercise Confidence” manual on the theoretical constructs shown to influence exercise participation, the current study evaluated the usefulness of an exercise intervention for college students. Considering the developmental and social significance that the health habits formed during college can have for an individual as a young adult and throughout the lifespan, the results of the study indicate that the “Raising Exercise Confidence” manual can serve as a valuable tool for promoting positive health behaviors.

Previous research has also revealed the applicability of various theories to the study of behavior change, including exercise behaviors. The current study added to the field of researchers who have utilized multiple theories to implement and evaluate health behavior change (Palmeira, et al, 2007; Chatzisarantis, et al, 2009; Hagger, Chatzisarantis, & Harris, 2006). Based on the review of literature presented earlier in this paper, the current study built off of previous researchers’ works that utilized the Theory of Planned Behavior (TPB) in predicting intentions, Self-Determinism Theory (SDT) in predicting motivation, and SCT in predicting confidence in specific tasks. By evaluating the “Raising Exercise Confidence” manual’s effect on constructs from multiple theories, the current study attempted to survey the complex interaction of constructs that may contribute to exercise behavior. By assessing the impact of the
manual on attitude, subjective norm, perceived behavioral control, intention, autonomy, competence, relatedness, and self-efficacy, this investigation contributed to the field of researchers who have taken a multi-theoretical approach to the understanding and study of health behaviors.

An additional contribution of the current study involves its significance in enhancing health literacy. As outlined in the review of literature, the field of health promotion strives to address disparities in health literacy, commonly through the use of health literacy materials to empower users to make informed health decisions. Previous research has demonstrated the ways in which health education materials have been used to foster behavioral change and the approaches health promoters have taken to evaluate the usefulness of such materials. The creation of the “Raising Exercise Confidence” manual emerged from research supporting the use of printed materials (Ball et al., 2005; Silk et al., 2008; Marshall et al., 2003; Friedrich et al., 1996) and a non-tailored frame (Plotnikoff et al., 2006; Bull et al., 1999). Additionally, the evaluation of the manual as a health literacy material drew from research emphasizing the language elements of an informational text (Clark et al., 1999; Ubbes, 2008). Because the mode of presentation, structure, and evaluation of the manual drew upon previous work in the field, the effectiveness of the manual in increasing each of the constructs being evaluated can contribute to this previous research in support of the use of printed, non-tailored materials that utilize a range of language elements.

Limitations

One major limitation involved the recruitment of study participants in terms of access, timing, and location. Miami University students were recruited to participate in the current study based on their enrollment in specific classes during the 2010 Summer Semester. The opportunity to participate was limited to students whose professors responded affirmatively to the researcher’s request and were in attendance at the time of the researcher’s visit. The data collection took place during a two-week time period and took place in classrooms on all three local Miami University campuses (Oxford, Hamilton, and Middletown). Access to participants was limited due to the nature of this recruitment. Since the researcher had to first recruit a professor to grant access to his or her classroom during scheduled class time, the researcher encountered many professors who elected to not participate, thus eliminating access to those groups of students. The timing of the data collection also limited the study since fewer students
were present during the summer, both in terms of class enrollment and in potential use of Miami University’s Recreational Center. Additionally, the location of data collection may have been limiting. Visiting classrooms provided the convenience of accessing a group of students at one time, but collecting data from students already at Miami University’s Recreational Center may have influenced the results as well.

Another study limitation involved the focus of the evaluation on theoretical constructs shown to influence exercise behavior rather than measuring the effect of the manual on the actual performance of the exercise. Since the study used a cross-sectional design rather than a longitudinal approach to evaluate the usefulness of the manual, the study could not determine the immediate impact on exercise behaviors nor could it measure the adoption of exercise habits over time. Instead, the study focused on the manual’s effect on the intent, motivation, and confidence of a participant based on reading the manual in a single sitting. This evaluation focused on changes in the constructs found by previous researchers to influence the performance of a behavior. These included constructs from the Theory of Planned Behavior (attitude, subjective norm, perceived behavioral control, and intention), Self-Determinism Theory (autonomy, competence, and relatedness), and Social Cognitive Theory (self-efficacy). These theories lent themselves to the study of the internal thoughts and feelings generated by viewing the manual, rather than focusing on the actual behavior that may have resulted. Although the current study was effective in measuring the manual’s effect on these constructs relating to exercise participation, it was limited by its design in evaluating the impact of the manual on the performance or adoption of actual exercise behaviors.

Future Research Directions

Based on the limitations discussed previously, future research could test the effect of the “Raising Exercise Confidence” manual on the actual exercise behaviors of participants. By evaluating the immediate effects of the manual on exercise behavior, in addition to the long-term effects of the manual on the development of exercise behavior habits, further evaluation could provide stronger support for the usefulness of the manual. Although the manual was effective in increasing all of the constructs evaluated by the current study, the measurement of actual exercise behaviors through a longitudinal research design would be beneficial. The collection of data for such a study could utilize students already using the Miami University Recreational Center in comparison to those who had not previously accessed this facility to determine if
differences in the perceived usefulness of the manual exist for these groups. Additionally, the manual could be converted to a digital format as either a website document or an interactive online learning experience. Further evaluation could test the effect that different modes of presentation (e.g., print, electronic) have on the usefulness of the manual. Finally, since “Raising Exercise Confidence” was found to increase all of the theoretical constructs that were evaluated, this manual could be used as a model for the design and implementation of other health literacy interventions for different populations. Examples could include additional manuals to address the procedures for the use of the strength training equipment or the group fitness classes at Miami University’s Recreational Center. Moving beyond the specific context of Miami University and college student exercise, however, this study can also inform health interventions for other populations experiencing a disparity in health literacy. The visual and textual format of the manual and planned attention to “language elements” (Ubbes, 2008, p. 95-126) can be generalized to influence future interventions within the field of health promotion. In conclusion, based on the findings from the current study, the “Raising Exercise Confidence” manual has the potential to inform future health literacy interventions and may inspire the application of similar educational materials to other contexts or behavioral changes.
REFERENCES


APPENDICES

Appendix A: Email to Professors

Dear Professor ___________,

As you prepare for the upcoming summer session, I would like you to consider dedicating some of your class time to help advance research on Miami University’s campus. As a graduate student within the Kinesiology & Health department, I am currently in the process of collecting data for my research project entitled “Raising Exercise Confidence of College Students: The Design and Evaluation of a Health Literacy Manual.” The purpose of my research is to evaluate the design and efficacy of a theory-based manual I created to promote exercise amongst college students. The findings of this study will provide benefits to the quality of life of Miami students and can inform future health interventions.

I am seeking a representative sample of the student population, therefore I’m seeking the assistance of professors across a range of disciplines. As the instructor for ________ that meets ________ from ________-________, I am hoping that you could allow me to come to your class for 20-25 minutes this upcoming week. I will be asking students to complete a pre-survey, review the manual under evaluation, and then complete a post-survey during my class visit. Participation will be completely voluntary and all information will be kept confidential.

If you are able to accommodate my request, I would greatly appreciate the opportunity to visit your class. Please email me with the specific time you would like me to come during your class, such as at the very beginning or sometime farther into the class time. Hopefully since the summer courses tend to meet for longer class sessions, it may be easier to dedicate some time towards my research. If you are not able to accommodate my request I completely understand and respect your time constraints, but if you could just send a response email declining my request that would help with my scheduling.

Thank you so much for your consideration. Please feel free to call or email me with any questions, or you can contact my thesis supervisor, Dr. Valerie Ubbes, at ubbesva@muohio.edu.

I look forward to hearing back from you soon!

Ariel Klingaman
KNH graduate student
klingaa@muohio.edu
Appendix B: Informed Consent Form

KDH 613 Health Communication and Education

Final Project

**Raising Exercise Confidence**

*A Student’s Guide to Miami University’s Recreational Sports Center*

*Cardio Equipment Manual*

What is this? A final project for a health promotion graduate student in the Kinesiology and Health department. The project involves the design of an informational guide for students regarding the use of the cardio equipment available at Miami University’s RSC.

What is my role? To make the manual user-friendly and relevant to Miami University students, photographs of real students using the cardio equipment are needed to enhance the effectiveness of the guide. By agreeing to participate, you will be photographed demonstrating the use of a piece of cardio equipment, such as a treadmill or elliptical machine.

Who will see my photo? This manual is only for a final project in a graduate class and will not be mass-produced or distributed outside of the class. Only a professor and up to 12 other health promotion graduate students will see the finished product.

Please fill out the information below, including your signature, indicating that you agree to have your photo used in the manual. **Thank you!**

<table>
<thead>
<tr>
<th>Name</th>
<th>Major</th>
<th>Year in School</th>
<th>Email Address</th>
<th>Signature</th>
<th>Type of Cardio</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Justin Commissio</td>
<td>KNH</td>
<td>Fresh</td>
<td><a href="mailto:dannyw@earthlink.net">dannyw@earthlink.net</a></td>
<td>Justin</td>
<td>Treadmill</td>
<td>CAT/ T</td>
</tr>
<tr>
<td>Wendy Loretto</td>
<td>MGT</td>
<td>Junior</td>
<td><a href="mailto:lovelett@earthlink.net">lovelett@earthlink.net</a></td>
<td>Wendy</td>
<td>Treadmill</td>
<td>CAT/ T</td>
</tr>
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<td>CA Thorne</td>
<td>EOG</td>
<td>Fresh</td>
<td><a href="mailto:suzett@earthlink.net">suzett@earthlink.net</a></td>
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<td>Treadmill</td>
<td>CAT/ T</td>
</tr>
<tr>
<td>Dalian Banks</td>
<td>BUS</td>
<td>Soph</td>
<td><a href="mailto:banksd@earthlink.net">banksd@earthlink.net</a></td>
<td>Dalian</td>
<td>X-T</td>
<td>Pink T</td>
</tr>
<tr>
<td>Katie Warner</td>
<td>COM</td>
<td>Soph</td>
<td><a href="mailto:Wagner@earthlink.net">Wagner@earthlink.net</a></td>
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</tr>
<tr>
<td>Leonard Matthias</td>
<td>SBP</td>
<td>Grad</td>
<td><a href="mailto:mutthi@earthlink.net">mutthi@earthlink.net</a></td>
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<td>X-T</td>
<td>Pink T</td>
</tr>
<tr>
<td>Eric Lindsey</td>
<td>KNH</td>
<td>Senior</td>
<td><a href="mailto:lindsey@earthlink.net">lindsey@earthlink.net</a></td>
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<tr>
<td>Kaylen Pittman</td>
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<td>Soph</td>
<td><a href="mailto:plant@earthlink.net">plant@earthlink.net</a></td>
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<td>X-T</td>
<td>Pink T</td>
</tr>
<tr>
<td>Mike Anderson</td>
<td>BUS</td>
<td>Junior</td>
<td><a href="mailto:anderson@earthlink.net">anderson@earthlink.net</a></td>
<td>Mike</td>
<td>X-T</td>
<td>Pink T</td>
</tr>
<tr>
<td>Sam Kibzin</td>
<td>BUS</td>
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<td>Sam</td>
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<tr>
<td>Adam Smith</td>
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<td><a href="mailto:stripes@earthlink.net">stripes@earthlink.net</a></td>
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<td>X-T</td>
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<tr>
<td>Derrick Lee</td>
<td>BUS</td>
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<td><a href="mailto:dleee@earthlink.net">dleee@earthlink.net</a></td>
<td>Derrick</td>
<td>X-T</td>
<td>Pink T</td>
</tr>
<tr>
<td>Anthony Rodgers</td>
<td>ECE</td>
<td>Fresh</td>
<td><a href="mailto:rodrig@earthlink.net">rodrig@earthlink.net</a></td>
<td>Anthony</td>
<td>X-T</td>
<td>Pink T</td>
</tr>
</tbody>
</table>
Appendix C: Pre-Survey

1. Age: ____________  

2. Gender: ________ ________  

3. Race/Ethnicity: ________________  

4. Year in School: ______________  

5. Academic Major: _________________  

6. Which campus is the location for the majority of your classes?  
   - Oxford  
   - Hamilton  
   - Middletown  

7. Are you currently a member of a sports team (varsity or club only, not intramurals) at Miami University?  
   - Y  
   - N  

8. Which sport? ________________________________________________________________  

9. How many hours a week do you typically exercise? __________________ hours per week on average  

10. When you exercise, what percentage of your time would you estimate that you spend…  
    - Using cardiovascular machines, such as a treadmill, elliptical, or stationary bike? ____________%  
    - Doing cardiovascular activities the do not require machines, such as jogging, bicycling, or swimming? ____________%  
    - Lifting weights? ____________%  
    - Other ____________%  
      (Please describe the “Other” activity: ______________________________________________________)  

11. Have you ever exercised at the Recreational Sports Center (REC) at Miami University’s Oxford campus?  
    - Y  
    - N  

    - If so, how many times a week do you typically exercise at the REC? __________________ times per week on average  

For the remaining sets of questions…  

- Cardiovascular machines will be referred to as “cardio machines.”  
- The Recreational Sports Center at Miami University’s Oxford campus will be referred to as the “REC.”  

  - If you answered yes to question 11, meaning you have exercised at the REC previously, please answer each question according to your past experiences at the REC.  
  - If you answered no to question 11, meaning you have never exercised at the REC, please answer each question according to how you would expect to perceive the experience.  

I. Instructions: Please circle the response for each question on the continuum that best describes your experience in the past or how you anticipate you would feel in this situation.  

<table>
<thead>
<tr>
<th>11. Unenjoyable</th>
<th>Extremely</th>
<th>Slightly</th>
<th>Neutral</th>
<th>Slightly</th>
<th>Moderately</th>
<th>Extremely</th>
<th>Enjoyable</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. Useless</td>
<td>Extremely</td>
<td>Slightly</td>
<td>Neutral</td>
<td>Moderately</td>
<td>Extremely</td>
<td>Useful</td>
<td></td>
</tr>
<tr>
<td>13. Unpleasant</td>
<td>Extremely</td>
<td>Slightly</td>
<td>Neutral</td>
<td>Moderately</td>
<td>Extremely</td>
<td>Pleasant</td>
<td></td>
</tr>
<tr>
<td>14. Boring</td>
<td>Extremely</td>
<td>Slightly</td>
<td>Neutral</td>
<td>Moderately</td>
<td>Extremely</td>
<td>Interesting</td>
<td></td>
</tr>
<tr>
<td>15. Harmful</td>
<td>Extremely</td>
<td>Slightly</td>
<td>Neutral</td>
<td>Moderately</td>
<td>Extremely</td>
<td>Beneficial</td>
<td></td>
</tr>
<tr>
<td>16. Difficult</td>
<td>Extremely</td>
<td>Slightly</td>
<td>Neutral</td>
<td>Moderately</td>
<td>Extremely</td>
<td>Easy</td>
<td></td>
</tr>
<tr>
<td>17. Confusing</td>
<td>Extremely</td>
<td>Slightly</td>
<td>Neutral</td>
<td>Moderately</td>
<td>Extremely</td>
<td>Clear</td>
<td></td>
</tr>
<tr>
<td>18. Intimidating</td>
<td>Extremely</td>
<td>Slightly</td>
<td>Neutral</td>
<td>Moderately</td>
<td>Extremely</td>
<td>Accessible</td>
<td></td>
</tr>
</tbody>
</table>

II. Instructions: For each statement, please circle the response that best represents the extent to which you believe it to be true for you based on your past experience or according to how you would expect to perceive the experience.  

   - Base your responses on the following scale:  
     - “Not at all true”  
     - “Somewhat true”  
     - “Very true”  

<p>| 19. Most people who are important to me would want me to use the cardio machines at the REC. | 1 2 3 4 5 6 7 |
| 20. I feel that I have personal control over my use of the cardio machines while exercising at the REC. | 1 2 3 4 5 6 7 |
| 21. I intend to use the cardio machines at the REC regularly over the next two weeks. | 1 2 3 4 5 6 7 |
| 22. I really like the other people who exercise on the cardio machines at the REC. | 1 2 3 4 5 6 7 |
| 23. I do not feel very competent in my ability to use the cardio machines at the REC. | 1 2 3 4 5 6 7 |
| 24. I feel pressured when using the cardio machines at the REC. | 1 2 3 4 5 6 7 |</p>
<table>
<thead>
<tr>
<th></th>
<th>I get along with people who use the cardio machines at the REC.</th>
<th>I pretty much keep to myself when I use the cardio machines the REC.</th>
<th>I feel free to express myself physically when using the cardio machines at the REC.</th>
<th>I have been able to learn interesting new skills while exercising on the cardio machines at the REC.</th>
<th>Most days I feel a sense of accomplishment from using the cardio machines to exercise at the REC.</th>
<th>I feel like I can pretty much be myself when using the cardio machines at the REC.</th>
<th>When I am using the cardio machines at the REC I often do not feel very capable.</th>
<th>I am comfortable on my own to decide which cardio machines to use at the REC.</th>
<th>People at the Martin Fitness Center in the REC are pretty friendly towards me.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### III. Instructions:

The following questions will ask you to consider how confident you are or would be in your ability to perform specific tasks while exercising at the REC.

- Base your responses on the following scale:

<table>
<thead>
<tr>
<th></th>
<th>“Not at all confident”</th>
<th>“Somewhat confident”</th>
<th>“Completely confident”</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

#### How confident are you that you can or would be able to…

<table>
<thead>
<tr>
<th></th>
<th>Find the Martin Fitness Center located within the REC?</th>
<th>Sign up for a cardio machine within the fitness center?</th>
<th>Understand how to input information on the screen of the cardio machine?</th>
<th>Properly use the cardio machine?</th>
<th>Understand the feedback on the screen of the cardio machine after you finish?</th>
<th>Properly clean the cardio machine?</th>
<th>Use any of the cardio machines available at the fitness center?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

Thank you for completing the pre-survey.

Please place this completed pre-survey inside the envelope and remove the two other documents.

You will next read through the “Raising Exercise Confidence” manual and then complete the post-survey.

Your participation is greatly appreciated!
Appendix D: Post-Survey

Now that you have read through the “Raising Exercise Confidence” manual, you will be asked to reflect on the questions you answered prior to reading the manual. For each question, think about how your thoughts or feelings about using the cardiovascular machines at REC may have changed due to the “Raising Exercise Confidence” manual.

I. Instructions: Please circle the response for each question that best describes how you anticipate you would feel in this situation now that you have read “Raising Exercise Confidence.”

For me, using the cardio machines while exercising at the REC would be...

|   | Unenjoyable | Extremely | Moderately | Slightly | Neutral | Slightly | Moderately | Extremely | Enjoyable | Unuseful | Extremely | Moderately | Slightly | Neutral | Slightly | Moderately | Extremely | Useful | Pleasant | Boring | Extremely | Moderately | Slightly | Neutral | Slightly | Moderately | Extremely | Interesting | Beneficial | Easy | Clear | Accessible |
|---|------------|----------|------------|----------|---------|----------|------------|-----------|-----------|----------|-----------|------------|----------|---------|----------|------------|-----------|--------|---------|--------|------------|----------|------------|-------------|-----|------|-----------|
| 1 |            |          |            |          |         |          |            |           |           |          |           |            |          |         |          |            |           |        |         |        |            |          |            |              |     |      |           |
| 2 |            |          |            |          |         |          |            |           |           |          |           |            |          |         |          |            |           |        |         |        |            |          |            |              |     |      |           |
| 3 |            |          |            |          |         |          |            |           |           |          |           |            |          |         |          |            |           |        |         |        |            |          |            |              |     |      |           |
| 4 |            |          |            |          |         |          |            |           |           |          |           |            |          |         |          |            |           |        |         |        |            |          |            |              |     |      |           |
| 5 |            |          |            |          |         |          |            |           |           |          |           |            |          |         |          |            |           |        |         |        |            |          |            |              |     |      |           |
| 6 |            |          |            |          |         |          |            |           |           |          |           |            |          |         |          |            |           |        |         |        |            |          |            |              |     |      |           |
| 7 |            |          |            |          |         |          |            |           |           |          |           |            |          |         |          |            |           |        |         |        |            |          |            |              |     |      |           |
| 8 |            |          |            |          |         |          |            |           |           |          |           |            |          |         |          |            |           |        |         |        |            |          |            |              |     |      |           |

II. Instructions: For each statement, please circle the response that best represents the extent to which you believe it to be true for you now that you have read the “Raising Exercise Confidence” manual.

- Base your responses on the following scale:

<table>
<thead>
<tr>
<th>“Not at all true”</th>
<th>“Somewhat true”</th>
<th>“Very true”</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. Most people who are important to me would want me to use the cardio machines at the REC.
   1 2 3 4 5 6 7

10. I feel that I have personal control over my use of the cardio machines while exercising at the REC.
    1 2 3 4 5 6 7

11. I intend to use the cardio machines at the REC regularly over the next two weeks.
    1 2 3 4 5 6 7

12. I really like the other people who exercise on the cardio machines at the REC.
    1 2 3 4 5 6 7

13. I do not feel very competent in my ability to use the cardio machines at the REC.
    1 2 3 4 5 6 7

14. I feel pressured when using the cardio machines at the REC.
    1 2 3 4 5 6 7

15. I get along with people who use the cardio machines at the REC.
    1 2 3 4 5 6 7

16. I pretty much keep to myself when I use the cardio machines the REC.
    1 2 3 4 5 6 7

17. I feel free to express myself physically when using the cardio machines at the REC.
    1 2 3 4 5 6 7

18. I have been able to learn interesting new skills while exercising on the cardio machines at the REC.
    1 2 3 4 5 6 7

19. Most days I feel a sense of accomplishment from using the cardio machines to exercise at the REC.
    1 2 3 4 5 6 7

20. I feel like I can pretty much be myself when using the cardio machines at the REC.
    1 2 3 4 5 6 7

21. When I am using the cardio machines at the REC I often do not feel very capable.
    1 2 3 4 5 6 7

22. I am comfortable on my own to decide which cardio machines to use at the REC.
    1 2 3 4 5 6 7

23. People at the Martin Fitness Center in the REC are pretty friendly towards me.
    1 2 3 4 5 6 7

62
III. Instructions: The following questions will ask you to consider how confident would be in your ability to perform specific tasks while exercising at the REC now that you have read the “Raising Exercise Confidence” manual.

- Base your responses on the following scale:

<table>
<thead>
<tr>
<th>“Not at all confident”</th>
<th>“Somewhat confident”</th>
<th>“Completely confident”</th>
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<td>1</td>
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</table>

How confident are you that you would now be able to...

<table>
<thead>
<tr>
<th>Question</th>
<th>Rating Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>24. Find the Martin Fitness Center located within the REC?</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>25. Sign up for a cardio machine within the fitness center?</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>26. Understand how to input information on the screen of the cardio machine?</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>27. Properly use the cardio machine?</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>28. Understand the feedback on the screen of the cardio machine after you finish?</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>29. Properly clean the cardio machine?</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>30. Use any of the cardio machines available at the fitness center?</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
</tbody>
</table>

IV. Instructions: The final set of questions will ask you to evaluate the usefulness of specific elements within the “Raising Exercise Confidence” manual. For each question, please circle the response that best represents your opinion.

To what extent do the following elements make it more likely that you will use the cardio machines at the REC...

<table>
<thead>
<tr>
<th>Question</th>
<th>Response Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>31. The pictures in the manual make it more likely that I will use the cardio machines at the REC.</td>
<td>Not Likely</td>
</tr>
<tr>
<td>32. The body language of the people in the manual make it more likely that I will use the cardio machines at the REC.</td>
<td>Not Likely</td>
</tr>
<tr>
<td>33. The written explanations (the words) of the manual make it more likely that I will use the cardio machines at the REC.</td>
<td>Not Likely</td>
</tr>
<tr>
<td>34. The numbered sequential steps of the manual make it more likely that I will use the cardio machines at the REC.</td>
<td>Not Likely</td>
</tr>
<tr>
<td>35. The rhythm or flow of the manual make it more likely that I will use the cardio machines at the REC.</td>
<td>Not Likely</td>
</tr>
<tr>
<td>36. The environmental cues of the manual (e.g., location, setting, place) make it more likely that I will use the cardio machines at the REC.</td>
<td>Not Likely</td>
</tr>
</tbody>
</table>

Please use the space below to provide any comments or feedback:
Appendix E: Coding Key for Survey Scales

I. Measuring components of the Theory of Planned Behavior (adapted from Rhodes, Matheson, & Blanchard, 2006)
   A. Attitude
      1. Questions 11-18 (pre) and 1-8 (post)
      2. Measured in the fixed graded scaling format using 7-point bipolar adjective items as suggested by Ajzen and Fishbein (1980)
      3. Attitude score determined by adding the responses to get a total score, with a maximum score of 56 and a minimum score of 7
         2. “Neutral”=4
         3. Towards positive adjective: Slightly”=5, “Moderately”=6, “Extremely”=7
      4. Higher scores indicate more favorable attitude towards using the cardio machines while exercising at the REC, while lower score indicate a less favorable attitude.
   B. Subjective Norm
      1. Question 19 (pre) and 9 (post)
      2. Measured using a 7-point scale that ranged from 1 (not at all true) to 7 (very true) for the fixed graded measure.
      3. Subjective Norm score determined by the response provided, with a maximum score of 7 and a minimum score of 1
      4. Higher scores indicate subjective norms that value the use of using the cardio machines while exercising at the REC, while lower score indicate less value being perceived.
   C. Perceived Behavioral Control
      1. Question 20 (pre) and 10 (post)
      2. Measured using a 7-point scale that ranged from 1 (not at all true) to 7 (very true) for the fixed graded measure.
      3. PBC score determined by the response provided, with a maximum score of 7 and a minimum score of 1
      4. Higher scores indicate a greater sense of control over the use of the cardio machines at the REC, while lower scores indicate less control being perceived.
   D. Intention
      1. Question 21 (pre) and 11 (post)
      2. Measured using a 7-point scale that ranged from 1 (not at all true) to 7 (very true) for the fixed graded measure.
      3. PBC score determined by the response provided, with a maximum score of 7 and a minimum score of 1
      4. Higher scores indicate greater intentions to use the cardio machines at the REC, while lower scores indicate less intention.
   E. Theory of Planned Behavior Total Score
      1. Questions 11-21 (pre) and 1-11 (post)
      2. Determined by adding the average of the attitude score (total attitude score divided by 8 items), along with the scores for subjective norm, perceived behavioral control, and intention
      3. Higher score indicates that according to the theory of planned behavior, the participant is more inclined towards using the cardio machines at the REC, while lower scores indicate a lower likelihood

II. Measuring components of Self-Determinism Theory (adapted from Van Den Broeck, Vansteenkiste, De Witte, Lens, and Soenens, 2010)
   A. Autonomy
      1. Questions
         a. Pre: 24 (reverse coded), 27, 30, & 32
         b. Post: 14 (reverse coded), 17, 30, & 32
      2. Measured using a 7-point scale that ranged from 1 (not at all true) to 7 (very true) for the fixed graded measure.
3. Autonomy score determined by adding the responses from items 24 (reverse coded), 27, 30, & 32 (pre) or 14 (reverse coded), 17, 30, & 32 (post), with a maximum score of 28 and a minimum score of 4
4. Higher scores indicate higher level of autonomy when using the cardio machines at the REC, while lower scores indicate lower levels of autonomy

B. Competence
1. Questions
   a. Pre: 23 (reverse coded), 28, 29, & 31 (reverse coded)
   b. Post: 13 (reverse coded), 18, 19, 21 (reverse coded)
2. Measured using a 7-point scale that ranged from 1 (not at all true) to 7 (very true) for the fixed graded measure.
3. Autonomy score determined by adding the responses from items 23 (reverse coded), 28, 29, & 31 (reverse coded) or 13 (reverse coded), 18, 19, 21 (reverse coded), with a maximum score of 28 and a minimum score of 4
4. Higher scores indicate higher level of competence when using the cardio machines at the REC, while lower scores indicate lower levels of competence

C. Relatedness
1. Questions
   a. Pre: 22, 25, 26 (reverse coded), & 33
   b. Post: 12, 15, 16 (reverse coded), & 23
2. Measured using a 7-point scale that ranged from 1 (not at all true) to 7 (very true) for the fixed graded measure.
3. Relatedness score determined by adding the responses from items 22, 25, 26 (reverse coded), & 33 or 12, 15, 16 (reverse coded), & 23, with a maximum score of 28 and a minimum score of 4
4. Higher scores indicate higher level of relatedness when using the cardio machines at the REC, while lower scores indicate lower levels of relatedness

D. Basic Psychological Needs Total Score
1. Questions 22-33
2. Determined by adding the total of each component score (autonomy, competence, and relatedness), with a maximum score of 84 and a minimum score of 12
3. Higher score indicates that according to self-determinism theory, the basic psychological needs of the participant is more likely to be met when using the cardio machines at the REC, while lower scores indicate a lower likelihood that these needs are met

III. Measuring components of Social Cognitive Theory (adapted from Lorig et al., 1996)
A. Self-Efficacy related to using the cardio machines at the REC
1. Questions 34-40 (pre) and 24-30 (post)
2. Measured using a 10-point scale that ranged from 1 (not at all confident) to 10 (completely confident) for the fixed graded measure.
3. Self-efficacy score determined by adding the responses from items 34-40 (pre) or 24-30 (post) to get a total score, with a maximum score of 70 and a minimum score of 7
4. Higher scores indicate higher level of self-efficacy when using the cardio machines at the REC, while lower scores indicate lower levels of self-efficacy

IV. Evaluating “Raising Exercise Confidence” as a health literacy material (adapted from Ubbes, 2008)
A. Usefulness of language elements for increasing health literacy
1. Questions 31-36 (post-survey only)
2. Measured using a 5-point scale that ranged from 1 (not likely) to 10 (very likely) for the fixed graded measure.
3. Usefulness of language elements score determined by adding the responses from items 31-36 to get a total score, with a maximum score of 30 and a minimum score of 6
4. Higher scores indicate that the participant perceived the language elements of the manual as useful in making them more likely to use the cardio machines at the REC, while lower scores indicate perceptions of less usefulness regarding the language elements
Appendix F: Qualitative Comments

7. Sorry, I’ve never seen/been to the REC center.
12. the manual seems very helpful. It disappoints me that regional campus students do not have access to the REC. It is a great facility and seems unfair and biased. I would use the REC frequently if I were permitted.
42. It’s useful, but I think it would be better if more specified.
46. It was good that you included pics of larger people. Makes me more comfortable.
48. I dislike using machines in general. I like to physically see my progress by the moving of whatever’s around me.
62. I do not use the REC due to lack of time.
76. Working outside trumps indoors any day!
94. I currently live at Heritage, so I am very close to the REC but I do not work out because I feel like to workout there you have to be in certain clothes and that people are judging me.
95. Your manual made me want to come in and work out! You made your point very clear on both the survey and the manual. Good job. =)
98. Very helpful to anyone; especially incoming freshmen.
99. Cool!
100. The biggest problem is access-MUH students have to pay huge fees to use the REC. Next, being an older, overweight student is beyond intimidating. I think more should be done to encourage those who most need it to come-like “older student” workout clubs or classes. Oh, and I noticed a typo on the back of your booklet-20008 should be 2008. =)
106. Very clear manual; well laid out.
108. Because I am already experienced with the REC and the cardio equipment, reading the manual did not teach me much more than I already knew, therefore the second survey should not differ much.
116. You should have these available at the REC.
118. I feel that the survey would be more effective if only Oxford students were surveyed; it would ensure accuracy.
126. This is useless-should be written in foreign languages because most people who are in college and have grown up in the US should know how to use these machines and what they are. Everything is labeled and requires common sense. Waste of paper.
129. Your booklet is very well put together. =)
133. I did not see how this pamphlet was beneficial, unless if you were a student who has never been to the REC center. Most people are either one of two types, A) you exercise regularly or B0 you don’t or do it else where. So it’s their decision and our facilities are well run that students and visitors are able to ask for assistance.
138. I would add more towards the beginning of the manual that ID card is required for treadmill.
143. Being a football player makes it hard to include myself with the rest of the student body.
147. Don’t use the REC, will next year though.
149. While I think it’s great that we have a recreational center on the Oxford campus, it would be more convenient for me to use it in place of LA Fitness (where I currently workout). If I lived in Oxford, however, I would drop the gym membership and use the REC.
168. Manual was very nice and professional.
175. Problem with REC is extreme dullness. Magazines difficult to read on machines, visual/audio would be nice.
198. There is a typo on page 18.
201. Great job - does a good job of showing the gym
205. It would be fair to consider Middletown and Hamilton students equally in using the REC center.
208. I really liked that there was a description of each type of machine available.
212. Laminated instructions attached to machines would be even better!
214. Seems great but next time I’m in Oxford will be the first.
235. Every gym should have one of these (manuals). It would make it less intimidating.
238. I really liked the descriptions of the various machines because I usually end up signing up for the same machines because I do not know how to use all of them. I also appreciated the location descriptions.
240. TVs on the machines and more machines would be the only influence on my decision to use machines.
241. This should be distributed to incoming freshmen. When I transferred here, I did not know how to sign up for a machine. Some of the questions (comfortability) seem to be more person-oriented.
242. The brochure was comprehensive and informative.
250. I found the manual helpful and descriptive in its basic purpose. That said, the survey seems problematic in its request for information such as “gender” and “race” and in the wording of many questions. Because of this, I decided not to answer many of the questions.
257. I believe the manual is a great idea. I hope you encourage more people to exercise!
262. I mostly lift weights so this is fairly irrelevant to me. I think it should have included areas other than cardiovascular machines.
270. I go to the REC a lot so I am pretty familiar already.
278. Improve the photo quality and include larger pictures instead of many small photos…then it’ll be perfect! =)
284. Don’t use the REC, but equipment at the Gross center is similar.
289. We need a new REC.
290. Long survey.
292. Good job.
293. Hard to answer questions on a fitness center I have never been to. These questions are geared toward people that have utilized the REC Center.
295. Manual is good. If someone doesn’t know how to use one wouldn’t they just ask?
303. The manual was great! I would be the one who just jumped on a machine without signing up and tick everybody off - not intentionally. Just would have missed it.
304. =)
306. Manual was very detailed and interesting!!
315. Cardio machines should be closer to front. Manual was awesome! Great job.
316. Excellent brochure - I saw how to work machines (never knew before) and have 2 selected that interest me.
320. I personally don’t like machines; I usually exercise by running, or sports.
<table>
<thead>
<tr>
<th>Subscale Variable</th>
<th>Mean (Pre)</th>
<th>Standard Deviation (Pre)</th>
<th>Range (Pre)</th>
<th>Mean (Post)</th>
<th>Standard Deviation (Post)</th>
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** p< .01  
* p< .05
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** p<.01  
* p<.05
Table 4: Follow-Up Descriptive Results for the Significant Gender and Time Main Effects

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</thead>
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<tr>
<td>TPB Average Attitude</td>
<td>Male</td>
<td>5.12 (1.00)</td>
<td>5.55 (1.00)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>5.37 (1.06)</td>
<td>5.80 (1.11)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>5.26 (1.04)</td>
<td>5.69 (1.07)</td>
</tr>
<tr>
<td>TPB Subjective Norm</td>
<td>Male</td>
<td>3.63 (1.78)</td>
<td>4.17 (1.84)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>4.29 (1.92)</td>
<td>4.75 (1.92)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>4.00 (1.88)</td>
<td>4.50 (1.91)</td>
</tr>
<tr>
<td>TPB Perceived Behavioral Control</td>
<td>Male</td>
<td>5.11 (1.48)</td>
<td>5.49 (1.34)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>5.17 (1.57)</td>
<td>5.61 (1.39)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>5.14 (1.53)</td>
<td>5.56 (1.37)</td>
</tr>
<tr>
<td>TPB Intention</td>
<td>Male</td>
<td>2.68 (2.06)</td>
<td>3.05 (2.09)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>2.56 (2.02)</td>
<td>3.05 (2.17)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>2.61 (2.03)</td>
<td>3.05 (2.13)</td>
</tr>
<tr>
<td>Self-Determinism Theory Total Score</td>
<td>Male</td>
<td>54.67 (9.92)</td>
<td>57.80 (10.82)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>52.88 (11.99)</td>
<td>56.76 (10.92)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>53.65 (11.16)</td>
<td>57.21 (10.87)</td>
</tr>
<tr>
<td>Self-Efficacy</td>
<td>Male</td>
<td>53.09 (14.76)</td>
<td>61.31 (11.51)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>47.71 (17.83)</td>
<td>60.27 (11.08)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>50.03 (16.76)</td>
<td>60.72 (11.26)</td>
</tr>
</tbody>
</table>

Table 5: Univariate Follow-Up Results for the Significant Time Main Effect

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Pre-Test M (SD)</th>
<th>Post-Test M (SD)</th>
<th>Univariate F-Value (df = 1, 281)</th>
<th>Effect Size (eta-squared)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPB Average Attitude</td>
<td>5.26 (1.04)</td>
<td>5.69 (1.07)</td>
<td>75.71</td>
<td>.21</td>
</tr>
<tr>
<td>TPB Subjective Norm</td>
<td>4.00 (1.88)</td>
<td>4.50 (1.91)</td>
<td>54.56</td>
<td>.16</td>
</tr>
<tr>
<td>TPB Behavioral Control</td>
<td>5.14 (1.53)</td>
<td>5.56 (1.37)</td>
<td>21.16</td>
<td>.07</td>
</tr>
<tr>
<td>TPB Intention</td>
<td>2.61 (2.03)</td>
<td>3.05 (2.13)</td>
<td>30.54*</td>
<td>.10</td>
</tr>
<tr>
<td>Self-Determinism Theory Total Score</td>
<td>53.65 (11.16)</td>
<td>57.21 (10.87)</td>
<td>48.06*</td>
<td>.15</td>
</tr>
<tr>
<td>Self-Efficacy</td>
<td>50.03 (16.76)</td>
<td>60.72 (11.26)</td>
<td>177.87*</td>
<td>.39</td>
</tr>
</tbody>
</table>

* p < .00