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Participation in Worksite Health Screening Activities, Health Behaviors and Readiness to Change

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PARTICIPATION IN WORKSITE HEALTH SCREENING ACTIVITIES, HEALTH BEHAVIORS AND READINESS TO CHANGE

by

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An abstract of

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Research is only just emerging on whether workplace wellness activities result in healthier employees, and what defines a successful workplace wellness program can vary. Little research has analyzed worksite wellness programs that utilize health risk screening activities and their relationship with employee health behaviors. Without understanding how health risk screening activities are related to health behaviors, companies could continue to invest in expensive screening activities without positive health outcomes. This study analyzed archival health risk assessment data from a municipal government worksite to test for a relationship between participation in worksite health risk screening activities, health behaviors and readiness to change health behaviors. A relationship was found between health risk screening activity participation and the employee health behaviors of vegetable consumption, fruit consumption, water consumption and exercise days. This is a starting point for research on health risk screening activities and their relationship with employee health behaviors and further research is recommended to understand the health risk screenings ability to influence health behaviors.

Chapter I: Statement of the problem

Introduction

Healthcare spending growth has been increasing faster than economic growth in the United States for the last 50 years (Herrera, Gaynor, Newman, Town, & Parente, 2013). With more than half of Americans enrolled in private employers' sponsored health insurance plans, employers are experiencing increased costs of health insurance (Herrera et al., 2013). To combat rising healthcare costs, employers across the country, in public, private and non-profit organizations are turning to workplace wellness programs in attempts to improve the health of their employees and reduce medical spending long term.

Workplace wellness programs are growing in the United States, with half of employers providing programs to their employees (Mattke, Schnyer, & Busum, 2012). The main reasons employers choose to offer employee wellness programs include reducing healthcare spending, increasing productivity, and increasing employee satisfaction and retention (Fronstin & Roebuck, 2015). Workplace wellness programs can vary in offerings, and can include physical activity competitions, nutrition, smoking cessation and classes, gym membership discounts, environmental change including healthy food options, onsite clinics, and smoke free policies. A more recent trend in workplace wellness is health risk screening activities, which allows participants to identify risks for certain health problems, and seek the appropriate steps to address their risks.

A recent study found that eighty percent of employers who implement a

workplace wellness program utilize a health risk screening activity, such as a biometric screening, Health Risk Assessment (HRA) or both (Mattke et al., 2012). Biometric screenings measure an individual's blood pressure, weight, height, body mass index, cholesterol, glucose levels, triglycerides and blood pressure and are typically performed by third party organizations who specialize in workplace wellness biometric screens. HRAs provide an overview of an individual's risk for certain health problems such as heart disease, diabetes or obesity. Data from biometric screenings and HRAs are compared to nationally recognized health standards and outcomes and health risks are reported back to the individual. Aggregate data are then provided to employers so employers who administer this program can understand where opportunities for interventions lie, and plan wellness program offerings around these opportunities.

Statement of the Problem

Research is only just emerging on whether workplace wellness activities result in healthier employees, and what defines a successful workplace wellness program can vary. Because many workplace wellness activities are often implemented at once, including both health risk screening activities and intervention programs such as gym memberships, walking challenges, nutrition education and onsite fitness classes, it is challenging to understand the effectiveness of each component of the program. In addition, because each employee base is unique, the transferability of each program's results is a challenge (Beck, Hirth, Jenkins, Sleeman, & Zhang, 2016; Hall, Bergman, & Nivens, 2014; Jørgensen, Villadsen, Burr, Punnett, & Holtermann, 2016). The inability to find consistency in workplace wellness program structure, population, and research

results generates a lack of understanding about the effectiveness of worksite wellness programs.

Need for the Study

Worksite wellness program prevalence is increasing, with more than half of employers investing in workplace wellness programs (Mattke et al., 2012). There has been some debate on the effectiveness of programs at reducing costs, with some reports stating there is little evidence on programs effectiveness at reducing short-term or medium term costs (Horwitz, Kelly, & DiNardo, 2013), and have reported insignificant impacts at lowering healthcare costs (Mattke et al., 2012). Contradicting these reports is a study by Dement, Epling, Joyner, and Cavanaugh, (2015) which showed worksite health promotions reduced health care utilization and costs.

Little research has analyzed worksite wellness programs that utilize health risk screening activities and their relationship with employee health behaviors. Without understanding how health risk screening activities are related to health behaviors, companies could continue to invest in expensive screening activities without positive health outcomes. Biometric screening activities are expensive to implement, costing companies between $65- 285 per employee each year, depending on the level of service received (Soler et al., 2010). Furthermore, each health screening activity requires employees to take time out of their day, which adds to the total cost of the program. Lastly, health risk screening activities are one time investments each year, with little follow up after the screenings are completed, so employers do not know how the individuals' known risk impacts their decisions or desires to adopt healthy behaviors.

This study will focus on the health behaviors and readiness to change reported by individuals who participated in worksite health risk screenings. It will examine whether health risk screening activities are related to a change in health behaviors or readiness to change, as reported in Health Risk Assessments.

Interventions and programs are implemented in workplaces which are convenient environments for large groups of people. If these programs are associated with employee health behavior change or readiness to change, additional resources and interventions could be implemented in this setting to further increase positive health outcomes. In addition, understanding whether health risk screening activities are related to participation in preventative health behaviors could encourage health risk screening activities in other populations beyond the worksite such as schools, religious organizations or non-profit service agencies.

Since worksite wellness is a new concept, introduced in the early 1990s, worksites have been implementing programs with little evidence of their effectiveness. In fact, many early adopters have been the organizations studied in recent research, such as the review of PepsiCo's self-insured plan and worksite wellness program (Liu et al., 2013). With 75% of companies implementing a biometric screening, HRA or both (Loppke, 2013), studying the relationship between worksite health risk screening activities and health behaviors of employees will help guide future wellness programs, health interventions and promotion at worksites.

As worksite wellness popularity grows, it is likely that many organizations are deciding to reallocate resources to support these programs, budgets are being prioritized

and staff are being hired to support these efforts. This research will benefit the human resources field and the business finance field, especially given that many human resources departments are often responsible for the implementation of such programs. Finance departments often manage the costs of these programs as well as the costs of health insurance packages and employee claims, so they could be interested in the influence these expensive activities have on their employees.

The study will help to better understand the influence worksite health risk screening activities could have on health behaviors and readiness to change, demonstrated in self-reports on Health Risk Assessments.

Research Questions

1. What are the health behaviors reported among a sample of employees who participate in a worksite wellness health risk screening program?
2. Is participation in worksite health risk screening activities associated with healthy behaviors as reported in a health risk assessment?
3. Is participation in health risk screening activities associated with readiness to change nutrition and physical activity habits among a sample of employees?

Limitations

The following limitations should be considered for this study.

1. Participation in a Health Risk Assessment is voluntary.
2. Health Risk Assessments are available only to benefit-earning employees.
3. Health Risk Assessments are completed by individuals who participate in

workplace wellness programs.

4. Two sets of employee data will be examined, with limited access to a wide range of racial diversity of employees.
5. Data may not be generalized to other worksite programs, due to the unique make up of the studied worksite.
6. Individual data is not accessible on the reported health behaviors of employees.
7. Only aggregate data was available to the researcher.
8. Turn-over rates of employees in this worksite means the employee group data compared between 2011 and 2016 may have different employees.

Delimitations

1. Due to time restrictions, one workplace population was included in this study.
2. The sample of this study included only individuals who participated in the Health Risk Assessment and biometric screening program.
3. The literature reviewed included background on workplace wellness, priority audience, results of programs and health screening activities at worksites.
4. This research did not analyze the self-reported behaviors of individuals who chose not to participate in worksite wellness programs, and focused only on those who voluntarily choose to participate.
5. Only exercise days, strength training, stretching, and consumption rates of fruits, vegetables, water and breakfast were studied. Other reports of health behaviors and indicators available in the Health Risk Assessment, such as biometric reports, stress levels, and the number of sick days taken by employees were not be taken

into consideration for this study.

6. To measure employees' readiness to change health behaviors, only reports related to nutrition and physical activity were used.

Assumptions

For the purpose of this study, it was assumed that:

1. Individuals who participated in workplace wellness biometric screenings also participated in Health Risk Assessments.
2. Those who completed the Health Risk Assessment were truthful.
3. Individuals who took the Health Risk Assessment may have been tempted to report health behaviors that they strive to perform, rather than have performed. However, for the purpose of this study, it was assumed that participants' answers reported on the Health Risk Assessment were representative of their actions.

Definition Terms:

- **Biometric Screening:** the measurement of physical characteristics such as height, weight, body mass index, blood pressure, blood cholesterol, blood glucose, and aerobic fitness tests that can be taken at the worksite and used as part of a workplace health assessment to benchmark and evaluate changes in employee health status over time (Centers for Disease Control, 2015).
- **Health Risk Assessments (HRAs):** Also known as Health Risk Appraisals, HRAs are questionnaires completed by the employee that gather information about weight, exercise and eating habits, smoking status, cholesterol levels, blood pressure and other health indicators. Employees receive a report with a snapshot

of their health risks at that moment in time.

- **Healthy behaviors**: any activity undertaken by an individual who believes himself to be healthy for the purpose of preventing or detecting illness in an asymptomatic state (Kasl & Cobb, 1966). In this research, healthy behaviors were behaviors related to eating habits and physical activity habits.
- **Worksite Wellness Program**: an employment-activity or employer sponsored benefit aimed at promoting health-related behaviors (primary prevention or health promotion) and disease management (secondary prevention). It may include a combination of strategies including data collection on employee health risks and interventions at the population and individual level to reduce those risks (Mattke, Schnyer & Busum, 2012).
- **Wellness Program:** a program offered by an employer that is designed to promote health and prevent disease.
- **Readiness to change:** The intent an individual has, to make a change in a health behavior.

Chapter II: Review of related literature

Worksite wellness programs can vary by employer, and each program can offer a combination of activities, including but not limited to physical activity competitions, healthy cooking classes, free exercise classes, on-site massage or chiropractic, onsite clinics, risk assessments such as self-report health risk assessments and biometric screenings and more. It was found that research on worksite wellness is broad, and this literature review will narrow the scope of worksite wellness into three topics. This literature review will first address the background of worksite wellness. It will then present research on the participation and effectiveness of worksite wellness interventions. Lastly, research on the implementation of health risk screening activities into worksites will be presented.

Background

Research and literature on worksite wellness programs began in the 1980's, and since then value, effectiveness and success of these programs has been reported in several studies, which will be discussed. Since the 1980's, when reports were first released on the cost of health problems among employees who were covered through employer sponsored health insurance, employers have been interested in curbing health problems to mitigate rising healthcare costs (Vesely, 2012). In response to this interest, much early research on worksite wellness was focused on the ability to feasibly implement workplace wellness programs (Weinberg, Iammaroino, Laufman & Trost, 1992). Upon testing for response to onsite cholesterol screenings, Weinberg and colleagues (1992) had

a 74% response rate in a school worksite. The workplace was a natural place to implement health interventions, because of the large amount of time that individuals spend at work, and because in the United States, 62.4% of non-elderly individuals receive health insurance from their employers (Blumenthal, 2006).

While much of the research has been conducted in the United States, worksite wellness has been implemented and tested in many countries including the United Kingdom, Australia, Scotland and Denmark, with various positive outcomes (Getliffe, Crouch, Gage, Lake, & Wilson, 2000; Jørgensen et al., 2016; Nöhammer, Stummer, & Schusterschitz, 2014). Overall, the findings of worksite wellness research have been positive, with studies reporting positive effects of worksite wellness (Berryman, Lukes, Fritsch, Montpellier, & Kussman, 2009; Gemson, Commisso, Fuente, Newman, & Benson, 2008; Nigam et al., 2008; Racette et al., 2009; Winick, Rothacker, & Norman, 2002). Research that has been described by researchers as positive can range from employees engaging in worksite wellness programs, such as research conducted on employees from a Danish police department which found that employees were interested in having employer sponsored wellness programs, and preferred worksite wellness programs that help them quit smoking and eat healthier (Persson, Cleal, Jakobsen, Villadsen & Andersen, 2014), to programs that increased knowledge, such research conducted at a university in Scotland on the effects of blood pressure screenings (Getliffe et al., 2000). Getliffe and colleagues (2000), and found that individuals who had blood pressure screenings scored higher on blood pressure knowledge questionnaires (Getliffe et al., 2000). Another study which reported positive results is a three-year intervention

implemented by Nigam et al. (2008), that educated employees on health and facilitated screenings and education. These interventions increased employees' total global health score, increased self-reported physical activity and nutrition practices, and reduced smoking and stress among employees who voluntarily participated in this program (Nigam et al., 2008). Longer term studies had positive results as well, such as five-year study conducted in the UK (Blake, Zhou, & Batt, 2013). Researchers reported an increase in the proportion of employees who exhibit national guidelines of physical activity, improved nutritional habits and mental health, and decreased absenteeism (Blake, Zhou, & Batt, 2013).

One limitation noted several times in the literature reviewed was the lack of ability to generalize the findings (Persson et al., 2014; Blake, Zhou, & Batt, 2013; Nigam et al., 2008; Getliffe et al., 2000). Persson and colleagues (2014) stated that the unique nature of a police officer's job limited the ability to generalize findings, and Blake and colleagues (2013) reported the inability to generalize findings because of the voluntary nature of the program. Furthermore, because worksite wellness programs are not randomly assigned, studies have concluded that lack of a control group was a barrier to making statements about the program's effectiveness (Nigam et al. 2008). Getliffe and colleagues (2008), who conducted research in a university setting stated the study could not be generalized to other worksites due to the unique characteristics of their university population, who consisted of students and faculty. Lastly, certain environmental and personality characteristics among employees, such as having a supportive workplace culture, have been shown to contribute to the outcomes of worksite wellness, which also

limits the ability for researchers to generalize data beyond that worksite (Beck et al., 2016; Hall et al, 2014; Jørgensen et al., 2016).

Participation

When discussing worksite wellness effectiveness, understanding the priority audience in worksite wellness programs is essential to an effective design. Worksite wellness programs are virtually always voluntary in nature, due to protections put in place by the Americans with Disabilities Act. Because it is voluntary, employers often provide financial incentives to encourage participation (Baiker, Cutler, & Song, 2010).

Research has been conducted to understand who is most likely to participate in worksite wellness programs (Beck et al., 2016; Dobbins et al., 1998; Hall et al., 2014; O' Quinn, 1995). Worksite wellness programs have shown to appeal to a specific population, specifically those who are women, white, already healthy, exercise regularly, seek preventative care services, and have a higher education level (Beck et al., 2016; Dobbins et al., 1998; Hall et al., 2014; O'Quinn, 1995).

A five-year data analysis conducted by the University of Michigan's worksite wellness, "M Healthy" described people who were more likely to participate in worksite wellness programs, as white and female (Beck et al., 2016). These findings were confirmed in a study from Dobbins and colleagues, which demonstrated that women with higher education levels were most likely to participate in workplace wellness (Dobbins et al., 1998). Also, a study by O' Quinn (1995) identified that individuals who exercise and participate in preventative health exams were more likely to participate in worksite

wellness activities. Lowest participation was found to be from men, faculty, union, minority races and ethnicities and those who had lower wages (Beck et al., 2016).

Worksite Wellness Interventions

Early literature on workplace wellness programs established the ability to implement worksite wellness programs within an employee population. Research by Weinberg, Iammaroino, Laufman and Trost (1992) demonstrated the acceptability of cholesterol screening within a school worksite setting. When presented with the opportunity, 74% of eligible participants opted to take part in the worksite cholesterol screening, which proved that a school worksite was able to implement wellness screening programs successfully (Weinberg et al., 1992). More current research, most of which has been conducted in the last ten years, has focused on the effectiveness of worksite wellness program interventions.

When studying the effects of worksite wellness programs, research uses a wide range of metrics to define an effective worksite wellness program. Participation levels, improved health behaviors, obesity reduction, increased knowledge, and improved biometric measures such as cholesterol or blood pressure have all been cited, to demonstrate if a worksite wellness program is effective, and each of these studies have reported a positive effect (Berryman et al., 2009; Crump, Earp, Kozma, & Hertz-Picciotto, 1996; Getliffe et al., 2000; Jorgensen et al., 2016; Nigam et al., 2008; Racette et al., 2009).

There is no one agreed upon best practice intervention among workplace wellness

programs, but research conducted both in the United States and in Europe have shown that both targeted interventions, designed to impact a single dimension of health, and larger, multi-component wellness programs have shown positive effects (Berryman et al., 2009; Nigam et al., 2008). One study of a seven month-long cholesterol awareness program which featured employee education and coaching sessions demonstrated reductions in cholesterol among employees of a financial services worksite (Berryman et al., 2009). Another program, with the goal of reducing blood pressure and weight by implementing blood pressure and weight screenings along with education, had positive effects on the intervention group's blood pressure, weight, and amount of physical activity (Gemson et al., 2008). Larger, multi-component programs have also shown positive effects of worksite wellness programs, such as the NHS's efforts towards targeting physical activity through programs that included physical activity challenges and free exercise classes, environmental and policy changes, which showed an increase in physical activity among participants (Blake, Zhou, & Batt, 2013). Worksite wellness programs can address more than one or two health problems at a time successfully. A three-year study in Canada which utilized a comprehensive package of wellness interventions, whose program included education in global health, smoking cessation, stress management, nutrition and physical activity reported positive effects in physical activity, nutrition, stress levels and smoking (Nigam et al., 2008).

Screening Metrics and Data

As worksite wellness activities grow, tracking employee health metrics is an essential way to design effective programs, and to track health outcomes over time. The

two most common types of screenings are self-report Health Risk Assessments (HRA), which are completed online by the employee, and a biometric screening which measures health markers including, but not limited to, weight, height, waist measurements, blood pressure, triglycerides, glucose and cholesterol. These measurements can indicate if an individual is at risk for health problems such as diabetes or heart disease. During this process, the biometric and HRA screening process educates employees on their potential for health problems, which follows the Health Belief Model constructs of perceived susceptibility and perceived severity, that knowing risk and the level of risk could motivate individuals to reduce these risks through changing health behaviors (Carpenter, 2010).

Seventy-five percent of employers now implement health risk screening activities and education as part of their worksite wellness programs, and little research has been completed on how these screenings impact desire to change health behaviors, and actual changes in health behaviors (Loppke, 2013). A study by Getliffe and colleagues (2010), found that participants who had their blood pressure checked in the last two years had greater knowledge of hypertension, but health behaviors were not studied. While there are few studies on health risk screening activities and health behaviors, one worksite demonstrated the potential for a Health Risk Assessment's ability to motivate behavior change when a worksite control group showed improvement on their cardiovascular disease risks after participating in only a Health Risk Assessment (Racette et al., 2009). While participants' health outcomes of were documented in this study, the preventative health behaviors among participants were not tracked, so it is unknown if the

improvement on cardiovascular disease risks was due to a change in health behaviors. A systematic review conducted by Soler and colleagues (2010) examined 37 studies on worksite wellness interventions that included a health screening activity or questionnaire, and found that there is evidence to believe that health screening activities followed by education and intervention will increase participation in preventative health behaviors.

In summary, success in worksite wellness programs can vary from participation, to health behavior changes, and overall findings are positive. Traditional interventions include education and programs on health topics, and health risk screenings are more recently becoming a popular intervention. Due to the lack of ability to generalize findings, the applicability of these finding in the worksite wellness field can be challenging.

Chapter III: Research Procedures

Introduction

The majority of worksite wellness programs include both biometric screenings and Health Risk Assessments (HRAs), which are intended to track employee group health status and inform participants about their potential risk for health problems (Mattke et al., 2012). The administration of both activities by a third party vendor is costly to employers, ranging from $65- 285 dollars per employee (Soler et al., 2010). This cost does not take into consideration the monetary incentive commonly offered by employers, used to increase the level of participation (Mattke et al., 2012).

The effects of biometric screenings and Health Risk Assessments should be studied to understand the potential influence they have on employee health behaviors. The ability to track biometric screening and receive Health Risk Assessment data from employees is helpful to worksite wellness programmers, but the potential for these activities to initiate motivation for change in health behaviors is unknown. This study will examine the change in health behaviors as reported in Health Risk Assessments collected in 2011 and 2016. This chapter will include a description of research design and rationale, participant selection, instrumentation, data collection and data processing and analysis.

This research will address the following questions:

1. What are the health behaviors reported among a sample of employees who participate in a worksite wellness health risk screening program?

2. Is participation in worksite health risk screening activities associated with healthy behaviors as reported in a health risk assessment?
3. Is participation in health risk screening activities associated with readiness to change nutrition and physical activity habits among a sample of employees?

Research Design

This study examined the health behaviors and readiness to change of participants who participated in a worksite biometric screening and HRA. Participation in the worksite health risk screening activities and the number of employees who reported readiness to change and meeting health behavior recommendations were the variables that were tested for a relationship. Regarding health behaviors, seven health behavior variables were studied: daily fruit consumption, daily vegetable consumption, daily water consumption, daily breakfast consumption, exercise days a week, strength training days a week and stretching days a week. Due to time constraints and ability to access preexisting data, preexisting data was utilized in this study. Archival data on employee health behaviors was provided through a Health Risk Assessment report from a municipal government worksite. Employees voluntarily fill out an HRA as part of their worksite wellness program. The HRA asked employees to report their health behaviors upon participating in a biometric screen. After health risk screening activities were completed, the employer received a report of the aggregate health data from the vendor who administered the HRA. This study examined data from 2011 and 2016 to determine if health behaviors changed over time, after participation in the worksite health risk screening activities, and if there was a relationship between the HRA year and the health

behaviors and ‘readiness to change’ of employees.

Participant Selection

The sample that was researched was a municipal government employee base near Minneapolis, Minnesota. The employer has a worksite wellness program which has been implemented for 10 years. The employee base is broad, including administrative personnel, maintenance staff, and public safety. All levels of the organization, both part-time and full time benefit earning employees, had access to the worksite health risk screening program. Since preexisting data was utilized, the employee sample was predetermined by voluntary participation. At the time of the study, the worksite implemented both a biometric screen and an HRA, and employees who participated in the worksite wellness program completed both activities to be eligible for a financial incentive of 40 dollars per month for one calendar year following completion in the wellness program. The health risk screening activities began in 2011, and have been available to employees once a year for the last six consecutive years, as part of their overall worksite wellness program.

Instrumentation

Data from preexisting Health Risk Assessment reports was utilized. This HRA was designed by a third party vendor and tested for validity and reliability (Appendix A). The Health Risk Assessment is an online assessment, which utilizes multiple choice questions and asks participants to report their health behaviors in several areas including their level of physical activity, nutrition, sleep, stress and seatbelt usage. The assessment

also asks employees to report their readiness to change health behaviors, by asking participants if they are planning to make a change in their health behaviors, or have no interest in making a change. The data used for this research was the self-reported rates of exercise days, strength training, stretching, breakfast consumption, water consumption, fruit consumption and vegetable consumption, and employees' readiness to change physical activity and nutrition habits. The original data were collected by a third party vendor who specializes in Health Risk Assessments and biometric screenings and a report was provided to the employer in aggregate form. The report classified employees falling into two categories for each health behavior. Participants either "met" or "did not meet" recommended guidelines for exercise days, strength training, stretching, breakfast consumption, water consumption, fruit consumption, and vegetable consumption. Also included on the report was the number of employees who indicated they were ready to make a change to their health behaviors, and the number of employees who reported having no interest in making a change to their current health behaviors. In this report, no identifying information was released to the employer.

Data Collection

Because this research involved human subjects, an Institutional Board Review was requested to ensure that the data collection and research met ethical standards. Data were requested from the study's worksite human resources department in February 2017. The third party vendor who disseminated and collected the employee Health Risk Assessment complied with HIPAA regulations, and the data reports released have no identifying information. Data released by the employer were the number of employees

who were placed in the "meets" and "did not meet" health behavior recommendations categories for each health behavior studied, and the number of employees who reported readiness to change health behaviors. Available data from 2011 to 2016 were collected. These two dates were chosen because 2011 was the first year employees were offered the health risk screening program, and 2016 was the year the most recent HRA taken.

Data Analysis

Data from 2011 and 2016 were analyzed to assess if there was a change in employee health behavior over time, if there was change in employees' readiness to change over time, and whether employee health behavior rates are associated with the year the HRA was taken. Data analysis was completed to test for association between the employee health behavior rates and year the HRA was taken by using a chi-square calculation in SPSS. The chi-square analysis tested for association between the number of employees who were in the 'meets' and 'does not meet' health behavior category, and the year the HRA was taken. The chi-square was also used to test for association between the number of employees who were ready to change, or not ready to change and the year the HRA was taken. Since data is in aggregate form for each health behavior, readiness to change and year, frequencies were used in SPSS and data was weighted in SPSS for frequencies.

Chapter IV: Presentation of analysis and discussion of data

Introduction

The sample studied was a municipal government worksite in a metro-area near Minneapolis, Minnesota. Health risk screening activities are offered one time each year to benefit-earning employees, and participation is voluntary. This worksite first implemented yearly health risk screening activities in 2011, and the most recent health risk screening activities took place in Fall 2016. The health risk screening activities included a biometric screening and a Health Risk Assessment (HRA).

Archival employee data from an HRA report were used from two points in time. The data from 2011, the first HRA taken by employees, as well as from 2016, the most recent HRA taken by employees were used. The data were obtained in aggregate form from the human resources department, with no identifying information about the individuals who participated. In 2011, one hundred and ninety-two (192) individuals participated in the Health Risk Assessment, of which one hundred and twenty-two (122) were male and sixty-five (65) were female. In 2016, one hundred and seventy-four (174) employees participated in the Health Risk Assessment, of which one hundred sixteen (116) were male and fifty-eight (58) were female.

What are the health behaviors reported among a sample of employees who participate in a worksite wellness health risk screening program?

Table 1 displays the health behavior data used in this research. Employees

reported their health behaviors on the HRA and based on the reported level of the health behavior, employees were placed into one of two categories: ‘meets recommended guidelines’ and ‘does not meet recommended guidelines’ for the particular health behavior.

Recommended guidelines were set by the third party vendor hired by the employer. Fruit and vegetable consumption recommended guidelines were consumption of each two or more cups per day. The water consumption recommended guideline was drinking five or more cups of water per day, and the breakfast consumption recommended guideline was eating breakfast most days or daily. The recommended guideline for exercise days was exercising 5 or more days a week, and strength training and stretching recommended guidelines were two or more days of each activity each week.

Employees who reported a health behavior at or above the recommended guidelines for the health behavior were placed in the ‘meets recommended guidelines’ category. If they reported a health behavior below the recommended guideline, they were placed in the ‘did not meet recommended guidelines’ category. Data was categorized by the third party vendor who administered the Health Risk Assessment. The research data were provided in this format from the human resources department.

Table 1
Employee Reported Health Behaviors

Health Behavior	2011 Meets recommended guidelines n=192	2016 Meets recommended guidelines n=174	2011 Does not meet recommended guidelines n=192	2016 Does not meet recommended guidelines n=174
Fruit Consumption	48 (25%)	108 (62 %)	144 (75%)	66 (38%)
Vegetable Consumption	48 (25%)	109 (62%)	144 (75%)	65 (38%)
Water Consumption	0 (0%)	108 (62%)	192 (100%)	64 (38%)
Breakfast Consumption	144 (75%)	122 (70%)	47 (25%)	51 (30%)
Exercise Days	50 (26%)	65 (37%)	142 (74%)	109 (73%)
Strength Training Days	83 (43%)	85 (48%)	108 (57%)	88 (52%)
Stretching Days	101(52%)	88 (50%)	88 (48%)	85 (50%)

Data in table 1 shows an increase in the number of people who met health behavior guidelines for fruit consumption, vegetable consumption, water consumption, exercise days and strength training days.

Is participation in worksite health risk screening activities associated with healthy behaviors as reported in a health risk assessment?

Data were analyzed in SPSS using chi-square to test for associations among the number of employees who reported a health behavior and the year the HRA was taken. Aggregate data were entered into SPSS and weighted by frequency before analysis was run. Each variable was analyzed independently with reported frequencies in 2011 and 2016. Associations were found between the year the HRA was taken and the number of

individuals who met fruit consumption, vegetable consumption, water consumption and exercise days recommended guidelines.

Fruit consumption. Among this research sample, the number of individuals who met fruit consumption recommendations increased from 2011 to 2016. The chi-square analysis showed a significant association between HRA year and the number of individuals who met fruit consumption recommended guidelines, $x^2(1) = 67.498$, p= .000.

Vegetable consumption. Among this research sample, the number of individuals who met vegetable consumption recommendations increased from 2011 to 2016. The chi-square analysis showed a significant association between HRA year and the number of individuals who met vegetable consumption recommendations, $x^2 (1) = 52.804$, p= .000.

Water consumption. Among this research sample, the number of individuals who met water consumption recommendations increased between 2011 and 2016. The chi-square data analysis showed a significant association between HRA year and the number of individuals who met water consumption guidelines, $x^2 (1)= 171.419$, p=.000.

Exercise days. Among this research sample, the number of individuals who met exercise day recommendations increased between 2011 and 2016. The chi-square data analysis showed a significant association between HRA year and the number of individuals who met exercise day guidelines, $x^2 (1)= 5.423$, p= .02.

Breakfast consumption. Among this research sample, the number of individuals who reported eating breakfast most days or daily decreased from 2011 to 2016. Statistical analysis showed no significant association between HRA year and the number of

employees who met breakfast consumption guidelines, x^2 (1) = 1.95, p> .295.

Strength training. Among this research sample, the number of individuals who meet the minimum recommendations of strength training increased between 2011 and 2016. The chi-square data analysis showed no significant association between HRA year and the number of individuals who met strength training guidelines, x^2 (1)= 1.177, p= .278.

Stretching. Among this research sample, the number of individuals who met weekly stretching recommendations decreased between 2011 and 2016, and the chi-square data analysis showed there was no significant association between HRA year and the number of individuals who met stretching guidelines, x^2 (1)= .239, p= .625.

Is participation in health risk screening activities associated with readiness to change nutrition and physical activity habits among a sample of employees?

Table 2 displays the employee 'readiness to change' data used in this research. Employees answered whether or not they plan to make changes to their nutrition and physical activity after participation in worksite health risk screening activities. Employees answered either 'yes', they plan to make a change within a month to six months or 'no', they have no present interest in making a change. Analysis was completed in SPSS to test for association between the number of employees who answered this question 'yes' or 'no' and the year the year the HRA was conducted.

Table 2
Employee Reported 'Readiness to Change'

	2011: Yes n=192	2016: Yes n=174	2011: No n=192	2016: No n=174
Ready to make changes to nutrition	45	38	17	15
Ready to make changes to physical activity levels	43	43	20	16

While the number of people who answered 'yes' to being ready to make changes to nutrition and physical activity levels was higher than the number of people who answered 'no', there was a decrease in the number of individuals who were ready to make a change to nutrition, and no change in the number of individuals who were ready to make a change to physical activity levels between the years of 2011 and 2016.

Chi-square analysis was completed for each 'readiness to change' variable in SPSS, using the frequency of individuals who answered 'yes' or 'no' weighted before analysis was completed. There was no significant association identified between the number of individuals ready to make a change and HRA year. The data analysis results for the variable 'ready to make changes to nutrition', $x(1)= .011$, $p= .916$. The data analysis results for the variable 'ready to make changes to physical activity', $x(1)= 3.14$, $p= .575$.

Discussion

This study found an association between the number of employees who met health behavior guideline recommendations in fruit consumption, vegetable consumption,

water consumption and exercise days, and the year the HRA was taken, as well as an increase in the number of people who met these guidelines between 2011 and 2016. These findings provide some evidence that it is possible that participation in worksite health risk screening activities may influence employee health behaviors in fruit consumption, vegetable consumption, water consumption and exercise days. The findings do not provide evidence that participation in health risk screening activities influence stretching, strength training or breakfast consumption.

Previous research has found that health risk screening activities could be related to participation in health behaviors (Racette, et al., 2009; Soler et al., 2013), and this research consistent with those findings. As participants learn of their health risks, the Health Belief Model's constructs of perceived susceptibility and perceived severity could explain the health behaviors that change once participants learn of their health risks. Utilizing health risk screening activities in a worksite could influence health behaviors by changing the beliefs participants have pertaining to their perceptions of their risks for health problems and the severity of those risks.

Chapter V: Summary conclusions and recommendation

Summary

Health risk screening activities are widespread, and are becoming a standard practice among worksite wellness programs (Loppke, 2013). With that, there were very few studies examining the effects of worksite health risk screening activities, and the influence they could have on the health behaviors of employees who participate. The goal of research study was to understand the relationship between health risk screening activities and employee health behaviors and readiness to change.

The sample studied were employees who participated in worksite health screening activities at a municipal government site. The sample participants voluntarily participated in a biometric screening and an online Health Risk Assessment. Aggregate data reports from the worksite HRA were used from two points in time, 2011 and 2016.

A chi square data analysis was conducted for each variable, indicating individuals' nutrition and physical activity health behaviors, and readiness to change health behaviors. Fruit consumption, vegetable consumption, water consumption, and breakfast consumption were indicators of nutrition health behaviors, while exercise, strength training and stretching were indicators of physical activity health behaviors. Answers to questions about plans to change nutrition and physical activity were used as measures chosen to represent individuals' 'readiness to change' health behaviors.

The health behaviors and 'readiness to change' reports between 2011 and 2016

were compared, and the number of employees who met health behavior recommended guidelines increased between 2011 and 2016 in fruit and vegetable consumption, water consumption, exercise days, and strength training. Analysis found associations between HRA year and the number of individuals who met recommendations in water intake, fruit consumption, vegetable consumption and exercise days. While there was an increase in the number of individuals who met recommendations for strength training between 2011 and 2016, no associations were found between year and number of individuals who met guidelines. There were no associations found between reported readiness to change in employees and the HRA year.

Conclusion

The results of this study indicate it may be possible that worksite health risk screening activities could influence the health behaviors of employees over time. This is a starting point for research on worksite health risk screening activities and their purpose in worksite wellness programs. There are reasons further conclusions cannot be drawn from this research. First, due to the data being aggregated and in categorical form upon collection, there were limitations in analysis which limited the ability to draw conclusions on health risk screening activities and their relationship to individual health behaviors. Second, because worksite health risk screening activities are voluntary, only the individuals who elected to participate were included in the study. This limited the ability to compare HRA data with a control group. Lastly, data collection resulted in aggregate data, with no ability to compare individual health behaviors between 2011 and 2016.

The ability to generalize findings of this data is challenging. The worksite studied in this research was a municipal government worksite, which may have a unique worksite culture which affected the results of this study. As found in the literature review, worksite culture can influence participation in worksite wellness programs and the ability to generalize findings beyond the sample studied (Persson et al., 2014; Getliffe et al., 2000).

In addition to challenges in generalizing findings, it can be problematic for worksite wellness program researchers to definitively conclude that worksite wellness programs are responsible for health outcomes in employees. Individuals are met with health messaging in several areas in their life, and their choices and behaviors can be influenced by other constructs in their life beyond the workplace. Friends, family, media, marketing and social media could all have an influence on someone's decision to participate in health behaviors. Because of this, research on worksite wellness programs could remain a challenge. .

Recommendations

Further research should be conducted on health risk screening activities implemented by worksites and their relationship with employee health behaviors. Utilizing a control sample, and documenting individual health behaviors to compare results over time could help expand upon data analysis capabilities and could result in stronger statistical conclusions. When utilizing a control group, randomly assigning participants to an intervention and control group would help to mitigate potential outcomes tied to the characteristics of those who voluntarily participate in worksite

wellness programs. Healthcare costs are continuing to grow, and health insurance companies and employers are looking for ways to reduce the rise of this costs. This research is important to the worksite wellness field, because of the expensive costs of health risk screening activities, a better understanding of the relationship between health risk screening activities and the health behaviors of employees would allow employers to determine if the health risk screening activities are the correct solution for their worksite wellness program.

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Appendix A

Basis and Interpretive Guide

The Personal Wellness Profile™ (PWP) is a health and lifestyle assessment system used in health screening managed care, demand management and health promotion programs. A versatile management tool, the PWP is designed to identify personal and group health needs and interests. This information is used to prepare personal reports for guidance in health behavior improvement. Group reports provide the facilitator pertinent information for assessing group health needs for program planning and risk interventions. This document will discuss the purpose and objectives of the PWP assessment. Background information on the development of the PWP assessment and why certain questions are included is discussed.

Purpose of the PWP Assessment

1. To identify current health behaviors for primary prevention and follow-up education
2. To identify chronic disease risk factors for secondary prevention and follow-up risk management
3. To identify current disease states for tertiary prevention and case management
4. To identify persons likely to have higher health claims
5. To provide a "prevention database" for criteria specific follow-up of targeted population groups
6. To establish benchmarks for monitoring change in individuals and groups
7. Provide timely information necessary for assessing personal need and taking appropriate health action to prevent disease, enhance health, and decrease the demand on the health care system to both the health counselor and participant.
8. To identify participants who need to be referred for preventive medical services.
9. To act as an educational resource database for explaining relationships of screening or fitness test results lifestyle change.
10. Provide a tracking system to evaluate program effectiveness.

Validity

A natural concern of any assessment tool is the question of validity. Is the questionnaire a valid instrument for accomplishing the objectives described above? Questions regarding questionnaire validity and reliability are often asked by researchers. This is appropriate when you are trying to measure a well-defined disease state or condition. However, wellness or ideal health has many definitions. We need to look at the various areas of the questionnaire and their scientific foundation. Considering the PWP assessment's comprehensive nature, and the objectives listed above, this question will be addressed in the following document.

The PWP questionnaire, clinical and fitness tests and scoring methodologies are derived primarily from published scientific research and from standards set by leading health authorities in each topic area. For example, the coronary risk assessment guidelines in PWP come directly from the National Cholesterol Education Program. Also, the exercise prescription guidelines are those recommended by the American College of Sports Medicine.

Wellsource does not conduct primary research itself to verify the validity of this research, rather our staff of health professionals, comprised of doctorate level preventive health specialists, registered dietitians and certified health education specialists, ensures that the most current and widely accepted guidelines are incorporated in our assessment systems. The Wellsource client base of over 2,000 health professionals working in hospitals, health plans, physician offices and other health organizations ensures that the assessments are adequately tested with many

different types of participants in a variety of settings.

The overall validity of the Personal Wellness Profile™ assessment can be affected by the choice of optional testing incorporated. The Personal Wellness Profile™ system accommodates a wide variety of testing options that may vary a great deal in their relative validity. For example, the use of Bioelectrical Impedance versus Hydrostatic or Skinfold testing for Body Composition will affect the overall validity of the assessment.

For more detailed information on the validity of the Personal Wellness Profile™ assessment instrument, review the original research upon which it is based, outlined and referenced below for each major health topic in PWP. Also refer to the attached list of research that has been done using the PWP instrument.

These same questions on"self-reported health status" were also used in the Steel Case Study[2] and were found to be some of the best predictors of high medical claims.

Biographical data. This information is used for computing algorithms and norms for specific test results. Biographical data is required for doing research and categorizing group statistics and norms, thus allowing for the development of user defin- able norms and statistics. Biographical data is necessary for making specific recommendations based on items such as the following:

- Age
- Gender
- Race
- Education level
- Income
- Job category

Health History/Symptoms

A brief family and personal health history are included. This section is not intended to replace a medical history by a doctor, but rather to include risk factors associated with chronic diseases such as heart disease, cancer, and diabetes. This data is then used for targeting risk assessment and risk reduction education programs. Specific questions on cardiovascular disease are taken from the National Cholesterol Education Program (NCEP)[3] risk assessment guidelines.

Questions regarding current symptoms are included for similar reasons as was family history. In addition, these responses can be used as a screening for a fitness assessment if it is provided. Persons who are reporting significant symptoms such as chest pain and joint pain can be identified prior to a fitness testing program. Screening questions are based on the American College of Sport's Medicine Guidelines[4] and the Canadian Standardized test of Fitness Training Manual[5]. Persons with significant symptoms are referred to their doctor for further evaluation and guidance, prior to screening.

A section on family health concerns is also included to address safety and health issues for family members. These questions are recommended by the Clinician's Handbook on Preventive Medicine.[20]

Exercise level

The level of physical activity has been identified in numerous studies to be a predictor of longevity[6,7], associated with heart disease and cancer[7,8], and helpful for preventing or controlling many other health problems[9], such as obesity, diabetes, high blood pressure, stress management, and enhanced personal image. Additional studies have found higher activity level to be associated with decreased medical claims, decreased employee turn-over rates, decreased work loss time, and decreased back injury and workman's compensation claims[2,10]. The fitness questions were worded to be consistent with findings of these studies, to easily document change over time, and to provide exercise guidance based on the ACSM's Exercise Guidelines[4]. The question on level of fitness (11 levels) was

taken from work done by NASA[11,36,37] where they predict a person's aerobic capacity based on the level of activity they mark (1-11), their age, gender, and BMI or percent body fat.
These prediction equations were developed using maximum treadmill tests. If actual fitness tests are not done, using this question can estimate aerobic capacity quite accurately.

The Daily Activities questions were taken from the SF-36 Health Survey[1], evaluating physical capabilities needed for daily living and any physical limitations. Age and gender specific standardized scores are available for comparing physical limita- tions present.

The exercise preference questions are helpful in exercise counseling and for planning fitness programs for the whole group.

Eating Habits

The questions on nutrition are a self-report of eating practices associated with health. The questions and nutritional recommendations are based on the primary principles found in the US Surgeon General's Report on Nutrition and Health[12], USDA's Dietary Guidelines[13], the Food Guide Pyramid[14], and dietary recommendations made by the National Academy of Sciences Food and Nutrition Board[15], and the World Health Organization[16]. Emphasis is on eating habits and public health nutrition issues rather than individual nutrients. Certain indicator questions associated with good nutrition and health are also included, such as breakfast eating[17]. And finally, the person's number of servings eaten in each of the food groups in the Food Guide Pyramid are compared to recommended levels[14].

Key nutritional issues include:

- Job category Fat intake - does the person eat mostly high fat foods or low fat(examples of each are given)?
- Job category Fiber intake - does the person eat primarily whole grains and breads or more refined grain products?
- Job category Fruits and vegetables - how many servings are usually eaten daily?
- Job category

Other nutrition issues include:

- Job category How often is breakfast eaten?
- Job category How often are typical "fast foods" eaten?
- Job category How much salt/salty foods are usually eaten?
- Job category How often are "typical snack foods" eaten (examples are given)?
- Job category How many servings of calcium rich foods are eaten daily?
- Job category How many servings of dark-green-leafy vegetables are eaten weekly (relates to eye health, prevention of AMD[18])?

A brief food frequency is used to determine how many servings are typically eaten of all the food groups listed in the Food Guide Pyramid.

Questions regarding weight perception, frequency and methods of dieting are recommended by the US Preventive Services Task force Report[19] and the Clinician's Handbook of Preventive Services[20] to help detect eating disorders.

Alcohol, Drugs and Smoking

The questions on drinking are designed to determine how much a person drinks on a regular basis; number of drinks per week, and a problem drinking. These questions are taken from the National Center for Health Statistics (NCHS) survey of health practices relating to drinking[21] and the USDHHS Clinician's Handbook of Preventive Services, section on alcohol. In making recommendations for

alcohol intake, the standard set in the USDHHS, Dietary Guidelines[13], and the National Academy of Sciences statement[15] on drinking and health, are used. The recommendation is "No more than 1 drink per day for women and no more than 2 drinks per day for men." In the Steele case study, high alcohol intake (21+ drinks per week) was also associated with higher medical claims[2]. The problem drinking questions are also known as the CAGE questions on alcohol abuse. They are widely used. Studies using CAGE questions for screening report good sensitivity (approximately 85%) and specificity (89%)[20,22].

Smoking is well established as a risk indicator for heart disease, cancer, lung disease, and high medical claims.[8,20,23]. Questions are designed to determine amount smoked, years smoked, and "pack years". If desired, reporting of a test to verify smoking is provided in PWP. Questions on exposure to second-hand smoke are also included.

Also included are questions regarding medication use, use of mood altering drugs, and drug interactions. These questions are based on recommendations from the Clinician's Handbook of Preventive Services[20] and the US Preventive Services Task force Report[19]. Drug interactions and number of medications being taken at once, are good indicators of high cost[2] and are key areas that need attention in health counseling and a possible indicator for case management. Wording of questions in this area are kept non-threatening for use in corporate health settings.

Stress and Coping

The purpose of this section is to identify persons who are having trouble coping with life, where they feel their sources of stress are coming from, and questions relating to stress reduction activities that can be commented on for recommendations in stress reduction. Various questions are included that are associated with coping and health. Questions on self-perception of stress are included, the person's own perception of how they are coping. "Stress Signals" are included, which have been shown to be associated with higher claims[2,24]. Coping questions found to have significant effect on health are taken from the Alameda County study[17]; general questions on happiness, sleep and social support systems, both werestrong predictors of longevity. Other indicators of coping are questions on"energy level" found to be a predictor of mental health[1,25] and coping. Questions from the mental health section of the SF-36 Health Survey[1] are included and thus provide standardized scores based on age and gender for mental health status. A series of questions relating to social health (live alone, recently lost my job, exposed to domestic violence, recently divorced, thought about suicide recently etc.) are included and are flags for personal counseling, referral and personal guidance as recommended by the Clinician's Handbook of Preventive Services[20] and the US Preventive Services Task Force Report[19.] The remaining questions relate to well established coping resources[20] and serve as flags for counseling and recommendations.

Safety/Work-site Health

Safety questions are based on recommendations of the Clinician's Handbook[20] and US Preventive Services Task Force Report[19]. Included are questions regarding seat belts, smoke detectors, correct lifting technique to prevent back injury, drinking and driving, wearing bike helmets, eye protection, and sun burn prevention. All are well established safety issues that can save lives and decrease medical costs significantly.

Worksite health concerns are issues employers have an interest in for safety, injury prevention, and general health and productivity of employees[26,27.28]. The "Job Satisfaction" question has been found to be a good predictor of health claims[1]. Job descriptions allows for statistical analysis based on job type.

Medical Care/Woman's Health Issues

Questions in medical care relate to health care usage, hospital days, doctor visits, which is helpful in tracking medical care usage. One question identifies persons without a personal physician. Using a primary care physician is one important way to decrease costs, especially from emergency room visits. A listing of medications used is helpful in counseling. Questions on immunizations and preventive exams are based on the Clinician's Handbook of Preventive Services[20]. Its purpose is to make sure people are properly immunized and seek appropriate preventive exams as recommended.

The section on women's health issues identifies risks for cancer, concerns about contraception, and women who are or may be pregnant soon. Preconception and prenatal care is an important preventive care concern. These questions help identify these persons for follow-up.

Questions on blood pressure and cholesterol are included primarily for use when these tests are not done. It gives oppor- tunity for people who know their numbers to report them. If people don't know, they are advised to find out. Actual test results may be also provided and are recommended when possible.

Questions on Health Care Satisfaction are included to help meet requirements from the National Committee for Quality Assurance[29], and to make sure people are getting adequate medical care.

Improving Health

This section is a health interest survey. This is very helpful in counseling referral, and follow-up. Readiness to start
making change is also determined in this section, as is locus of control. A question regarding permission for follow-up is also included for use in populations that may not want to be notified of risk interventions.

Health Age

The health age appraisal is based on the Alameda County"Good Health Practices Study"[17]. The study looked at health practices of some 6,900 people for 15 years and then determined which health practices were significantly related to longevity. In PWP, the individual's health practices are compared with results from this prospective study and their "health age" computed based on the number of good health practices they currently are following. The original study showed that people who were following all or nearly all of the good health habits, lived on the average 12.5 years longer than those not following a healthy

Biometrics

A large variety of clinical tests and fitness evaluation results can be entered into PWP and reported and compared to nationally recognized health standards in the PWP report. The validity of these tests are well documented, such as blood lipids for coronary risk[3,8,20], blood pressure screening[30], and PSA test for prostate cancer screening[20]. Body composition tests are available including percent body fat determination using skinfolds[4,31,32,35] or hydrostatic weighing[31], or direct entry of per- cent fat if known. Input of height and weight[15,20] and girth measurements also allow for body mass index (BMI)[15] and waist hip ratio (WHR)[5,15] calculations.

Protocols for fitness tests are based on the guidelines established by the American College of Sports Medicine[4,31], and the Canadian Standardized Test of Fitness[5]. A Fitness Assessment Manual is provided with PWP to give full instructions and guidelines for safe and valid fitness testing.

Lung function tests are optional. Norms are based on standard lung function prediction tables[33,34].

Reliability

Reliability of the Personal Wellness Profile™ assessment depends in large part on the honesty of the participant in reporting their health practices and health history. This reliability could be affected greatly depending on many factors including: the method of implementing the assessment, corporate policies, confidentiality of the data collected and incentives.

The variety of testing options utilized can also impact reliability. For example, if many different testing labs are used for determining results of blood lipid screenings, this may adversely affect the reliability of the assessment. However, test results can be used to help eliminate the problems inherent in self-reported behavior information. For example, a blood test for smoking (an option in PWP) may be much more reliable than a self-reported smoking question. Using actual fitness test data will be more reliable than self-reported fitness levels. Therefore it is possible to improve the reliability of the assess- ment by your choice and method of testing options offered in PWP. Please refer to the original research cited in the following Personal Wellness Profile™ Scientific References for additional detail regarding reliability.

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