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The Impact of Telephonic Health Coaching on Physical Activity, Healthy Eating, and Cholesterol Levels

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The Impact of Telephonic Health Coaching on Physical Activity, Healthy Eating, and

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Abstract

The purpose of this study was to understand the role of telephonic health coaching in reducing the risk behaviors of physical inactivity and imprudent dietary behaviors and improving cholesterol levels from Year 1 to Year 2. Data related to 45,410 employees was drawn from seven employer groups from January 1, 2009 to December 12, 2012. Descriptive statistics, independent sample t-tests, one sample t-tests, and Pearson's product-moment correlational analyses were used to describe the employees in data set and test the hypotheses of this study. Health coaching participants were significantly more likely to be females than males. Participants in health coaching had lower cholesterol levels and healthier dietary behaviors than nonparticipants in health coaching. Further research is needed to compare the impact of enrollment into health coaching versus engagement in other wellness initiatives for ongoing behavior change.

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Chapter One: Introduction

Public health professionals and employers are focused on strategies to address risk

behaviors associated with heart disease including lack of physical activity and poor nutritional

habits to reduce risk factors such as high cholesterol levels. Making the worksite healthier is

especially important to employers addressing risk behaviors, as a healthier worksite may lead to

higher productivity (Burton et al., 2005), decreased absenteeism and sick leave (Marzec et al.,

2011), and decreased medical costs (Healthcare Intelligence Network, 2007). Excess costs and

health risks including chronic disease were calculated to be 19.2% when there was no

engagement in a wellness program compared with 9.2% who engaged in wellness program

(Musich, McDonald, Hirschland, & Edington, 2002).

Wellness programs are continually evolving through enhancements, modifications, and

tailoring to meet the needs of the population and/or worksite group. Public health

professionals are focused on and challenged with working towards best practices for wellness

programs along with testing theories that may drive research (Glanz, Rimer, & Viswanath, 2008).

According to Glanz and associates (2008), there needs to be an exchange of theory, research,

and practice to produce effective health education. One type of wellness intervention that is

continually evolving and gaining attention is health coaching for employers, providers, and

payers (Huffman, 2010). Health coaching is one suggested intervention that uses theories such

as motivational interviewing to work with a person throughout their health journey (Olsen &

Nesbitt, 2010). The idea of health coaching is to motivate and empower people to make

changes when they are ready and to allow them to feel confident that they can move forward

with any plan of action (Huffman, 2010). Various modes of health coaching can be utilized, such

as face to face, over the phone, electronic mail (email), postal mail, or a combination of any

modes (Olsen & Nesbitt, 2010).

Justification of the Study

In 2010, chronic diseases accounted for 63% of deaths in the United States (Murphy, Xu,

& Kochanek, 2010). The number one health disparity according to Health People 2020 is heart

disease (United State Department of Health and Human Services [USDHHS], July 2012). Elevated

cholesterol levels can put a person at risk for heart disease (Centers for Disease Control and

Prevention [CDC], 2012). Schober, Carroll, Lacher, and Hirsch (2007) report that about one in

every six Americans has high cholesterol levels. In relation to this statistic, high cholesterol,

unfortunately, does not have any symptoms (CDC, July 2012). A person can continue to practice

unhealthy habits because they are unaware that they are even at risk for high cholesterol which

can lead to heart disease and stroke (CDC, July 2012). High cholesterol can be a direct result of

poor eating habits and lack of exercise, which can lead to obesity and chronic diseases.

However, only 32.5% of Americans consume two or more fruits per day and 26.3% consume

three or more vegetables a day (CDC, 2010). Furthermore, over 80% of Americans do not get

the recommended amount of physical activity per day as defined by *Healthy People 2020*

(USDHHS, 2008).

Health coaching is one approach to help people modify physical activity and healthy

behaviors to reduce health risks related to high cholesterol. According to the Healthcare

Intelligence Network (2007), health coaching improves health outcomes and reduces the need

for healthcare. Health coaching is usually implemented in worksites, communities, or

commercial settings (Butterworth, Linden, & McClay, 2007). Within health coaching,

motivational interviewing is one practice that is utilized to encourage motivation and healthy

behaviors (Miller & Rollnick, 2002). The health coaching agenda works around what is most

important to the person relative to their health while uncovering their beliefs and values (Huffman, 2010). This type of agenda builds trust and fosters a genuine relationship of interest to work with a health coach (Huffman, 2010).

Statement of the Problem

The purpose of this study was to understand the role of telephonic health coaching in reducing the risk behaviors of physical inactivity and imprudent dietary behaviors and improving cholesterol levels.

Hypotheses

The following set of null hypotheses were tested:

1. telephonic health coaching has no significant influence on cholesterol levels,

2. telephonic health coaching has no significant influence on physical activity and dietary behaviors,

3. there is no significant relationship between cholesterol levels and lack of physical activity and poor dietary habits, and

4. participation in health coaching was not influenced by gender.

Limitations

The following set of limitations apply to this study:

1. the quality of HRA responses was limited to those provided by the employees responding to their HRA,

2. the requirements related to professionally collected biometrics changed from Year 1 to Year 2,

3. the timeframes for pre-test and post-test between clients varied,

4. the mode of coaching interactions varied from phone and web-site to mail based interventions,

5. the fact that it was not possible to account for some or any employee engagement in any previous program or intervention prior to Year 1, and

6. that there was no one true population as they varied from universities, chemical companies and factory workers.

Delimitations

The following delimitations apply to this study:

1. the employees were delimited to locations throughout the United States, and

2. the data source was delimited to dates between January 1, 2009 and December 31, 2011.

Assumptions

The following assumptions apply to this study:

1. all employees who answered the health risk assessment understood the survey and responded honestly and accurately,

2. all employees who worked with a telephonic health coach honestly worked on their health goals,

3. there was validity of the professionally collected biometrics when applicable,

4. the sample was a reliable representation of the population,

5. it was assumed that employees took the health risk assessment in Year 1 and Year 2,

6. all health coaches used motivational interviewing techniques, and

7. all telephonic health coaches were trained in motivational interviewing techniques.

Definition of Terms

Three definitions were used in this study.

Health risk assessment. "HRAs are questionnaires completed by employees about their health practice, history, and status. The assessments are usually meant to provide general understanding of that individual's modifiable risk factors" (Rothstein & Harrell, 2009, p. 2).

Motivational interviewing. "A collaborative, person-centered form of guiding to elicit and strengthen motivation for change" (Miller & Rollnick, 2009, p. 137).

Telephonic health coaching. "The practice of health education and health promotion within a coaching context, to enhance the wellbeing of individuals and to facilitate the achievement of their health-related goals" (Palmer, Tibbs, & Whybrow, 2003, p. 92).

Summary

The goal of the study was to research the significance of health coaching in relation to improving healthy eating and physical activity behaviors in relation to cardiovascular disease stemming from poor cholesterol levels. Chapter Two will include a review of literature related to the study.

Chapter Two: Review of Literature

This literature review included research related to telephonic coaching and focused on healthy eating and physical activity as it relates to lowering cholesterol levels. Motivational interviewing was also reviewed and its relation to telephonic health coaching.

Telephonic Health Coaching

Positive behavior outcomes can lead to greater health benefits and potential lifelong changes. Health coaching originated in the 1980's from Miller and Rollnick's work where it was first referred to as motivational interviewing (Huffman, 2010). Health coaching is centered on behavioral health interventions that encourage motivation (Miller & Rollnick, 2002) rather than scare techniques (Rosenstock, Stretcher, & Becker, 1988). In a study of effective worksite telephone-based programs, Terry, Seaverson, Grossmeier, and Anderson (2011) found that employees engaged in a phone-based health coaching program experienced positive weight loss. Also, Terry and associates (2011) noted that people who completed a coaching program had a better health status than those who did not complete a program.

Mail Versus Telephonic Interventions

Health coaching can come in various modes including the internet, phone, and mail (Olsen & Nesbitt, 2010). Terry and colleagues (2011) compared telephone versus mail based health coaching interventions and found that the telephone approach was more effective than the mail based approach with employees. The researchers found that although employees in both modes were confident and ready to make a change, the telephone intervention was a more effective approach in weight management (Terry et al., 2011). Hughes and associates (2011) concluded that phone coaching employees had doubled their health outcomes when compared to web-based interventions. Additionally, Terry, Seaverson, Staufacker, and

Gingerich (2010) found both approaches to be effective in health risk reduction; however, telephone coaching was noted to be slightly more effective. However, Richardson (2010) concluded that automated coaching can help employees improve physical activity habits if the program was easy to use and monitored correctly. Each study varied in frequency and duration. According to Olsen and Nesbitt's findings (2010), health coaching interventions should range from six to 12 months in duration for optimal behavior outcomes.

Motivational Interviewing Theory

One theory that researchers found as a core basis for telephone coaching training and effectiveness was motivational interviewing. Motivational interviewing is client-centered to elicit behavior change by exploring and resolving ambivalence (Rollnick & Miller, 1995). Motivational interviewing is a technique that fundamentally is humanistic instead of behaviorist which works with knowledge and strengths one already possesses rather than installing any new education or expertise (Miller & Rollnick, 2009). The communication style that helps someone solve a problem in motivational interviewing is called "guiding," which involves listening, reflective listening, asking, and informing (Miller & Rollnick, 2009). Guiding helps people through a discovery process regarding their ambivalence about health behavior change (Huffman, Bello, & Bissontz, 2008).

Application of motivational interviewing has shown, according to Huffman (2010), that coaching is about discovery, and having consistent concepts can lead to improved outcomes and reduced medical costs. Butterworth and associates (2007) reported that motivational interviewing in health coaching is a technique consistently demonstrated in association with positive behavioral outcomes. Researchers who have applied motivational interviewing to health promotion intervention reported positive behavior change (Butterworth, Linden, McClay, & Leo, 2006). Olsen and Nesbitt (2010) reported that "key factors in effective health coaching

programs include the use of goal setting, MI, collaboration with primary health care providers, and program duration of 6 to 12 months" (p. e11). Further exploration is needed on the number of hours that would be considered effective training for motivational interviewing for health coaches. Exploration is also needed on what is sufficient for ongoing education and training for health coaches.

Healthy Behaviors and Physical Activity

Researchers found that telephone coaching can increase physical activity and healthy eating behaviors which, in turn, can lead to lower cholesterol levels (Huffman, 2010; Hughes et al., 2011; Schuessler, Beyer, & Mischler, 2007). Researchers at the Center for Research on Health and Aging used data from three randomized control groups: coaching with HRA, HRA with behavior modules, and printed health promotion materials at two worksites (Hughes et al., 2011). They found that at six to 12 months people who were coached increased vegetable and fruit intake and improved physical activity. Rollnick, Miller, and Butler (2008) found that people are more likely to increase physical activity and reduce sodium intake if they engaged in health coaching. Schuessler and associates (2007) tested the hypothesis that fitness challenges and health coaching can have an impact in the corporate setting. Nearly half of the employees increased fiber intake in their study and increased physical activity, and lowered their fat consumption. Finally, the research of Vale, Jelinek, and Best (2005) resulted in substantial improvements in healthy eating and exercise when taking advice from a coach.

Telephonic Health Coaching and Cholesterol Levels

Not only can telephonic coaching impact healthy behavior and physical activity interventions but it can also influence cholesterol levels. Vale and colleagues (Vale, Jelinek, Best, & Santamaria, 2002; Vale, Jelinek, Grigg, & Newman, 2003) found that cholesterol levels can be impacted by telephone coaching. Vale and associates (2002) used data from a

randomized control group. Out of a total of 245 employees, 121 utilized the coaching group

which occurred every six weeks over the phone using beliefs, education and setting goals. Vale,

and others (2002) found that the coaching group's total cholesterol levels were significantly

lower than the non-coaching group. In another study by Vale and colleagues (2003) data was

used from a multicenter randomized controlled trial from six university teaching hospitals. Vale

and associates (2003, 2005) found that coaching programs achieved significantly greater

outcomes than the usual care and that health coaching is a highly effective strategy to reduce

total cholesterol and other risk factors. Similarly, Vale and associates (2002) attributed low

density lipoprotein cholesterol levels in health coaching employees than individuals not

receiving health coaching.

Summary

A review of the literature related to health coaching, healthy eating and physical

activity, cholesterol, and motivational interviewing revealed that healthier outcomes were

shown when there was some form of health coaching intervention in reducing cholesterol. The

studies outlined the scientific impact on cholesterol levels and healthy eating habits and

increased physical activity in relation to providing health coaching. Motivational interviewing

was explored and noted that theory based models are needed as a framework towards how to

coach effectively and gain results. Throughout this review, an overarching theme of support,

self-awareness, progression and continued research in telephonic coaching is present. The

research methods that were used to conduct the study are provided in Chapter Three.

Chapter Three: Research Method

Introduction

This chapter details the study methods used to test the hypotheses introduced in Chapter One. This chapter details the research design, data source, institutional review for the protection of human research employees, and data processing and analysis.

Research Design

A one-year longitudinal study design was used to determine the association between cholesterol level variables and enrollment in health coaching programs between Year 1 and Year 2 (pre-test and post-test) using the individual employees as the control group. The study relied on a secondary data sources gathered from a single provider of National Committee for Quality Assurance (NCQA, 2012) programs from Year 1 to Year 2 health risk assessments (HRA). The design compared the effectiveness of those employees who (a) took the HRA from Year 1 to Year 2 (pre-test and post-test) and (b) those who enrolled in a health coaching program compared to those who did not enroll.

Data Source

The data source included information related to employee's responses to an HRA and participation in health coaching.

Data selection. The study employed data from employees serviced by a corporate health and wellness provider in the Mid-western region of the United States. The health and wellness corporation served organizations of blue and white collar workers. These organizations were of various size and type, and can be characterized as self-insured employers with

populations of 2,000 or more domestic employees/spouses distributed across multiple locations

in the United States. The employees worked in a variety of industries, primarily public and

private-sector companies that were clients of the health and wellness company. Health plans,

pilots groups, and employers with <4,000 employees were excluded from the study population.

The data source included data from persons 18 years of age to 65 who met inclusion criteria to

take a HRA and enroll into a health coaching program. Employee-level and worksite-level

variables included program enrollment in one of the following coaching program modes:

telephone/web, telephone/print (mail-based resources). The data was from

employees/spouses eligible to take the HRA and eligible to enroll in a health coaching program.

The date ranged from 1/1/2009 – 12/31/2012. Based on the inclusion criteria, 45,410

individuals from seven companies were eligible for the study and 17,212 individuals enrolled

into the health coaching program.

   HRA and coaching data. The HRA was available to all employees based on the

timeframe provided by the employer. The database assigned a random unique identifier to all

individuals eligible to participate in programs. Marketing was typically sent out to employees to

remind them to take the HRA in various forms (email, mail, at worksite). Employees completed

the HRA either online or through paper (if applicable through their employer). The HRA

included questions related to biometrics, health status, lifestyle habits, readiness to change, and

chronic conditions. The HRA used a combination of required fields, interval scales, and

numerical items to categorize the data. For biometric values, the employees attended a

worksite biometric screening, self-reported their biometric levels, or reported their results from

their physician and/or medical lab. All other HRA questions (health status, lifestyle habits,

readiness to change, and chronic conditions) were self-reported. Results were given to

employees immediately upon completion of the HRA online. HRA results through paper format

took up to 15 business days typically.

Upon completion of the HRA, employees were invited to enroll in a health coaching

program (enrollment criteria varied from employer to employer). Everyone, regardless of risk

factor, was eligible to enroll in the health coaching program (unless employer stratified risk).

Enrollment into a health coaching program was completed either online or over the phone by

speaking to a health educator. Enrollment online was based in tailored feedback from the HRA.

Feedback was received regarding their health status and risks, readiness to change, and other

pertinent information. Outreach over the phone was conducted by a health educator

encouraging employees to enroll in the health coaching program. The health educator phone

conversation reviewed the employee's feedback and tailored the conversation around the

employee's personal health and well-being, stage of change, risk factors, and program referral

information. The conversation wove the HRA information with personal motivation, assets, and

obstacles. A total of five attempts were made (two emails and three phone calls). Upon

enrollment, employees worked with a qualified health coach over the phone and online or

through the mail (face-to-face health coaching is also an alternative if the employer purchased

that service but that is not a part of this study). Heath coach qualifications included a bachelor's

degree or higher in a health related field, three years' experience in a professional health field,

and ideally, coaching experience, and/or licensure or certifications in health education, dietetics,

exercise physiology, mental health and chiropractics, or ACE, ACSM and CHES.

The health coach completed a comprehensive four week training was evidence-based.

Elements of training included customer service; risk factors and health behaviors; coaching skills

for telephonic and web-based portal delivery; data collection and documentation; privacy and

confidentiality; and external referrals to appropriate employer or community health resources.

Coaching theories trained on included, but were not limited to, Prochaska and DiClemente's

(1984) Transtheoretical model, Miller and Rollnick's (1990) Motivational Interviewing,

Seligman's (2002) Positive Psychology, Bandura's (2001) Social Cognitive Theory, and Skinner's

(1966) Behavioral Analysis.

The phone coaching sessions were outbound calls by a health coach to the employee.

Each session worked towards a vision statement, goal setting (SMART - specific, measureable,

achievable, rewarding, and trackable (Locke, 1968), social support, health information, and

referrals which encompassed behavior change, positive psychology, and motivational

interviewing. Within each session the health coach worked with the employee's strengths and

ambivalence towards change around behavior-based goals. Follow-up sessions and timing were

individualized depending on each employee's unique needs (through the phone and/or online).

Health information online or through the mail included educational and behavior change

information related to behavior-based goals that the health coach and employee are working on

together. The average length of engagement (phone and online) with a health coach was five

months. For employees in this study enrolled in health coaching, the mean number of days

engaged in the health coaching program was 177.60 (5.71 months).

Demographic characteristics. The data source contained demographic information

including the employees' age (18-65) and gender (male or female).

Eligibility for health coaching. A participant was determined to be eligible to take the

HRA and enroll into health coaching based off of the employer's criteria. Typically, all benefit

eligible employees and sometimes spouses were eligible. Occasionally dependents over 18 and

retirees were eligible.

Eating and physical activity behaviors. The data source included behaviors related to

the employees eating and physical activity habits. Eating habits were assessed in terms of

number of the following each day: fruits, vegetables, high fatty foods, healthy fats, whole grains, salt, sugary drinks, dairy, and protein. Physical activity habits were assessed in terms of days of the week and minutes for moderate and heavy activity, days of strength training, and days of stretching.

Cholesterol levels. The study pulled total cholesterol, high density lipoproteins, and low density lipoproteins, levels (mg/dl). The study also pulled Body Mass Index (BMI) - height and weight.

Health Coaching intervention. The study pulled pre-test and post-test HRA results related to the employees' for eating and physical activity habits, and cardiovascular risk factors (total cholesterol, high density lipoproteins, and low density lipoproteins).

HRA instrument. The data used for this study was generated by a proprietary HRA created by the health and wellness corporation.

Data validity. Biometric screening events were administered by the health and wellness company and all blood was analyzed using a cholestech machine for accuracy and validity. The Cholestech LDX device measured total cholesterol, HDL cholesterol, TC/HDL ratio, LDL cholesterol, triglycerides and glucose. The Cholestech LDX device meets all relevant National Cholesterol Education Program (NCEP) guidelines (Alere Cholestech LDX System, 2003) and is certified by CDC's (2012) Cholesterol Reference Method Laboratory Network (CRMLN) for total and HDL cholesterol. Self-reported biometric data administered the HRA nationwide when a worksite biometric screening event was not possible. However, if biometric data was self-reported, the accuracy of the biometric data was unknown.

The HRA was a proprietary survey instrument created over 18 years ago and has been modified two times and currently is in the process of a third revision. The predictive validity of the HRA has been established (validity references cannot be shared based on the discretion of

the health and wellness company). The second set of data collected was the proprietary health

coaching data. The health coaching database was used to collect information on employees

who enrolled into the health coaching program and completed the HRA in Year 1 and Year 2.

Procedures. The health and wellness corporation's client data was evaluated for

completeness and data availability. The HRA was taken either online or in a paper format. If a

participant had a question on how to fill out the survey, a customer service number was

provided. Employees had a certain timeframe in which to complete the HRA outlined by their

company. A typical timeframe could range from 30 to 60 days. If a paper HRA was completed,

the results were sent to customer service to input the data into the database and results were

sent directly to the participant and uploaded to the employee's online profile.

Protection of human research participants. Approval was obtained from the

Minnesota State University, Mankato Institutional Review Board before data were exported for

data analysis to ensure that the employees' rights were protected (Minnesota State University,

Mankato IRB approval number: 437300-1). As part of the IRB application process, written

consent was obtained from the Human Resources health and wellness company. HIPAA

certification was also verified to protect the population analyzed.

Data Processing and Analysis

Analysis was performed on the health management company's computer to protect the

data within the company's firewall. Cholesterol levels, dietary behaviors, and physical activity

were compared between Year 1 and Year 2 HRA and the relation between coaching engagement

versus non-coaching engagement. Cholesterol levels were assessed in the relationship between

healthy eating habits and physical activity.

Demographic characteristics. Demographics were recoded as females = 1 and males =

2. Only employees and spouses ages 18-65 were included in the analysis.

Data processing. For data analysis the following variables were accounted for: age,
gender, cholesterol levels, BMI, HRA pre-test (Year 1) and post-test (Year 2),eating habits (fruits,
vegetables, high fatty foods, healthy fats, whole grains, salt, sugary drinks, dairy, and protein),
physical activity habits (aerobic, strength, flexibility), and health coaching program enrollment
(opt in and opt out date).

Program enrollment. An employee was determined to be enrolled in a health coaching
program when they accepted an invitation online (upon completion of the HRA) or by speaking
to a health educator. Registration was indicated based on a program enrollment date. All
individuals were assigned a program enrollment date upon acceptance of the invitation and a
personal health coach.

Program participation. Once enrolled in a program, the data management system
tracked the number of health coaching active days in the program. This number represented
true interventions in the health coaching program.

Program completion. Program completion was defined as one of the following:
participant was active in the health coaching program for more than four months, or a
participant opened at least one goal and had a least six coaching interactions over an eight-week
period. However, a participant may still continue on with the coaching relationship as long as
they are still eligible to participate. The average length of engagement is five months. The type
and frequency of interactions is determined by the employee and health coach based on the
level of support the participant needs to achieve change (telephone/online). Engagement could
range from web and telephone-based interactions and/or a combination of both. Calls were
scheduled approximately monthly.

Recoded and computed variables for data analysis. The following variables were recorded and or computed for hypothesis testing: cholesterol levels, healthy eating, and physical activity.

Healthy eating. Healthy eating variables from Year 1 and Year 2 were computed in the following manor - recoded (see recoding below), and added up to equal Healthyeating1 and Healthyeating2. The variables used were fruits, vegetables, high fatty foods, healthy fats, whole grains, salt, sugary drinks, dairy, and protein. The dietary guidelines used to recode the healthy eating variables were taken from *Build a Healthy Base* (USDHHS, n.d). The higher the recoded score the healthier the outcome. The following healthy eating variables were reverse coded, high fatty foods, healthy fats, salt, and sugary drinks. The recoded process was as follows:

Fruit1 and fruit2: 0, 1, 2, 3, 4, 5-9 (5), and 10+ (missing),

Vegetable1 and vegetable2: 0, 1, 2, 3, 4, 5-11 (5), 12+ (missing),

Highfattyfoods1 and highfattyfoods2: 5-6 (0), 4(1), 3(2), 2(3), 1(4), 0(5) (reverse coded),

Healthyfats1 and healthyfats2: 5-6 (0), 4(1), 3(2), 2(3), 1(4), 0(5) (reverse coded),

Wholegrains1 and wholegrains2: 0, 1, 2, 3, 4, 5-7 (5),

Salt1 and salt2: 5, 4, 3, 2, 1, 0 (reverse coded),

Sugarydrinks1 and sugarydrinks2: 5-6, 4, 3, 2, 1, 0 (reverse coded),

Dairy1 and dairy2: 0 (0), 1(4), 2-3(5), 4(4), 5(3), 6(2), 7(1), 8-9(0), 10+ (missing), and

Protein1 and protein2: 0 (0), 1(4), 2-3(5), 4(4), 5(3), 6(2), 7(1), 8-11(0), 12+ (missing).

Physical activity. Physical activity variables from Year 1 and year 2 were computed together (physical activity, flexibility, and strength) to equal Physicalactivity1 and Physicalactivity2.

Change scores for cholesterol, healthy eating, and physical activity. The following change scores were calculated for hypothesis testing:

TotalCholChange = TC2 - TC1,

LDLChange = LDL2 - LDL1,

HDLChange = HDL2 - HDL1,

MinutesChange = ModMinDay2 - ModMinDay1,

PhysicalActivityChange = PhyscialActivity2 - Physicalactivity1, and

EatingChange = HealthyEating2 - HealthyEating1.

Data analysis for hypothesis testing. The statically analysis for hypothesis testing are listed as follows. All statistical tests were performed using SPSS, version 21.0 (International Business Machines Corp., 2012).

Hypothesis 1. An independent sample t-test were used to test between change scores for pre-test and post-test cholesterol levels (dependent), and the participation in health coaching (independent).

Hypothesis 2. An independent sample t-test were used to test between change scores for pre-test and post-test for healthy eating and physical activity behaviors (dependent), and the participation in health coaching (independent).

Hypothesis 3. A bivariate correlation analyses were used to analyze the relationship between change scores in cholesterol levels and physical activity and healthy eating behaviors.

Hypothesis 4. Chi square analysis was used to compare men's and women participation in health coaching.

Summary

The research methods that were used to conduct this study were described in this Chapter Three. The results of the study will be reported in Chapter Four.

Chapter Four: Results and Discussion

In this chapter the results of the discussion will be presented. These results are based on an original eligible population of 45,410. The chapter will start with results related to the employees' characteristics. The next section will include the results related to the four hypotheses.

Sample Size and Characteristics of the Employees in the Dataset

The sample size, age, gender, and enrollment into health coaching characteristics of the employees in the dataset are described below.

Sample size. About one third, 17,212 (37.9%) of the original 45,410 eligible population of employees completed an HRA and enrolled in a health coaching program. The data for 510 employees was excluded from analysis due to invalid data for cholesterol levels, height, or weight.

Age. Age was assessed on the health and wellness company's HRA by using the individual's date of birth as provided by the employer demographic files, and subtracting it from the date that the HRA survey was taken. Age demographic comparisons are presented in Table 1. The age range for the study was from 19.30-65.00, therefore the mean age was 46.21 and the standard deviation was 10.65.

Gender. Of the 45,410 eligible population, 49.7% of females were accounted for in the eligible population (22,548) and 50.3% of the eligible population were males (22,862) (see Table 1).

Enrollment into health coaching. Of the 17,212 enrollees, 7619 (16.8%) were males and 9593 (21.1%) were females (see Table 2). The mean number of active days in health coaching was 177.60 days (5.9 months) and the standard deviation was 79.12.

Table 1

Demographic Characteristics of the Population

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Characteristic	n	%	M (SD)
Gender	45,410		
Male	22,862	50.3	
Female	22,548	49.7	
Age	45,410		46.21 (10.65)

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Table 2

Frequency Count Analyzing the Means and Standard Deviations (SD) for Total Cholesterol (Total), Low Density Lipoproteins (LDL), High Density Lipoproteins (HDL), Physical Activity, and Healthy Eating

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	Variable				
Year	Total	LDL	HDL	Physical Activity	Healthy Eating
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Year1	189.12 (36.35)	111.36 (51.54)	8.08 (3.60)	25.32 (3.78)	25.32 (3.78)
Year 2	187.18 (35.72)	108.84 (31.47)	50.91 (17.46)	8.76 (3.60)	25.84 (3.73)

Results and Discussion

The results and discussion related to each of the hypotheses is presented in the following paragraphs.

Hypothesis 1: Telephonic health coaching has no significant influence on cholesterol levels. The results of the independent sample t-tests comparing the cholesterol change scores from Time 1 to Time 2 between employees who participated in health coaching and those did not participate in health coaching are provided in Table 3. The change scores for total cholesterol (t = -2.93, p < .01), HDL (t = -6.73, p < .01), and LDL (t = 2.10, p < .5) for participants in health coaching were significantly greater than those for nonparticipants in health coaching. This reveals that engagement in health coaching positively affects cholesterol levels. These results are consistent with findings by Vale and others (2002, 2003, 2005) that health coaching has significant impact on the cholesterol levels of participants in health coaching.

Table 3

Independent Sample T-Test Comparing Mean, Differences between Pre-test and Post-test Cholesterol, Healthy Eating, and Physical Activity Scores by Participation in Health Coaching

Change score	Coaching M (SD)	No coaching M (SD)	*t*-value
Total Cholesterol	-2.63 (28.90)	-1.66 (27.30)	-2.93**
LDL	-2.30 (25.50)	-3.32 (24.41)	2.10*
HDL	-1.21 (13.60)	-0.14 (12.64)	-6.73**
Eating Behaviors	0.70 (3.67)	0.40 (3.61)	8.70**
Physical Activity	0.63 (3.20)	0.74 (3.40)	-1.10
Minutes	15.56 (260.93)	15.16 (271.01)	0.15

*p < .05. ** p < .01.

Hypothesis 2: Telephonic health coaching has no significant influence on physical activity and dietary behaviors. The results of the independent sample t-tests comparing the physical activity scores and minute scores from Time 1 to Time 2 between employees who

participated in health coaching and those did not participate in health coaching are also

provided in Table 3. The change scores were not significantly different between the participants

and nonparticipants in health coaching. These findings were inconsistent with those of previous

researchers (Huffman, 2010; Hughes, et al., 2011; Rollnick, et al., 2008; Schuessler, et al., 2007;

Terry et al., 2011; Vale et al., 2002; Vale et al., 2003; and Vale et al., 2005) who found that

health coaching does impact physical activity.

The results of the independent sample t-tests comparing the healthy eating scores from

Time 1 to Time 2 between employees who participated in health coaching and those did not

participate in health coaching are provided in Table 3. The change score for healthy eating for

participants in health coaching were significantly greater (t = 8.70, p < .01) than that for

nonparticipants in health coaching. This means that engagement in health coaching positively

affects eating behaviors. These results are consistent with findings others (Huffman, 2010;

Hughes, et al., 2011; Rollnick, et al., 2008; Schuessler, et al., 2007; Terry et al., 2011) that health

coaching has significant, positive impact on the eating behaviors of participants in health

coaching.

Hypothesis 3: There is no significant relationship between cholesterol levels and lack

of physical activity and poor dietary habits. Pearson's bivariate correlation analyses revealed

significant associations between Year 1 physical activity and total cholesterol, and HDL as well as

significant associations between Year 2 physical activity and total cholesterol, LDL, HDL (see

Table 4). Significant positive correlations were found between HDL and both Year 1 (r = .12) and

Year 2 (r = .11) physical activity whereas significant negative correlations were found between

total cholesterol and both Year 1 (-.07) and Year 2 (-.07) physical activity as well as LDL

cholesterol and Year 2 (-.04) physical activity. Additionally, significantly positive correlations

were found between HDL and both Year 1 (r = .11) and Year 2 (r = .12) dietary behaviors

whereas significant negative correlations were found between total cholesterol and both Year 1

(-.03) and Year 2 (-.03) dietary behaviors as well as LDL and both Year 1 (r = -.05) and Year 2 (r = -

.06) dietary behaviors. Therefore, healthy physical activity and eating behaviors were

significantly correlated in the desired direction (positively associated with HDL and negatively

associated with total cholesterol and LDL) for most of the cholesterol levels in Year 1 and all of

the cholesterol levels in Year 2. Therefore, healthy dietary behaviors and physical activity habits

are significantly associated with healthy cholesterol levels.

Table 4

Pearson's Correlation Coefficient r Comparing Cholesterol Levels between Physical Activity and Healthy Eating Behaviors

_____

Behaviors	Total TC r	LDL r	HDL r
Activity 1	-0.07*	-0.05	0.12**
Dietary Behaviors1	-0.03*	-0.05**	0.11**
Activity 2	-0.07**	-0.05**	0.11**
Dietary Behaviors2	-0.03**	-0.06**	0.12**

*p < .05. ** p < .01.

Hypothesis 4: Participation in health coaching was not influenced by gender. Chi-

square analysis was used to determine whether participation in health coaching was related to

gender (see Table 5). Being female was significantly associated with enrollment in health

coaching (x^2 = 409.89). This data is consistent with Terry, Seaverson, Staufacker, and Gingerich's

(2010) study that telephonic health coaching population was more likely to be female.

Table 5

Frequency Distributions (n), Percentages (%), and Chi-Square Value for Participation in Health Coaching by Gender

_____

	Gender				
	Female			Male	
Variable	*n*	*%*		*n*	*%*

_____

Coaching	9,593	21.10		7,619	16.80
No Coaching	12,955	28.50		15,243	33.60
Total	22,548	49.65		28,198	62.10

χ^2 = 409.89*

_____

* *p* < .01.

Summary

The summary, recommendations, and conclusions of the study will be discussed in Chapter Five.

Chapter Five: Summary, Conclusions, and Recommendations

In this chapter the summary, conclusions, and recommendations for research and practice are presented.

Summary

The results from this study revealed that health coaching is associated with positive changes in cholesterol levels and dietary behaviors. Engagement in a health coaching program allowed for positive changes in cholesterol levels from Year 1 to Year 2 (i.e., decreased total cholesterol and LDL cholesterol levels and increased HDL cholesterol). The results also revealed that health coaching positively changed dietary habits from Year 1 to Year 2.

A negative correlation was shown between physical activity and healthy eating habits in relation to cholesterol levels. In Year 1, physical activity between HDL and dietary habits between LDL and HDL were positively affected. Additionally, in Year 2, physical activity and dietary habits all positively affected total cholesterol, LDL, and HDL (i.e., decreased total cholesterol and LDL cholesterol levels and increased HDL cholesterol). Finally, it was noted that participation in health coaching was associated with gender as more females (21.1%) engaged in health coaching than males (16.8%). This was noted especially since there were more males accounted for the eligible population than females.

Conclusions

The findings of this study were consistent with the work of Vale and others (2002; 2003; 2005) that participants in health coaching interventions experienced positively changes in cholesterol levels. Additionally, improvements in healthy eating habits were also found among participants in health coaching whereas improvements in physical activity were not found

among participants in health coaching. Healthy eating habits and increased physical activity are related to positive cholesterol level change. With behavior change in dietary habits and physical activity, it was revealed that change can occur to directly influence cholesterol levels. Additionally, health coaching was influenced by gender. More females enrolled in a health coaching program compared to males.

In conclusion, this study further demonstrates that health coaching programs do influence effective positive outcomes in cholesterol levels and dietary behaviors. As public health professionals focus on strategies to address risk behaviors associated with heart disease including lack of physical activity and poor nutritional habits, health coaching should be one of the strategies that are considered in yearly planning.

Recommendations

This study encompassed a one-year longitudinal study design with variables for cholesterol, dietary behaviors, and physical activity as it related to health coaching engagement. Due to this study design, many other variables could not be accounted for that may have influenced engagement, enrollment, or the success of the program. The following information outlines recommendations for research and practice.

Recommendations for research. The recommendations for research are described below regarding engagement, data, and coaching.

Engagement. It was undetermined if any previous wellness program took place to influence enrollment into the health coaching program or HRA Year 2 risk factors. Previous engagement could have shown stage of change and/or previous knowledge that would have attributed to enrollment or engagement. Additional outliers that could have affected change in this study included enrollment into another wellness program, tailored feedback from HRA

completion, or heightened awareness of one's health risks that facilitated positive health actions.

Engagement could have also been influenced by marketing and communications. It was undetermined what types of marketing and communications were sent out to employees and their spouses to engage – each marketing campaign may have varied. Incentives may have also played a part in involvement with completing an HRA, attending a biometric screening event, and/or enrolling and engaging in a health coaching program. It was unknown what types of incentives each employer used, if any, as one strategy for engagement. It is also important to note that a different incentive strategy could have been applied from Year 1 to Year 2 affecting enrollment and behavior change. Knowing the frequency, type, and incentive may have shown varying influences on coaching engagement and behavior change which in turn could be used for future coaching programs.

Data. The data analyzed did not take into account health status or chronic conditions. Chronic conditions could have influenced the study in relation to cholesterol levels. Since health status, chronic conditions, eating behaviors, and physical activity were self-reported; this may have introduced biased responses leading to reliability of the data. Additionally, HRA time frames played a factor that was not taken into account. The date range spanned from 2009 – 2012 which introduced two different versions of the HRA. The earlier version of the HRA did not include physical activity days, sugary drinks, healthy fats, sodium, or whole grains. Secondly, it was unknown what industries and populations across the United States achieved greater positive outcome from health coaching as ethnicity, education level, and hourly/salaried were not taken into account. Finally, Year 1 to Year 2 was not gauged for in terms of length. Although the typical time span in-between the HRA is one year, this factor was not measured which in turn could have impacted the health coaching participation time period. Each of these

data points could have enhanced the findings in this study if analyzed for a more robust outlook of contributing factors in behavior change.

Coaching. Analysis was performed for the active number of minutes in the health coaching program. It might have been useful to compare the number of minutes in relation to cholesterol levels, dietary behaviors, and physical activity. Also, a comparison could have been analyzed whether online and phone versus mail-based and phone contact methods were more effective. Since this study only compared Year 1 to Year 2 HRA results in relation to health coaching, long-term behavior change was not accessed. This too could have been a contributing factor in lasting behavior change.

Finally, upon further study, it is recommended to compare coaching data to the length of coach training, use of coaching theories, and the cost effectiveness of health coaching for employers as the lack of research in these areas.

Recommendations for practice. The recommendations for practice are described below .

This study for public health professionals provides telling evidence in the effectiveness of health coaching programs. Although this study used a worksite setting, the research was diverse within populations across the United States. And, although this study's population came from a variety of industries, it was unknown which sections of the United States or demographics responded in favor of health coaching. This may suggest that before looking at starting a health coaching program to reference one's population and create a survey or pilot study to figure out if this type of wellness program would be effective. A health coaching program can provide a meaningful intervention that is tailored to a person's needs, desires, and health risks. Health professionals should note that those who took advantage of the health coaching program were more likely to be female. The study population also noted that the

mean age was in the mid-forties. This may suggest that a variety of mode intervention needs to

be offered to meet the needs of the male population as well as younger or older demographics.

This study also outlined the significance of motivational interviewing skills to help drive

behavior change and positive outcomes. Health professionals should note that building a health

coaching program can take time. It is not just about the educational resources, but about the

tools and skills learned by a health coach to make the program effective. Research still needs to

be done regarding necessary length of training of a health coach for safety, accuracy, and

effectiveness. Additionally, a study recommendation is to look at how cost-effective a health

coaching program may be. Depending on the scope and modality of the program such as face to

face, over the phone, electronic mail (email), or postal mail, various resources and associated

costs will be needed. In conjunction with modes of the program, engagement should be

assessed as to what results the program is looking for and would incentives play a part. As

another study limitation, cost effectiveness was not compared for health coaching programs for

each client.

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