2016

Online learning and the effects on functional health: a pilot study

Jessica Mangis
Eastern Washington University

ONLINE LEARNING AND THE EFFECTS ON FUNCTIONAL HEALTH: A PILOT STUDY

A Thesis

Presented To

Eastern Washington University

Cheney, Washington

In Partial Fulfillment of the Requirements

For the Degree

Masters of Science in Physical Education

By

Jessica Mangis

Summer 2016

THESIS OF JESSICA MANGIS APPROVED BY

_____ Date_____

Wendy Repovich, PhD, FACSM

_____ Date_____

Janet Peterson, DrPH, FACSM

MASTER'S THESIS

In presenting this thesis in partial fulfillment of the requirements for a master's degree at Eastern Washington University, I agree that the JFK Library shall make copies freely available for inspection. I further agree that copying of this project in whole or in part is allowable only for scholarly purposes. It is understood however, that any copying or publication of this thesis for commercial purposes or for financial gain, shall not be allowed without my written permission.

Signature _____

Date_____

Abstract

Online learning presents a major risk on our emotional and physical health, otherwise known as functional health which results in a trend away from active leisure pursuits and recreational sports and leading us towards a sedentary lifestyle (Wang, Luo, Gao, & Kong, 2012). Sedentary behavior leads to many health risks and conditions such as cardiovascular disease, one of the leading causes of death. A sedentary lifestyle is defined as someone who does not meet the minimum suggested levels of physical activity: 150 minutes of endurance training and two days of strength training a week (American College of Sports Medicine, 2011; USDHHS, 2008). The purpose of this study was to investigate the effects of an online learning course on functional health. The Short Form Health Questionnaire (SF-36) was sent to two different online courses. Nine students completed the survey, resulting in 14 different significant correlations between the eight functional health categories. Strong significant correlations were found between general health and social functioning, marital status, and physical functioning. No other significant effects were found, but the results support previous research that online learning has negative effect on functional health.

Key Words
Online learning, physical activity, sedentary lifestyle, sedentary risk factors

Table of Contents

Tables and Figures

Chapter 1

Introduction

Technology impacts college students in their day to day life. In fact, technology not only impacts academics but also their health (University of Minnesota, 2007). Good health is one of the strongest influences on completion of a degree. College students face multiple risks to their health, including the use of computers and internet, which could prevent them from completing their degrees. Research has suggested that having a college degree has a positive impact on long term health, therefore it is important that the time on the computer does not have a negative impact on the completion of their degree. (University of Minnesota, 2007; Wang et al., 2012). Online learning can be beneficial but also comes with added health risk.

Online learning moves what we know as face-to face learning to a computer screen (Bates & Khasawneh, 2007; Lim, Morris, & Kupritz, 2007; Moore, Dickson-Deane, & Galyen, 2011; Shin & Chan, 2004; Xu & Jaggars, 2013). For the purpose of this study we defined online learning as the education in which instruction and content are delivered primarily over the Internet (Watson & Kalmon, 2005). The term does not include printed-based correspondence education, broadcast television or radio, videocassettes, and stand-alone educational software programs that do not have a significant Internet-based instructional component (U.S. Department of Eductaiton, 2010). Online learning appeals to more of a non-traditional student, but can be accessed by everyone(Bates & Khasawneh, 2007; Lim, Morris, & Kupritz, 2007; Moore, Dickson-Deane, & Galyen, 2011; Shin & Chan, 2004; Xu & Jaggars, 2013). In a recent study by Xu and Jaggars, they found that woman tend to adapt to the change

from face-to-face learning to online learning better than men possibly because they are more motivated, more adept at communicating online, and more effective in scheduling their learning. Race and age also play into how well a person adapts to this learning platform (Wang et al., 2012; Xu & Jaggars, 2013). Whites tend to adapt better than Blacks and Hispanics possibly because they have easier access to the technology, and the older a person becomes the better they have learned to manage time (Xu & Jaggars, 2013).

Online learning has made it easier on instructors and students by providing assembly tools to create learning content, storage and distribution components, resources banks, and overcoming the time and place constraints on instruction that are usually found in the traditional classrooms (Bates & Khasawneh, 2007). These technological advances have resulted in later bedtimes, longer sleep onset latency, and later waking times. Screen time such as computer games has been associated with a more sedentary lifestyle (Wang, et.al, 2012). So even though online courses make it easier for students and teachers to access education, it potentially leads them to a sedentary lifestyle and related health issues.

Spending more time on the computer presents a major risk to our physical and mental health, resulting in a trend away from active leisure pursuits and recreational sports and leading us towards sedentary entertainment such as television, video games, and computers (University of Minnesota, 2007; Wang et al., 2012). This sedentary behavior is associated with many health risks such as cardiovascular disease, the leading causes of death in the United States. Other issues sedentary lifestyles may cause include premature death, diseases such as stroke, some cancers, type 2 diabetes,

osteoporosis, and depression (Chomistrek et al., 2013; Fishman et al., 2016; Garber, et al., 2011; Katzmarzyk, 2016; Schmid, Ricci, Baumeister, & Leitzmann, 2016; USDHHS, 2008).

A physically active lifestyle is currently defined as a minimum of 150 minutes of cardiovascular exercise and two days of strength training a week (American College of Sports Medicine, 2011; USDHHS, 2008). The benefits of increased physical activity include a reduced health risk. Many experts agree that some physical activity is better than none (ACSM, 2011; Chomistrek et al., 2013; Dietary Guidlines for Americans, 2015; Fishman et al., 2016, Katzmarzyk, 2016, Schmid et al., 2016, USDHHS, 2008).

College students who have better health are more likely to complete a degree, but it is unclear whether time on the computer has a negative impact on health. We know that physical inactivity or sedentary behavior is the number two risk factor for a variety of diseases and general health. Therefore, the effect on functional health needs to be examined in students taking online courses.

Purpose Statement

The purpose of this study was to investigate the effects of participation in an online learning course on functional health.

Null Hypothesis

There are no significant effects on the measures of functional health in college students who are taking an online learning course. The alpha level was set to $p \leq 0.05$.

Operational Definitions

For this study, the definition of functional health is the combination of physical and mental health behaviors categorized by physical functioning, role limitations due to physical health, role limitations due to emotional problems, energy/fatigue, emotional well-being, social functioning, pain, and general health as measured by the Short Form Health Survey 1.0 (SF-36) (McHorney, Ware, & Raczek, 1993; Ware, Snow, Kosinski, & Gandek, 1993).

Limitations and Delimitations

The ability to generalize the findings of this study is limited by the following:

1. The participants were limited to college students taking a single online course at Eastern Washington University.
2. None were completing online degrees.

Assumptions

The following assumption was used throughout this study:

1. All the participants had similar experience taking online courses.

Significance

There have been very few studies linking online learning with health behaviors and physical activity. The development of a sedentary lifestyle has long term health issues. The completion of this study adds to the research of online learning and functional health.

Summary

Online courses are beneficial for many reasons. With the combination of the advances in technology and busy schedules the only way some people are able to go to school is online. The addition of sedentary screen time while participating in multiple online classes could be causing harm to the body. What is unknown is how much physical activity people get while having to sit in front of the computer for extended periods of time.

Chapter 2

Review of Literature

Introduction

The purpose of this study was to investigate the effects of an online learning course on functional health. This chapter discusses research from previous studies about online learning and the types of students who adapt to online courses, physical activity requirements, and sedentary lifestyles and the risks associated with it as well as a discussion of the survey instrument used in the study.

Online Learning

Online learning is a term that is very difficult to define. Practitioners and researchers have difficulty agreeing on a common definition and terminology for how learning occurs and/or is communicated (Moore, Dickson-Deane, & Galyen, 2011). Different learning environments can depend on the learning objective, target audience, access (physical, virtual, and/or both), and type of content (Lim, Morris, & Kupritz, 2007; Moore et al., 2011). Some researchers define online learning as the most recent version of or new and improved distance learning which improves access to educational opportunities for nontraditional students (Xu & Jaggars, 2013), or an accesss to the learning experience via the use of some form of technology (Moore et al., 2011). With the constant changes in technology, there is no reason to regularly update the definition of online learning by adding all possible methods of delivery (Bates & Khasawneh, 2007; Lim, Morris, & Kupritz, 2007; Moore, Dickson-Deane, & Galyen, 2011; Shin & Chan, 2004; Xu & Jaggars, 2013).

Blackboard, Semester Book, or WebBoard are a few examples of instructional platforms that make a range of components available which in turn enhances learning and instruction. Computer-based technologies such as authoring tools, multimedia servers, learning catalogs, e-mail, and various software platforms give instructors and students freedom to continue learning in face-to-face or online courses. (Bates & Khasawneh, 2007). Combining new computer-based technologies and software platforms improves the instruction by:

- Overcoming the time and place constraints on instruction found in traditional classrooms
- Making available to students a greater breadth of information about course topics
- Providing a means to more closely monitor and facilitate student progress
- Facilitate more active participation and interaction
- Provide instructors with an increase range of instructional techniques and options (Bates & Khasawneh, 2007, pp. 181).

This type of learning is most attractive to the nontraditional students who may work full-time, have children, have part-time attendance history, or delayed their postsecondary education enrollment (Xu & Jaggars, 2013). These types of students have difficulty attending traditional face-to-face classes partly because of time and place constraints and other work and family obligations (Bates & Khasawneh, 2007). Woman tend to adapt more easily to the change from face-to-face learning to online learning because they are more motivated, more adept at communicating online, and are more effective in scheduling their learning than men (Wang et al., 2012; Xu & Jaggars, 2013). This outcome relative to online learning and women's performance may not be unique because women also tend to perform better in school overall (Xu & Jaggars, 2013).

Another factor that determines the success of those pursuing online learning is age. Success is attributed to an increase in rehearsal, elaboration, critical thinking, and metacognitive self-regulation that the person has perfected over their lifetime (Xu & Jaggars, 2013). The effect that age plays on the success of online students is interesting because usually the older students have more family and employment obligations which create problems with time management for younger students. The older students have had more time to perfect their time management skills that translate easily to online learning (Shin & Chan, 2004; Xu & Jaggars, 2013).

Active learning, which is the student's involvement in the learning environment, includes instructional activities where the students is doing things and thinking about what they are doing. This can create a positive online learning environment increasing the adaptability of students which translate to better grades. (Moore et al., 2011; Smart & Cappel, 2006)

With the changes to technology and the resources available to instructors and students, it is important to remember that the healthier a student is the better grades the student will achieve in face-to-face or online learning environments. So by making it easier in one aspect it may be detrimental in another due to the sedentary nature of computer use (University of Minnesota, 2007). In at least one study the frequent use of the computer has resulted in later bedtimes, longer sleep onset latency, and later waking times which takes away from a person's energy level. Lower energy levels result in inadequate work performance and leads to a more sedentary lifestyle (Wang, et.al, 2012).

Physical Activity Guidelines

Physical activity is defined by any bodily movement produced by skeletal muscles that results in energy expenditure above resting levels (Garber, et al., 2011). While physical activity can be done through exercise, sport, and other physical activity done on a daily basis, the amount of physical activity a personal can do is an important behavioral predictor for not only health but also functional independence, disability, morbidity and mortality (Blair & Brodney, 1999; Garber, et al., 2011). It is clear that overweight and obesity are associate with increased risk of morbidity and mortality while living an active way of life protects against morbidity and mortality (Blair & Brodney, 1999).

The physical activity requirements for all age groups continues to evolve, especially with an increase in sedentary lifestyles (Garber, et al., 2011; USDHHS, 2008). There have been many recommendations published since the early publications of the American College of Sports Medicine. Recommendations continue to evolve ever since the release of the 1995 Center for Disease Control and Prevention (CDC)/ACSM public health recommendation and the 1996 US Surgeon General's Report leading to confusion between the public and health and fitness professionals alike (Garber, et al., 2011).

The current guidelines for Americans can be found in the 2008 issue of the USDHHS Physical Activity Guidelines for Americans. It states that all adults should avoid inactivity. Some physical activity is better than none (Fishman, et al., 2016; Garber, et al., 2011; USDHHS, 2008). Adults should be participating in a minimum of 150 minutes of moderate-intensity, or 75 minutes of vigorous-intensity of aerobic

activity a week. Muscle-strengthening activities should be moderate to vigorous two or more days a week (ACSM, 2011; Garber, et al., 2011; USDHHS, 2008). Adults should also perform flexibility exercises two to three days a week while holding each stretch for 10-30 seconds. Neuromotor exercises, or functional fitness training including balance, agility, coordination, and proprioceptive training, should be done two to three days a week as well (ACSM, 2011). Even replacing a few minutes, or just reducing the amount of sedentary time and adding short amounts of physical activity such as standing should be a goal for all adults as it is associated with lower mortality and improves functional health in most people (Garber, et al., 2011; Fishman, et al., 2016).

Sedentary Lifestyle Risks

Sedentary behavior is defined by activity that involves little or no movement of physical activity (Garber, et al., 2011). This type of behavior has become the second leading cause of death in the United States, trailing only tobacco use (Warren, et al., 2010). Sedentary lifestyles or physical inactivity is increasing because of the availability of computers (Wang et al., 2012). It has been shown that 55% of an average person's waking day is spent in a sedentary position. Sedentary behavior is measured in a range of 1.0 to 1.5 METs, compared with moderate at 4-6METs or vigorous at >6METs which are the intensities required in the health recommendation for activity. The forms of these sedentary behaviors include: riding in a car, working at a desk, eating a meal at a table, playing video games, using a computer, and watching television (Garber, et al., 2011; Katzmarzyk, Church, Craig, & Bouchard, 2009). These sedentary activities make it harder for people to follow the Physical Activity Guidelines and may be putting them at risk of premature death, and diseases such as

coronary heart disease, stroke, some cancers, type 2 diabetes, osteoporosis, depression, high blood pressure and high blood cholesterol. Physical fitness and mental health are subject to loss of function as well. (ACSM, 2011; Chomistrek, et al., 2013; Dietary Guidlines for Americans, 2015; Garber, et al., 2011; Katzmarzyk et al., 2009; USDHHS, 2008)

Sedentary behavior detrimentally alters metabolic function and enhances chronic inflammation. Physical inactivity induced suppression of lipoprotein lipase activity, which is involved in the uptake of free fatty acids and triglycerides into skeletal muscle and the production of high-density lipoprotein (HDL) cholesterol. An abnormal value in any or all of these variables increases the risk of coronary heart disease (Schmid et al., 2016). Increasing physical activity improves insulin sensitivity, lowers chronic inflammation, affects immune function, and antioxidant defense systems (Schmid et al., 2016). Sedentary behavior replacing light physical activity can be associated with a 14-20% lower risk of mortality, but when sedentary behavior is replaced with moderate to vigorous activity; it can be as high as 50% lower risk (Katzmarzyk, 2016). By reducing the total time spent in a sedentary behavior, and adding short periods of physical activity such as standing, should be a goal for all adults to improve physical and mental health (Garber, et al., 2011). A program that does not meet all components or achieve less than the recommended duration, intensity, or frequency will still most likely have a benefit for any inactive person (Garber, et al., 2011).

Functional Health and the SF-36

The functional health survey was originally designed for primary care physicians to use with patients to enhance care. It was designed as a paper and pencil survey

completed by the patient prior to an office visit, so the time spent with the patient is not just spent in acute care (McHorney et al., 1993) The Short-Form Functional Health Survey (SF-36) was created to measure the representation of multidimensional health concepts and a full range of health states including levels of well-being and personal evaluations of health broadening the SF-20 (McHorney et al., 1993). While this survey measures the main health survey concepts such as physical, role, social functioning, mental health, and general health, it also measures bodily pain and vitality. The survey was validated over a year on patients and physicians in Boston, Chicago, and Los Angeles. Validations were done in two ways, psychometric criteria to demonstrate the association of the subscales and against clinical criteria to identify actual health risks (McHorney et al., 1993). Translations of the SF-36 survey have been validated in various countries against similar criteria used in those countries.

The physical functioning and mental health scales from this survey are relatively pure and have unequivocal interpretations. These two scales measure both physical and mental dimensions of health and when there is an observed difference is found on this scale the interpretation attributed to either physical or mental causes can be made with confidence (McHorney et al., 1993).

Summary

Online learning is a great tool to use to make it easier for teachers and students by taking away time and place constraints and attracts the nontraditional students. Increased computer use can result in later bedtimes, longer sleep onset latency, and later waking times which has been associated with a more sedentary lifestyle. A minimum of 150 minutes of moderate aerobic activity and two days of strength training

are required in order to be considered physically active. By using the SF-36, an observation can be made about the use of online learning on college students in both physical and mental health, or functional health, dimensions.

Chapter 3

Methods

Introduction

The purpose of this study was to investigate the effects of participating in an online learning course on functional health. This chapter will discuss the procedures, participants and statistical analysis performed.

Participants

A total of 35 students (22 in Medical Terminology and 13 in Personal and Community Health) were invited to participate in the survey through an announcement in their Canvas (online learning platform) courses. None of the programs that are offered in this department are offered completely online. Therefore, none of the students in these two classes were taking their entire program online. Extra credit was given to one group of students for completing the questionnaire, but this survey may have been too long to get a high response rate.

Instruments

The instrument chosen for this survey was the Short Form Health Survey 1.0 (SF-36) (Ware et al., 1993). The SF-36 is a questionnaire of 36 items measuring eight variables including: physical functioning, role limitations due to physical health, role limitations due to emotional problems, energy/fatigue, emotional well-being, social functioning, pain, and general health. It also included a single item that provided an indication of perceived change in health. All questions were scored on a scale of 0-100, with 100 representing the highest level of functioning possible. In addition, a group of 11 demographic questions were included to describe the participants. The

demographics we were most concerned with were how many children, relationship status, hours of sleep, and intentional exercise because these were the things most associated with online learners (Bates & Khasawneh, 2007; Wang, Luo, Gao, & Kong, 2012; Xu & Jaggars, 2013). A copy of the survey can be found in Appendix A. The first 11 questions are demographics and the rest are from the SF-36. The eight functional health measures and the number of questions pertaining to each measure (in parenthesis) were physical functioning (10), role limitation due to physical health (4), role limitations due to emotional problems (3), energy/fatigue (4), emotional well-being (5), social functioning (2), pain (2), and general health (5), see Table 1 The scores from the SF-36 questionnaire that address each specific area of the eight functional health status are added together and then averaged and finally calculated as a percentage. Scoring guidelines for the SF-36, refer to Table 2.

Table 1

Subgroup Category Questions

Scale	Number of Items	After Recording, Average Following Items
Physical Functioning	10	14, 15, 16, 17, 18, 19, 20, 21, 22, 23
Role limitations due to physical health	4	24, 25, 26, 27
Role limitations due to emotional problems	3	28, 29, 30
Energy/Fatigue	4	34, 38, 40, 42
Emotional well-being	5	35, 36, 37, 39, 41
Social Functioning	2	31, 43
Pain	2	32, 33
General Health	5	12, 44, 45, 46, 47

Table 2

Scoring Guide

Question Number	Original Response	Recorded Vaule
12,13, 31, 32, 45, 47	1	100
	2	75
	3	50
	4	25
	5	0
14, 15, 16, 17, 18, 19, 20, 21, 22, 23	1	0
	2	50
	3	100
24, 25, 26, 27, 28, 29, 30	1	0
	2	100
32, 34, 37, 38, 41	1	100
	2	80
	3	60
	4	40
	5	20
	6	0
35, 36, 39, 40, 42	1	0
	2	20
	3	40
	4	60
	5	80
	6	100
43, 44, 46	1	0
	2	25
	3	50
	4	75
	5	100

Overall nine students (26%) completed the Short Form Health Survey (SF-36) Questionnaire. The questions that were asked can be found in Appendix A and the specific questions from the SF-36 were questions 12-47. Questions were sorted into their subscales and combined. The mean score was then calculated as an index reflecting an aspect of functional health and the higher the score, the better the health

state (See Table 2). Physical functioning measured how well they functioned physically. Role limitation due to physical health measured how their social life was influenced by their physical health. Role limitation due to emotional problems also measured their social life but with the influence of their emotional problems. Energy/fatigue measured how much energy they had on a day to day basis. Emotional well-being measured how emotionally stable they were. Social functioning measured how they physical and emotional states affected their social life. Pain measured how much bodily pain they felt on a day to day basis. General health measured their overall perception of their functional health (Ware et al., 1993).

Table 3

Short Form Health Survey (SF-36) 1.0 Questionnaire Score

Functional Health Status	Percecntage
Physical Functioning	91
Role Limitations Due to Physical Health	86
Role Limitations Due to Emotional Problems	88
Energy/fatigue	48
Emotional Well-Being	64
Socail Functioning	78
Pain	82
General Health	70

Procedures

This study was approved by the Eastern Washington Institutional Review Board prior to collecting any data. The survey was entered into Survey Monkey for delivery to the students. Once entered, an email message with a link to the survey was sent to the professors. An assignment was created in Canvas and announcement about the research project to inform the students. A link to the survey was included in the assignment. Clicking on the link implied the student's consent. The survey was sent

with a request to be completed within five days. Once the surveys were sent, reminders were email to the professors to pass on to the students on day three and five for follow-up urging completion of the survey.

Statistical Analysis

Initial analysis was calculated using SPSS 21 for the SF-36 test scores based on the eight functioning health factors and descriptive statistics of mean (± SD), and range on the demographic questions (see Table 4). To analyze the data by the eight functional health factors, new variables were created by combining scores from all appropriate questions. A one-way Analysis of Variance (ANOVA) was completed to look at the differences between the amount of exercise, question eight of the demographic survey and the eight functional health factors. A Pearson Correlation was calculated to examine the relationships between the demographics and the eight functional health factors (see Table 5). Finally, a Linear Multiple Regression was analyzed to determine whether any variables could be used to predict intention to exercise.

Summary

Thirty-five students from two online health courses were invited to participate in this online survey. Nine completed the survey, a 26% completion rate. The survey used was the SF-36 with 11 demographic questions added. After data collection, results were input to SPSS for statistical analysis using descriptive statistics, a one-way ANOVA, a Pearson Correlation, and a Linear Multiple Regression.

Chapter 4

Results

Introduction

The purpose of this study was to investigate the effects of an online learning course on functional health. This chapter will discuss the results of the analysis including the SF-36 score, descriptive statistics on all variables, a one-way ANOVA, a Pearson Correlation, and a Linear Multiple Regression.

Factor Analysis

The survey was developed to be used with medical patients, so a factor analysis was run to determine if the instrument was useful for this population. The small number of respondents (n=9) rendered a factor analysis inconclusive.

Short Form Health Survey (SF-36) Questionnaire

Since a score of 100 represents high energy with no fatigue, the lower score of 48% suggests that the student is experiencing a loss of energy and is experiencing some fatigue. With a small sample size two students at 10% and 15%, while another was at 90% impacts the overall percent. The highest percentages included physical functioning, role limitation due to physical health, and role limitations due to emotional problems meaning that none of the students presented any physical or mental health problems.

Descriptive Statistics

The overall demographic frequencies are shown in Table 4

Table 4

Descriptive Statistics

	N	Range	Min.	Max.	Mean (SD)
Age	9	3	1	4	2.11 (1.167)
Year in School	9	4	1	5	3.78 (1.202)
Gender	9	1	1	2	1.78 (0.441)
Marital Status	9	1	1	2	1.67 (0.5)
Children	9	2	1	3	1.44 (0.882)
Working Status	9	2	1	3	1.67(0.707)
Hours of Sleep	9	1	1	2	1.22 (0.441)
Intentional Exercise	9	2	1	3	2.56 (0.726)
Eating Habits	9	1	1	2	1.44 (0.527)
Physical Functioning	9	10	20	30	28.22 (3.27)
Role limitation due to physical health	9	3	5	8	7.44 (1.014)
Role limitation due to emotional problems	9	1	5	6	5.67 (0.5)
Energy/Fatigue	9	4	12	16	13.11 (1.453)
Emotional Well Being	9	8	18	26	21.44 (2.833)
Social Functioining	9	5	2	7	3.67 (2)
Pain	9	2	5	7	6 (0.5)
General Health	9	7	12	19	14.67 (2.291)

Note. Nine students completed the survey and all questions were answered totaling 100 percent for each question

Out of the nine students that completed the survey, four were between the age of 18-22, five were juniors, seven females, three were in a relationship, two had kids, one student was unemployed, seven were getting < 8 hours of sleep a day, six were getting exercise on an irregular basis, and four had unhealthy diets.

One-way ANOVA

The intent to exercise question (#8) from the demographic survey was compared to each of the eight functional health factors using a one-way ANOVA. No significant difference was found between any of the factors: physical functioning ($F(2,6) = 0.235$, $p > .05$), role limitation dues to physical health ($F(2,6) = 0.149$, $p > .05$), role due to emotional problems ($F(2,6) = 0.083$, $p > .05$), energy/fatigue ($F(2,6) = 3.909$, $p > .05$), emotional well-being ($F(2,6) = 0.717$, $p > .05$), social functioning ($F(2,6) = 0.368$, $p > .05$), pain ($F(2,6) = 0$, $p > .05$), and general health ($F(2,6) = 1.021$, $p > .05$).

Pearson Correlation

Even though there was a small sample that completed the surveys, there were several significant correlations observed. Table 5 presents only the significant correlation factors. For the entire correlation table please see Appendix B.

The strongest positive correlation was between general health and social functioning ($r(7) = .900$, $p = .001$), meaning that as social functioning is high, so is general health. Physical functioning ($r(7) = -.873$, $p = .002$) and role limitation due to physical health ($r(7) = -.682$, $p = .043$) had significant negative correlations to general health, indicating that those doing less physical activity also demonstrated poorer health.

Table 5

Pearson Correlation

Measure	1	2	3	4	5	6	7	8
1 Physical Functioning	-							
2 Role limitation due to physical health	**.834**** **.005**	-						
3 Role limitation due to emotional problems	.586 .097	.575 .105	-					
4 Energy/Fatigue	-.164 .674	-.038 .923	.229 .553	-				
5 Emotional Well Being	-.214 .580	-.034 .931	.294 .442	.594 .092	-			
6 Social Functioining	**-.828**** .006	-.534 .138	**-.750*** **.020**	-.029 .942	-.015 .970	-		
7 Pain	-.535 .138	**-.740*** **.023**	0.000 1.000	.344 .365	.353 .352	0.000 1.000	-	
8 General Health	**-.873**** **.002**	**-.682*** **.043**	-.546 .129	-.100 .798	.006 .987	**.900**** **.001**	.218 .573	-

Note. Significant correlations are bold, *p<0.05. **p<0.01

Linear Multiple Regression

A multiple Linear Multiple Regression was calculated predicting the intent to exercise among the participants based on the eight functional health factors. The regression equation was not significant ($F(7,1) = 0.988$, $p > .05$) with an R^2 of 0.874. None of the eight functional health factors were significant predictors of intention to exercise in this small sample.

Summary

The results of the SF-36 showed losses presented in energy/fatigue, emotional well-being and general health. Energy/fatigue being the most affected. The factor

analysis was inconclusive due to the low response rate. The one-way ANOVA showed no significant changes between the eight functional health factors. There were 14 different correlations among the demographics and eight functional health factors. The Linear Multiple Regression also showed no significant differences between the eight functioning health factors.

Chapter 5

Discussion

Introduction

The purpose of this study was to investigate the effects of an online learning course on functional health. This chapter discusses the results of the statistical analysis in relation to the existing body of literature. It also presents the limitations and recommendations for further research.

Summary of Results

After receiving IRB approval, a survey consisting of 11 demographic questions and the SF-36 Functional Health Questions was sent to two summer Health Education online classes. A total of nine out of 35 students (26%) completed the survey. There were no significant changes between the eight functional health factors in either the one-way ANOVA or the Linear Multiple Regression.

The small sample made it difficult to analyze the data based on groupings. For example, of the nine, those who were older were more likely to be in a relationship and have children, and when comparing marital status in the correlation those in a relationship had significant negative correlations with both social functioning ($r(7) = -.750$, $p = .020$) and general health ($r(7) = -.873$, $p = .002$), while the combined group had the highest positive correlation between social functioning and general health ($r(7) = .900$, $p = .001$). See Appendix B for full correlation table. There were a total 14 significant correlations found between the demographics and the eight functional health measures. The results show that as the older a person gets, the more children that they

have, and the more social they are their general health seems to be better. It is also interesting to see that people who are in a relationship tend to have more children, have less social interaction, and worse general health. These results were similar with that of past research that stated students that are in a relationship and with children have more family obligations resulting in general health issues while taking online courses (Wang et al., 2012, Xu & Jaggars, 2013).

Even though these results are similar, it is possible that the functional health issues found in this study are because of the online learning classes. Although we did not test for this outcome it is also possible that online learning gives students more time to be physically active because there is no time constraint by having to be in class at a certain location or a certain time (University of Minnesota, 2007).

Another factor that could have had a negative affect on the results of this study are the instructors experience with online learning. Frustrations with the type of learning or the environment in which the students were completing their coursework may have had a negative impact (Moore et al., 2011; Lim et al., 2007)). Maybe different questions or additional questions should be asked about the instruction of the online course and the environment in which it was completed in.

Research suggests adding prompts to reduce sitting time while on the computer may have a positive influence on health. The results of adding prompts in a worksite situation to remind individuals to take a 1-minute break from sitting every 30 minutes, reduced the number of and time spent in, prolonged uninterrupted sitting periods. (Evans et al., 2012). There is also research suggesting instructor experience in designing online learning may impact both learning outcomes and student satisfaction

(Lim, Morris, & Kupritz, 2007). It may be important to also encourage the instructors teaching in online programs to include prompts for physical activity in any assignment requiring extended periods of time in front of the computer (Evans et al., 2012).

Limitations

This study was limited by college students who were taking a single online course not completing their entire degree program online. Thirty-five students were sent the survey, and nine completed it (26%). When considering online surveys, there are several factors to look at to receive higher response rates such as follow-ups, incentives, and length and presentation of the questionnaire (Deutskens, Ruyter, Wetzels, & Oosterveld, 2004). Lotteries, or incentives, and shorter questionnaires have been shown to be the most successful with getting the highest response rates (Deutskens et al., 2004). With a limited number of students completing the survey, the results in some of the sub-groups in the SF-36 questionnaire may have been impacted by the small number of participants. For example, if the two students who scored a 10% and 15% on the energy/fatigue measure, the results would have been closer to 55% instead of the 48%.

Suggestions for Future Research

1. Research could be done with actual online learners compared to students taking face-to-face instruction to see whether there are differences between the two on amounts of physical activity and/or measures of health.

2. Research could consider the effect of the instructor's experience with online learning. If an instructor is experienced in online learning as opposed to simply putting

a course online may impact computer time for the students, which could then impact their activity time and/or measures of health.

Summary

The results of this study appear to support past research that online learning has a strong correlation to functional health. The primary issue with the outcomes was the small sample size and dichotomous breakdown of the demographics in the population. More obligations related to a decrease in general health in the participants in the present study.

References

American College of Sports Medicine. (2011, July). Retrieved from About ACSM Media Room: http://www.acsm.org/about-acsm/media-room/news-releases/2011/08/01/acsm-issues-new-recommendations-on-quantity-and-quality-of-exercise

Bates, R., & Khasawneh, S. (2007). Self-efficacy and college students' perceptions and use of online learning systems. *Computers in Human Behavior*, 175-191.

Blair, S. N., & Brodney, S. (1999). Effects of physical inactiviey and obesity on morbidity and mortalityL current evidence and research issues. *Medicine & Science in Sports and Exercise*, S646-S662.

Chomistrek, A. K., Manson, J. E., Stefanick, M. L., Lu, B., Sands-Lincoln, M., Going, S. B., . . . Johnson, K. C. (2013). Relationship of sedentary behavior and physical activity. *Journal of the American College of Cardiology, 61*(23), 2346-2354.

Deutskens, E., Ruyter, K. D., Wetzels, M., & Oosterveld, P. (2004). Response rate and response quality of internet-based surveys: an experimental study. *Marketing Letters*, 21-36.

Dietary Guidlines for Americans. (2015). Retrieved from health.gov: https://health.gov/dietaryguidelines/2015/guidelines/

Evans, R. E., Fawole, H. O., Sheriff, S. A., Dall, P. M., Grant, P. M., & Ryan, C. G. (2012). Point-of-choice prompts to reduce sitting time at work. *American Journal of Preventive Medicine, 43*(3), 293-297.

Fishman, E. I., Steeves, J. A., Zipunnikov, V., Koster, A., Berrigan, D., Harris, T. A., & Murphy, R. (2016). Association between objectively measured physical activity in mortality in NHANES. *Medicine & Science and Sports & Exercise, 48*(7), 1303-1311.

Garber, C. E., Blissmer, B., Deschenes, M. R., Franklin, B. A., Lamonte, M. J., Lee, I.-M., . . . Swain, D. P. (2011). Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: guidance for prescribing exercise. *Medicine & Science in Sports & Exercise,* 1334-1359.

Katzmarzyk, P. T. (2016). Studies of sedentary behavior, activity, and mortality: duplication or replication? *Medicine & Science in Sports & Exercise, 48*(7), 1302.

Katzmarzyk, P. T., Church, T. S., Craig, C. L., & Bouchard, C. (2009). Sitting time and mortality from all causes, cardiovascular disease, and cancer. *Medicine & Science in Sports & Exercise,* 998-1005.

Lim, D. H., Morris, M. L., & Kupritz, V. W. (2007). Online vs. blended learning: differences in instructional outcomes and learning satisfaction. *Journal of Asynchronous Learning Network, 10*(4).

McHorney, C. A., Ware, J. E., & Raczek, A. E. (1993). The MOS 36-Item short-form health survey (SF-36): II psychometric and clinical tests of validity in mearsuring physical and mental helath constructs. *Medical Care,* 247-263.

Moore, J. L., Dickson-Deane, C., & Galyen, K. (2011). E-learning, online learning, and distance learning environments: are they the same? *Internet and Higher Education, 14,* 129-135.

Schmid, D., Ricci, C., Baumeister, S. E., & Leitzmann, a. M. (2016). Replacing sedentary time with physical activty in relation to mortality. *Medicine & Science in Sports & Exercise, 48*(7), 1312-1319.

Shin, N., & Chan, J. K. (2004). Direct and indirect learning effects of online learning on distance education. *British Journal of Educational Technology, 35*(3), 275-288.

Smart, K. L., & Cappel, J. J. (2006). Student's perceptions of online learning: a comparative study. *Journal of Information Technology Education, 5*, 201-219.

(2010). *U.S. Department of Eductaiton Office of Planning, Evaluation, and Policy Development Policy ad Program Studies Service.* Retrieved from http://www.inacol.org/wp-content/uploads/2015/02/iNACOL_DefinitionsProject.pdf

U.S. Department of Health and Human Services. (2008). *2008 Physical Activity Guidelines for Americans.* Retrieved from https://health.gov/paguidelines/pdf/paguide.pdf

University of Minnesota. (2007). *Report on health and habits of college students released.* Minnesota: University of Minnesota. Retrieved from https://www.sciencedaily.com/releases/2007/11/071115125827.htm#.V7Kbc-De_S0.email

Wang, L., Luo, J., Gao, W., & Kong, J. (2012). The effect of internet use on adolescents' lifestyles: a national survey. *Computers in Human Behavior, 28*, 2007-2013.

Ware, J. E., Snow, K. K., Kosinski, M., & Gandek, B. (1993). SF-36 health survey manual and interpretation guide. *The Health Institue*.

Warren, T. Y., Barry, V., Hooker, S. P., Sui, X., Church, T. S., & Blair, S. N. (2010). Sedentary behaviors increase risk of cardiovascular disease mortality in men. *Medical Science Sports Exercise, 42*(5), 879-885.

Watson, J. F., & Kalmon, S. (2005). *Learning Point Associates*. Retrieved from http://www.learningpt.org/pdfs/tech/Keeping_Pace2.pdf

Xu, D., & Jaggars, S. S. (2013, February). Adaptability to online learning: differences across types of students and academic subject areas. *Research Associate, Community College Research Center*, 1-32.

Appendix A

Online Learning and Physical Inactivity

Demographics

1. What is your age?
    a. 18-22
    b. 23-25
    c. 26-30
    d. 31+
2. What year in school are you?
    a. Freshman
    b. Sophomore
    c. Junior
    d. Senior
    e. Graduate
3. What is your gender?
    a. Male
    b. Female
4. What is your marital status?
    a. In a relationship
    b. Not in a relationship
5. How many children do you have?
    a. 0
    b. 1
    c. 2
    d. 3
    e. 4+
6. What is your current working status?
    a. Full time
    b. Part time
    c. Unemployed
7. How many hours of sleep do you get a night?
    a. <8 hours
    b. >8 hours
8. How much intentional exercise do you get a week?
    a. Daily
    b. 3 times a week
    c. Irregular
    d. None
9. What are your eating habits like?
    a. Healthy diet
    b. Not healthy diet
10. What % of time do you spend on the computer for:
    a. Class
    b. Work

c. Fun
d. Social media
e. Other

11. Where do you access the internet from? (%)
    a. At home
    b. On your phone
    c. Library
    d. Other

SF-36

12. In general, would you say your health is:
    a. Excellent
    b. Very good
    c. Good
    d. Fair
    e. Poor
13. Compared to one year ago, how would you rate your health in general now?
    a. Much better now than one year ago
    b. Somewhat better now than one year ago
    c. About the same
    d. Somewhat worse now than one year ago
    e. Much worse now than one year ago

The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

14. Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports
    a. Yes, Limited a Lot
    b. Yes, Limited a Little
    c. No, Not Limited at All
15. Moderate activities, such a s moving a table, pushing a vacuum cleaner, bowling or playing golf
    a. Yes, Limited a Lot
    b. Yes, Limited a Little
    c. No, Not Limited at All
16. Lifting or carrying groceries
    a. Yes, Limited a Lot
    b. Yes, Limited a Little
    c. No, Not Limited at All
17. Climbing several flights of stairs
    a. Yes, Limited a Lot
    b. Yes, Limited a Little
    c. No, Not Limited at All
18. Climbing one flight of stairs
    a. Yes, Limited a Lot
    b. Yes, Limited a Little
    c. No, Not Limited at All

19. Bending, kneeling, or stooping
    a. Yes, Limited a Lot
    b. Yes, Limited a Little
    c. No, Not Limited at All
20. Walking more than a mile
    a. Yes, Limited a Lot
    b. Yes, Limited a Little
    c. No, Not Limited at All
21. Walking several blocks
    a. Yes, Limited a Lot
    b. Yes, Limited a Little
    c. No, Not Limited at All
22. Walking one block
    a. Yes, Limited a Lot
    b. Yes, Limited a Little
    c. No, Not Limited at All
23. Bathing or dressing yourself
    a. Yes, Limited a Lot
    b. Yes, Limited a Little
    c. No, Not Limited at All

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

24. Cut down the amount of time you spent on work or other activities
    a. Yes
    b. No
25. Accomplished less than you would like
    a. Yes
    b. No
26. Were limited in the kind of work or other activities
    a. Yes
    b. No
27. Had difficulty performing the work or other activities (for example, extra effort)
    a. Yes
    b. No

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)

28. Cut down the amount of time you spent on work or other activities
    a. Yes
    b. No
29. Accomplished less than you would like
    a. Yes
    b. No
30. Didn’t do work or other activities as carefully as usual
    a. Yes
    b. No

31. During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?
    a. Not at all
    b. Slightly
    c. Moderately
    d. Quite a bit
    e. Extremely
32. How much bodily pain have you had during the past 4 weeks?
    a. None
    b. Very mildly
    c. Mild
    d. Moderate
    e. Severe
    f. Very severe
33. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?
    a. Not at all
    b. Slightly
    c. Moderately
    d. Quite a bit
    e. Extremely

These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling.

34. Did you feel full of pep?
    a. All of the time
    b. Most of the time
    c. A good bit of the time
    d. Some of the time
    e. A little of the time
    f. None of the time
35. Have you been a very nervous person?
    a. All of the time
    b. Most of the time
    c. A good bit of the time
    d. Some of the time
    e. A little of the time
    f. None of the time
36. Have you felt so down in the dumps that nothing could cheer you up?
    a. All of the time
    b. Most of the time
    c. A good bit of the time
    d. Some of the time
    e. A little of the time
    f. None of the time

37. Have you felt calm and peaceful?
    a. All of the time
    b. Most of the time
    c. A good bit of the time
    d. Some of the time
    e. A little of the time
    f. None of the time
38. Did you have a lot of energy?
    a. All of the time
    b. Most of the time
    c. A good bit of the time
    d. Some of the time
    e. A little of the time
    f. None of the time
39. Have you felt downhearted and blue?
    a. All of the time
    b. Most of the time
    c. A good bit of the time
    d. Some of the time
    e. A little of the time
    f. None of the time
40. Did you feel worn out?
    a. All of the time
    b. Most of the time
    c. A good bit of the time
    d. Some of the time
    e. A little of the time
    f. None of the time
41. Have you been a happy person?
    a. All of the time
    b. Most of the time
    c. A good bit of the time
    d. Some of the time
    e. A little of the time
    f. None of the time
42. Did you feel tired?
    a. All of the time
    b. Most of the time
    c. A good bit of the time
    d. Some of the time
    e. A little of the time
    f. None of the time
43. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?
    a. All of the time

b. Most of the time
c. A good bit of the time
d. Some of the time
e. A little of the time
f. None of the time

How TRUE or FALSE is each of the following statements for you?

44. I seem to get sick a little easier than other people.
    a. Definitely true
    b. Mostly true
    c. Don't know
    d. Mostly false
    e. Definitely false
45. I am as healthy as anybody I know.
    a. Definitely true
    b. Mostly true
    c. Don't know
    d. Mostly false
    e. Definitely false
46. I expect my health to get worse.
    a. Definitely true
    b. Mostly true
    c. Don't know
    d. Mostly false
    e. Definitely false
47. My health is excellent.
    a. Definitely true
    b. Mostly true
    c. Don't know
    d. Mostly false
    e. Definitely false

Appendix B

Table 6

Pearson Correlation Table

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Age	-																
2	School Year	.555 .121	-															
3	Gender	-.189 .626	-.341 .370	-														
4	Marital Status	-.571 .108	-.139 .722	.189 .626	-													
5	Children	.432 .246	.105 .788	-.357 .345	-.756* .018	-												
6	Working Status	-.253 .512	-.539 .134	-.267 .487	.000 1.000	-.134 .732	-											
7	Hours of sleep	-.054 .890	.341 .370	.286 .456	.378 .316	-.286 .456	-.134 .732	-										
8	Intentional Exercise	.655 .055	.302 .429	.434 .244	-.459 .214	.347 .360	-.568 .111	-.043 .912	-									
9	Eating Habits	.316 .407	-.219 .571	.478 .193	.158 .685	-.478 .193	.112 .775	.060 .879	.254 .510	-								
10	Physical Functioning	-.630 .069	-.208 .590	.559 .118	.663 .052	-.645 .061	-.342 .367	.308 .420	-.269 .484	.153 .694	-							
11	Role limitation due to physical health	-.470 .202	-.319 .402	.528 .144	.575 .105	-.808** .008	-.116 .766	.031 .937	-.207 .592	.520 .151	.834** .005	-						
12	Role limitation due to emotional problems	-.357 .345	-.347 .361	.189 .626	.500 .170	-.189 .626	-.354 .351	-.189 .626	-.115 .769	.158 .685	.586 .097	.575 .105	-					
13	Energy/Fatigue	-.082 .834	-.127 .744	-.737* .023	.229 .553	-.043 .912	.406 .279	-.434 .244	-.658 .054	-.073 .853	-.164 .674	-.038 .923	.229 .553	-				
14	Emotional Well Being	-.433 .245	-.518 .153	-.411 .271	.206 .595	.011 .977	.520 .151	-.589 .095	-.439 .238	-.233 .547	-.214 .580	-.034 .931	.294 .442	.594 .092	-			
15	Social Functioining	.607 .083	.069 .859	-.236 .541	-.750* .020	.378 .316	.442 .234	-.331 .385	.315 .408	.158 .685	-.828** .006	-.534 .138	-.750* .020	-.029 .942	-.015 .970	-		
16	Pain	.214 .580	.208 .591	-.567 .111	0.000 1.000	.567 .111	0.000 1.000	0.000 1.000	0.000 1.000	-.474 .197	-.535 .138	-.740* .023	0.000 1.000	.344 .365	.353 .352	0.000 1.000	-	
17	General Health	.670* .048	.015 .969	-.206 .595	-.873** .002	.701* .035	.231 .549	-.412 .270	.501 .170	.035 .930	-.873** .002	-.682* .043	-.546 .129	-.100 .798	.006 .987	.900** .001	.218 .573	-

VITA

Author: Jessica Mangis

Place of Birth: Spokane, Washington

Undergraduate Schools Attended: Eastern Washington University

Whitworth University

Degrees Awarded: Bachelor of Arts, 2011, Whitworth University

Honors and Awards: N/A

Professional Experience: Internship. SNAP Fitness Northtown Square, Spokane, Washington, 2012