The Physical Educator Vol. 72 • pp. 721–734 • 2015

WELLNESS

# Effectiveness of the Complete Health Improvement Program

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## Abstract

*Currently, heart disease and diabetes dominate society as the leading cause of death for Americans. In this study, we examined the effectiveness of a lifestyle enhancement program on factors related to the development of heart disease. The Wabash Valley Complete Health Improvement Program (CHIP) is a community-based lifestyle change program with the aim to prevent and reverse the effects of all forms of heart disease through educating participants to make more positive choices in regard to their dietary habits, physical activity, stress management, and tobacco use. Fifty-one participants participated in this 8-week study consisting of 16 sessions that included pre– and post–health screenings for comparison. The health screenings included total cholesterol, HDL cholesterol, LDL cholesterol, triglycerides, glucose, weight (pounds), body mass index, systolic blood pressure, diastolic blood pressure, and resting heart rate. Aggregate data for the group were used to compare the pre– and post–heart screen data for each category. According to the American Heart Association (2006), approximately 34.3% of deaths in the United States are caused by some form of cardiovascular disease. Most of these cases result from unhealthy lifestyle choices related to poor nutrition, physical activity, stress, and tobacco use. In*

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*this study, we examined several factors to look for correlations between healthy lifestyle and risk of heart disease. Results show CHIP was effective in reducing the aforementioned factors from 4.8% to 19.2% from pre- to postscreening. These results suggest that the CHIP program was successful in reducing the participants' overall risk of heart disease.*

Heart disease is defined as having one or more heart conditions, including coronary artery disease, angina, heart failure, and arrhythmia (Centers for Disease Control and Prevention [CDC], 2009). According to the American Heart Association (AHA, 2006), approximately 34.3% of deaths in the United States are linked to cardiovascular disease, and it is the leading cause of death for people in the United States. Heart disease is the leading cause of death for men and women and can be attributed to several factors. According to the CDC (2010), these factors include inactivity, obesity, high blood pressure, cigarette smoking, high cholesterol, and diabetes. The concern is that the majority of these risks can be reduced or reversed through healthy lifestyle choices. Modifiable risk factors that can be altered to lower the risk of heart disease include cigarette smoking, high blood pressure, abnormal levels of blood lipids (fats), obesity, the metabolic syndrome, diabetes, physical inactivity, C-reactive protein (CRP) levels, homocysteine levels, stress, and depression (Gerstenblith & Margolis, 2009). The nonmodifiable risk factors for heart disease include age, gender, family history, personal history of cardiovascular disease, and kidney disease (Gerstenblith & Margolis, 2009).

We propose that heart disease risk can be affected through participation in the Wabash Valley Coronary Health Improvement Program (CHIP). A holistic approach is used in the program to educate individuals about the importance of making healthier food choices, the incorporation of regular physical activity into their day, effective stress management techniques, and the cessation of tobacco use (if applicable). This specific, local program is based on what was previously called the Coronary Health Improvement Project and is now called the Complete Health Improvement Program, developed by Dr. Hans Diehl, Founder of the Lifestyle Medicine Institute at Loma Linda University. Dr. Diehl formulated this program to com-

bat the ever increasing amount of chronic disease in society and to increase the quality of citizens' overall health and wellness (Aldana et al., 2006).

## Risk Factors Associated With Heart Disease

CDC (2010) data indicate nearly 632,000 Americans died in 2006 as a result of heart disease. The United States spent $444 billion on heart disease in 2010. These numbers are alarming. What is even more alarming is that heart disease is often negatively affected by a person's lifestyle and associated behavior patterns. Experts agree that living a healthy lifestyle can help prevent, delay, or even reverse the onset of heart disease (Aldana et al., 2005). A healthy lifestyle is defined as consuming a healthy diet, maintaining a healthy weight, exercising regularly, having low to moderate stress levels, not smoking, and limiting alcohol use.

Choosing healthy foods is a factor that has been proven to have an effect on the development of heart disease. Research has shown that participants who follow specific diet plans, such as the Mediterranean Diet, have a 50% to 70% lower risk of heart disease than those who only eat a healthier diet (Bowden, 2010). In addition, more than 47% of the money that Americans spend on food is spent at fast-food restaurants, which is twice the amount that was spent in 1955 (Page & Page, 2007). Restaurant meals are typically high in fat, sugar, and salt, which can lead to heart disease. A healthy diet consists of a balance of essential nutrients, calories, carbohydrates, fats, and protein and has been associated with lower risk of heart disease (Page & Page, 2007).

Obesity has been shown to have a significant effect on cardiovascular disease and diabetes. According to the CDC (2011c), obesity is defined as having a body mass index (BMI) greater than or equal to 30 $m/kg^2$, which is determined by using an individual's height and weight. In 2009, Indiana ranked 12th in the United States in adult obesity rates, with 29.5% of its population having a BMI of 30 or greater (CDC, 2011c). Obesity places individuals at risk for a variety of health problems, including high cholesterol, diabetes, hypertension, heart disease, and stroke (AHA, 2011a, 2011b). These obesity-related statistics for Indiana give cause for concern and demonstrate the need for an effective lifestyle change program to aid in lowering these rates.

One of the more deadly health problems linked to obesity is coronary heart disease, also known as coronary artery disease. According to the National Institutes of Health (NIH), arteries can become narrow when fat, cholesterol, and calcium begin to build up and form plaque in the artery, a condition known as atherosclerosis (NIH, 2011b). Common signs and symptoms of coronary heart disease include angina (chest pain), shortness of breath, and arrhythmia (abnormal heart rhythm; NIH, 2011a). The causes of coronary heart disease include smoking, high levels of fat and cholesterol in the diet, high blood pressure, and high levels of sugar in the blood because of insulin resistance or diabetes (NIH, 2011c). Obesity is also commonly associated with these problems.

It has been shown that accumulating 150 min of moderate intensity physical activity per week can reduce risk of heart disease and high blood pressure and improve cholesterol levels (CDC, 2011a). The aim of CHIP is to reduce or eliminate the risk of heart disease through use of these physical activity recommendations as guidelines. Actual and projected physical activity rates among Americans, along with obesity rates, emphasize the need to focus on fitness and weight management. According to the AHA, only 49.1% of American adults met the recommended physical activity standards in 2005 (Haskell et al., 2007). That percentage dropped to 48.8% in 2008, and CDC (2011b) data further indicate that 24.1% of American adults reported no leisure-time physical activity during that same year. Since 1950, sedentary occupations have increased by 83%, with physically active jobs now making up only 25% of the workforce (AHA, 2011a, 2011b). Lifestyle change programs, such as CHIP, emphasize the importance of combining a healthy diet and physical activity to maximize health benefits and reduce the risk of heart disease.

Stress is another factor that has been shown to contribute to the risk of heart disease. When a stressful situation occurs, the body reacts by initiating the fight-or-flight response, which causes a person's heart rate and blood pressure to increase (Gerstenblith & Margolis, 2009). It has also been made known that individuals suffering from anxiety, depression, and anger have an increased chance of developing heart disease (Lockyer & Thompson, 2009). This information is cause for concern when examining current American lifestyles, in which stress is the norm. Thus, Americans may be at increased risk

for heart disease. In addition, many Americans are struggling to balance work, finances, family life, and time to practice healthy behaviors (American Psychological Association, 2010). Strategies for reducing stress include regular aerobic exercise; supportive family and friends; and/or relaxation techniques, such as yoga (Gerstenblith & Margolis, 2008).

## Method

Fifty-one participants were included in this study. The study consisted of an 8-week, 16-session educational program that included pre– and post–health screens for comparison purposes. The health screens included assessments of total cholesterol, HDL cholesterol, LDL cholesterol, triglycerides, glucose, weight (pounds), body mass index, systolic blood pressure, diastolic blood pressure, and pulse. Screening component data were placed into one of five categories: ideal, elevated, high, very high, and dangerous. Aggregate data for the group were used to compare the pre– and post–health screen data for each screening. Sessions were held every Monday and Thursday throughout the 8 weeks and averaged 2 hr per class. The sessions included educational information on making healthier food choices, adding more physical activity into lifestyle, managing stress effectively, and stopping tobacco use and limiting alcohol use. The cost for participation in the program was $399 for individuals and $650 for couples. Data analysis compared the pre- and postprogram results of the heart screen to see if improvements were made in the group's results as an outcome of the lifestyle changes made. The study was approved by the institutional review board (IRB) at a Midwestern university.

## Results

Results show the CHIP program was effective in reducing health factors related to heart disease by anywhere from 19.2% to 4.8% from pre- to postscreening. These data are presented in Tables 1–6 and Figures 1–6. Some of the most significant improvements were made in total cholesterol (see Table 4 and Figure 4), LDL cholesterol, and weight (see Table 1 and Figure 1). The average total cholesterol levels went from 189 mg/dl to an ideal range of 159 mg/dl. Even more impressive, the individuals who had dangerously high cholesterol levels showed an 18% change with a decrease of 51 mg/dl. The largest and

possibly the most significant improvements were in the LDL cholesterol levels. The group LDL average went from 100 mg/dl to 81 mg/dl, which is a 19% decrease. Those participants with very high LDL levels showed substantial improvements as well. Their average went from 158 mg/dl to 112 mg/dl, equaling a 29% decrease in LDL levels. Last, participants in each category showed decreases in weight that ranged from 2 to 10 lb (see Table 1 and Figure 1).

## Discussion

The results of this research suggest CHIP is an effective lifestyle change program. This program included group support, biweekly educational videos/ lectures, instruction in self-monitoring of eating habits and physical activity levels, mentorship from a trained CHIP facilitator, and community involvement from local restaurants that provided CHIP-compliant menu options for CHIP participants.

To further validate the effectiveness of the CHIP program, it is important to discuss the heart screen results. The group as a whole showed improvements in major health components linked to heart disease, including BMI (see Table 2 and Figure 2), blood pressure (see Table 3 and Figure 3), and cholesterol (see Table 4 and Figure 4). The group showed a decrease in BMI in each of the five categories that were used. Blood pressure also decreased for each category except for two of the diastolic readings. Last, total cholesterol for each category also decreased significantly from the first heart screen to the second heart screen. These results support the validation of CHIP as an effective lifestyle change program that could be used as a blueprint for implementing similar programs in other communities.

**Table 1**
*Weight Changes Based on Screening 1 Weight Categories*

| Categories | # | Screening 1 average lb | Screening 2 average lb | Change (lb) | Change (%) |
|---|---|---|---|---|---|
| Underweight | 1 | 92.0 | 90.0 | −2.0 | −2.2 |
| Ideal weight | 19 | 142.2 | 136.3 | −6.1 | −4.3 |
| Overweight | 5 | 175.4 | 169.6 | −5.8 | −3.3 |
| Obese I | 12 | 204.2 | 194.1 | −10.1 | −4.9 |
| Obese II | 5 | 201.0 | 192.0 | −9.0 | −4.5 |
| Obese III | 9 | 243.0 | 233.3 | −9.7 | −4.0 |

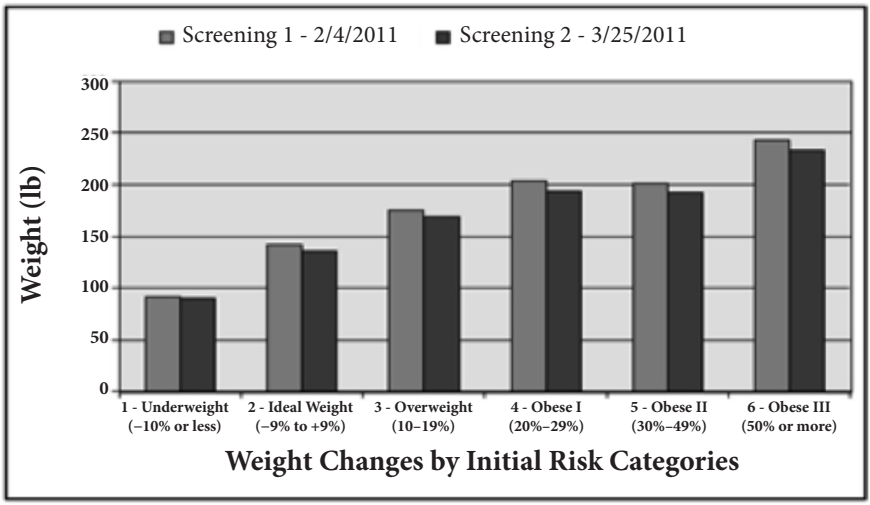


***Figure 1.*** Weight changes based on Screening 1 weight categories.

**Table 2**
*Body Mass Index Changes*

| Categories | # | Screening 1 average lb | Screening 2 average lb | Change (lb) | Change (%) |
|---|---|---|---|---|---|
| Underweight | 0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Ideal weight | 12 | 21.2 | 20.3 | −0.9 | −4.1 |
| Overweight | 12 | 26.7 | 25.5 | −1.3 | −4.8 |
| Obese I | 16 | 31.9 | 30.5 | −1.4 | −4.4 |
| Obese II | 7 | 37.7 | 35.9 | −1.8 | −4.8 |
| Obese III | 4 | 44.1 | 43.1 | −0.9 | −2.1 |

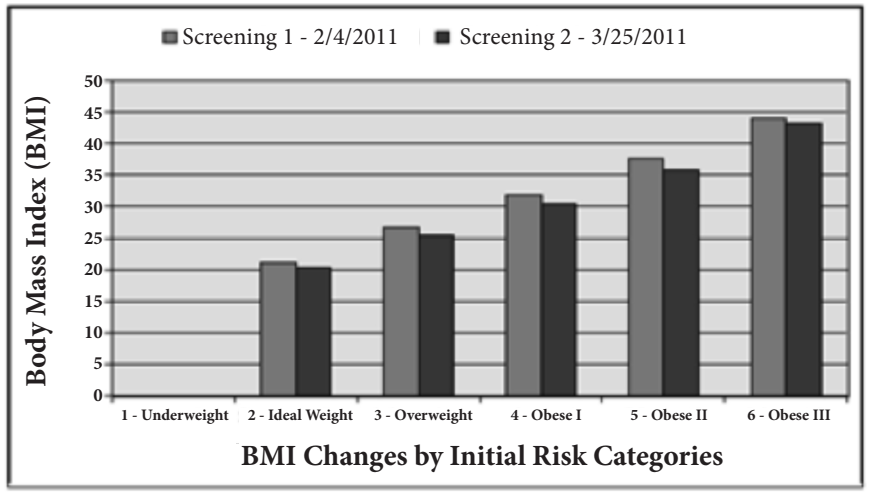


***Figure 2.*** Body mass index changes.

**Table 3**
*Blood Pressure Changes*

| Categories | # | Screening 1 average | Screening 2 average | Change (mmHg) | Change (%) |
|---|---|---|---|---|---|
| Ideal blood pressure | 16 | 110/67 | 112/69 | 2/2 | 1/2 |
| High normal | 14 | 121/78 | 120/83 | −1/5 | −1/6 |
| High blood presssure | 17 | 138/82 | 120/81 | −18/−1 | −5/−4 |
| Dangerous | 4 | 143/99 | 131/85 | −13/−14 | −9/−14 |

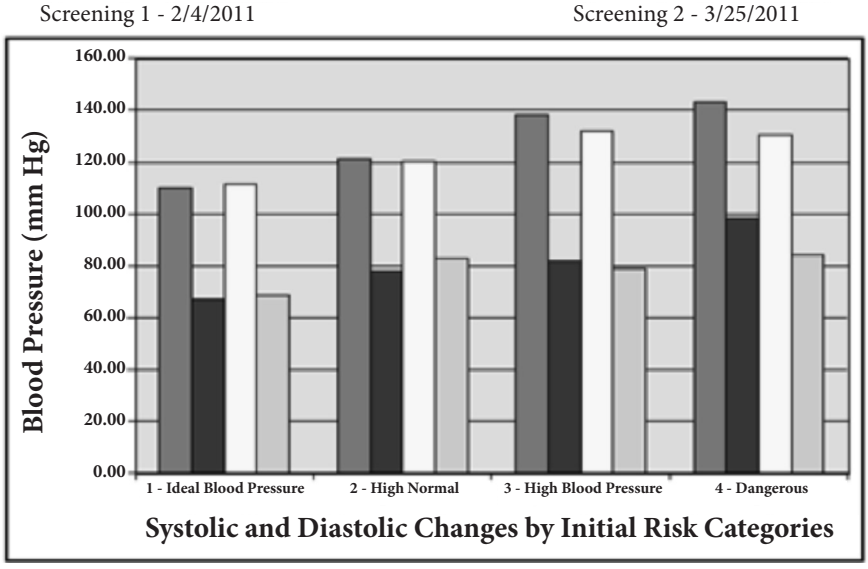


***Figure 3.*** Blood pressure changes.

**Table 4**
*Total Cholesterol*

| Categories | # | Screening 1 average lb | Screening 2 average lb | Change (lb) | Change (%) |
|---|---|---|---|---|---|
| Ideal | 14 | 138 | 131 | −7.5 | −5.4 |
| Elevated | 19 | 170 | 148 | −22.2 | −13.0 |
| High | 4 | 199 | 167 | −31.3 | −15.7 |
| Very High | 12 | 241 | 204 | −37.0 | −15.4 |
| Dangerous | 2 | 273 | 221 | −51.3 | −18.8 |

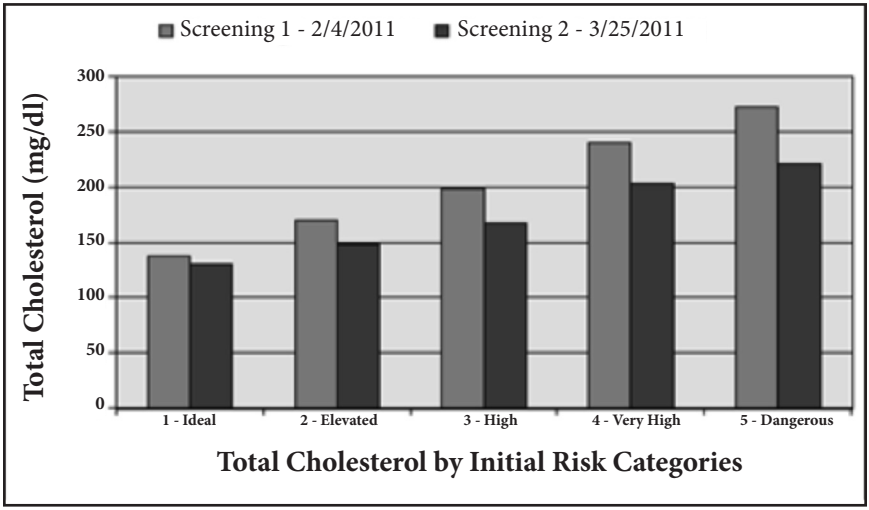


***Figure 4***. Total cholesterol.

**Table 5**
*Blood Sugar*

| Categories | # | Screening 1 average lb | Screening 2 average lb | Change (lb) | Change (%) |
|---|---|---|---|---|---|
| Ideal | 36 | 85 | 84 | −0.9 | −1.1 |
| Elevated | 6 | 106 | 94 | −11.3 | −10.7 |
| Pre-diabetes | 4 | 119 | 107 | −11.5 | −9.7 |
| Diabetes | 5 | 145 | 128 | −17.6 | −12.1 |

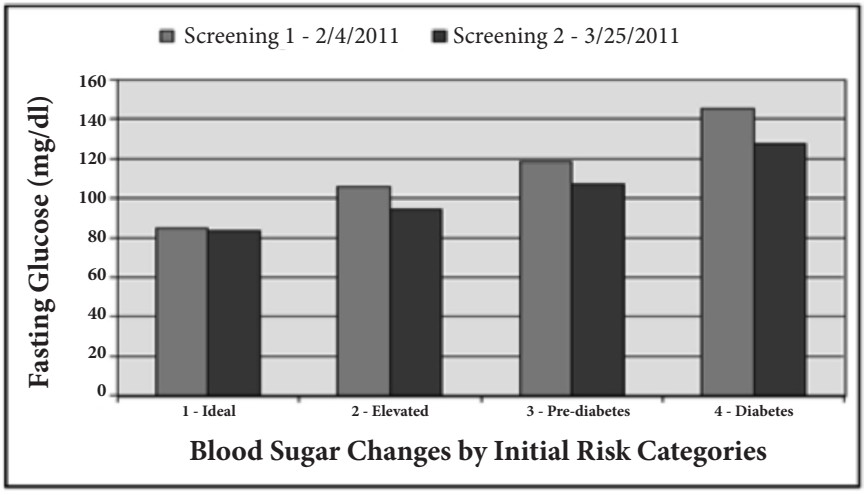


***Figure 5.*** Blood sugar.

**Table 6**
*Triglycerides*

| Categories | # | Screening 1 average lb | Screening 2 average lb | Change (lb) | Change (%) |
|---|---|---|---|---|---|
| Ideal | 36 | 90 | 97 | 6.2 | 6.8 |
| Elevated | 6 | 180 | 154 | −25.5 | −14.2 |
| High | 8 | 239 | 204 | −35.1 | −14.7 |
| Very High | 1 | 376 | 434 | 58 | 15.4 |
| Dangerous | 0 | 0 | 0 | 0 | 0 |

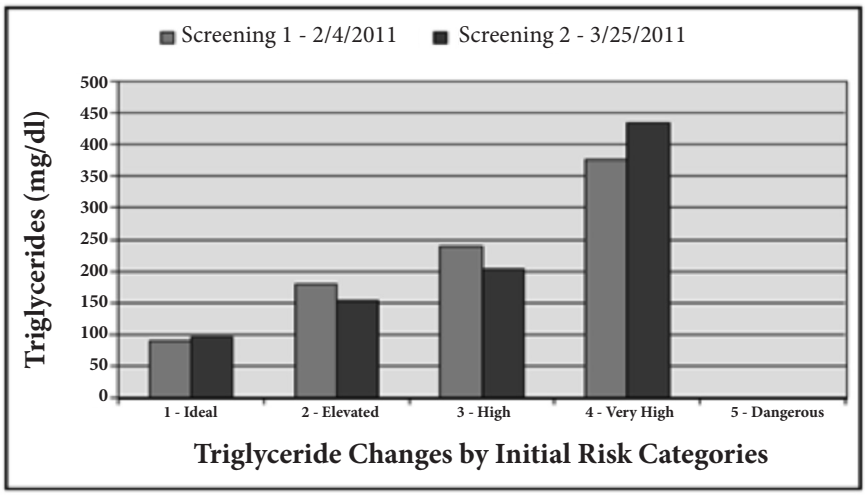


***Figure 6.*** Triglycerides.

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