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A video-based lifestyle intervention and changes in coronary risk

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Abstract

If population-wide improvements in nutrition and physical activity behavior are to be made, behavior change interventions must use a variety of media. This study examines whether participation in a facilitator-based video version of the Coronary Health Improvement Project could significantly reduce coronary risk. A total of 28 video classes conducted in worksite, medical and community settings were used to teach 763 middle-aged adults, ages 30–79 years, about healthy lifestyles. Four to 8 weeks after baseline, follow-up measures were taken. Demographic and biometric data [body weight, body mass index (BMI), blood lipids, blood pressure and fasting blood glucose] were gathered. The class participants were evaluated in aggregate and showed significant improvements in body weight, BMI, resting heart rate, total cholesterol, low-density lipoprotein, triglycerides and fasting blood glucose. Males demonstrated greater improvement than females, and individuals with higher baseline health risks experienced the greatest reductions in risk. This video lifestyle change program appears to help participants make important lifestyle changes. For individuals empowered to make better choices regarding diet and exercise, significant improvements occurred in most coronary risk factors in as little as 4–6 weeks.

Introduction

Lifestyle interventions use education, training and environmental and community change to help individuals adopt and maintain healthy behaviors and reduce cardiovascular risk factors. Comprehensive lifestyle interventions include the Diabetes Prevention Program [1], PREMIER clinical trial [2] and Dietary Approaches to Stop Hypertension [3]. Other lifestyle change programs have been conducted in a community-based or residential environment [4–10]. Evaluations of all these programs have documented reductions in total cholesterol, low-density lipoprotein (LDL) cholesterol, blood pressure, body weight and some reductions in triglyceride and glucose levels. Each of these programs has been able to improve nutrition and physical activity behavior and reduce the level of several coronary risk factors.

The Coronary Health Improvement Project (CHIP) was created with the goal of reducing atherosclerosis-related diseases and improving the overall health of the public by providing a lifestyle change program to both the community and the workplace [5]. The CHIP program, originally developed as a 30-day, 40-h live-lecture educational course, highlights the importance of making better lifestyle choices for preventing and reducing coronary heart disease (CHD). The program also

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teaches participants how to implement these choices in a group setting.

Using the CHIP program in a community setting, Diehl was able to use a one-group pre-test/post-test design to document significant reductions in several CHD risk factors [5]. Pre- and post-intervention (4 weeks) data from 288 participants were gathered and analyzed. Results indicated significant ($P < 0.001$) decreases in blood pressure, body mass index (BMI) and body weight. Participants also experienced significant ($P < 0.05$) reductions in total serum cholesterol and LDL cholesterol levels. Men and women with the highest baseline LDL cholesterol levels (>189 mg dL^{-1}) exhibited the largest decreases (34 and 19%, respectively). Additionally, 83% of the male participants who had elevated triglyceride levels at baseline were able to lower their triglyceride levels. A clinical trial of the CHIP program showed similar results after 6 weeks [11] and most of these risk factor improvements continued after 6 months [12].

In attempts to make the CHIP program more accessible to a wider audience, each of the live presentations was videotaped. These videos were then used in conjunction with trained and certified group facilitators who worked with the video program participants to help them understand and implement the information into daily life. The video version allowed individuals in a variety of settings to participate in the program; as opposed to the live sessions, which were limited to the availability of a qualified speaker/lecturer. Based upon previously published research on the CHIP program, we hypothesized that the facilitator-based video version of the CHIP program could significantly reduce coronary risk factors.

Methods

Recruitment and design

The SwedishAmerican Center for Complimentary Medicine (SACCM) offered the video program in the Rockford, Illinois, metropolitan area. SACCM targeted adults in the greater Rockford, Illinois, metropolitan area through advertizing, marketing through the Centers of Excellence, CHIP alumni groups, corporate client sites and the Swedish-American Medical Group. Interested participants had to meet the following inclusion and exclusion criteria: be able to attend at least 12 of the 15 sessions, live in the Rockford, Illinois metropolitan area and be willing to have two fasting blood draws performed. Non-English speakers and those under the age of 18 were excluded. The video program was offered in worksite, community and medical small-group settings. Participants received encouragement to participate with a spouse or companion. Several employee groups, community organizations and faith-based communities offered the video program.

A pre-test/post-test design was used with multiple groups gathered into one large cohort. Follow-up measures were taken after 4–8 weeks, depending on the frequency of the weekly sessions. Although the program start dates were scattered among cohorts and sites, programs were conducted between 2000 and 2004. At baseline, each participant completed the 'Heart Screen', a self-reported questionnaire that gathered information on demographics, lifestyle habits, medication use and a short medical history. On the same form, a registered nurse entered all biometric data including height, weight, blood pressure, blood lipids and fasting blood glucose. All completed Heart Screen forms were reviewed by a nurse; those participants identified as having medical issues were referred to a physician or to their medical care provider. The attending nurse made written, individualized recommendations on each form, and a copy was returned to each participant. After completion of the baseline Heart Screen, participants began 4–8 weeks of educational lectures delivered via video and augmented by trained facilitators. At the end of the intervention, the second Heart Screen, identical to the one used at baseline, was administered. Participants were not compensated for program participation. The study was approved by the Institutional Review Board of the SwedishAmerican Health System, January 2003.

Intervention

The intervention used for this study was the facilitator-based video version of the CHIP [5]. Participants met for 4–8 weeks depending on meeting frequency. Some met four times each week for 2 h for 4 weeks and others met twice a week for 2 h for 8 weeks where they received instruction via 16 CHIP video tapes. The decision to have a 4- or 8-week program was left to the sponsoring organization. The CHIP curriculum via video included the following topics: modern medicine and medical myths, atherosclerosis, coronary risk factors, obesity, dietary fiber, dietary fat, diabetes, hypertension, cholesterol, exercise, osteoporosis, cancer, lifestyle and health, the Optimal Diet, behavioral change and self-worth.

In conjunction with the CHIP videos, participants received a textbook and workbooks that closely followed the video topics and contained assignments with learning objectives for each topic presented. These assignments were designed to help in the understanding and integration of the concepts and information presented in the videos. Participants also had access to scheduled shopping tours and cooking demonstrations given by a dietitian. Additionally, dietitians and medical professionals were invited to speak to each cohort, providing nutritional and medical advice.

A trained facilitator presided at each of the intervention sites and was responsible to answer questions regarding the video presentations, the workbook assignments and the program. The training and certification of the facilitators involved a 2.5-day workshop which provided an overview of the program, its concepts and philosophy, behavior change models and strategies and training for the screening procedures. The facilitators were trained in how to administer and interpret the Heart Screen results, following standardized CHIP protocols, and understand learning procedures as outlined in the Facilitator Manual. Most program facilitators were nurses, dietitians or corporate health promotion professionals.

Along with the educational video program, participants were encouraged to follow pre-set dietary and exercise goals. The dietary goal involved adopting the more plant-food-based 'Optimal Diet' [5]. This largely unrefined complex carbohydrate-centered diet (65–70% of total calories) emphasizes foods such as grains, legumes, vegetables and fresh fruits *ad libitum*. The Optimal Diet is low in fat (<20% of energy), animal protein, sugar and salt, yet high in fiber and virtually free of cholesterol. At the same time, CHIP program participants were encouraged to build up toward walking or exercising at least 30 min a day [13]. Participants kept a self-reported exercise log to record the miles walked each day and to record any qualitative comments. These logs were not designed to provide quantitative measures of miles walked and were not part of the data analysis. During each class, exercise logs were checked by program facilitators.

Measures

In addition to the demographic information, biometric data were gathered. After resting for 5 min, blood pressure was measured using the guidelines set forth by the American Heart Association [14]. After a 12-h fast, phlebotomists conducted a venipuncture. The samples were drawn into a Vacutainer (Becton-Dickinson Vacutainer Systems, Rutherford, NJ, USA), allowed to clot, centrifuged and taken to the SwedishAmerican Health System's (Rockford, IL, USA) outpatient laboratory for analysis following the lipid standards provided by the Centers for Disease Control and Prevention. Glucose, total cholesterol, high-density lipoprotein (HDL) cholesterol and triglyceride concentrations were determined using Kodak Ektachem serum cholesterol oxidase assays. LDL values were calculated as follows: LDL = total cholesterol − HDL − (triglycerides × 0.16) [15]. LDL could not be calculated when triglyceride values exceeded 400 mg dL^{-1}.

BMI was determined using the formula: weight (kg)/height (m^2). Weight and height were measured using standard medical weight and height scales recently calibrated by the Biometrics Department of the SwedishAmerican Health System. All clinical data were collected by a registered nurse. Smoking was assessed by self-report.

Program attendance was monitored each day as participants signed attendance rolls. To successfully complete the program and graduate, participants had to attend at least 12 of the 15 sessions. Participants who missed a session could check out the appropriate video, view it at home and turn in a one-page summary highlighting the information discussed in the video and still get credit for attending. Less than 5% of participation was from take-home videos.

Statistical analysis

Cross-tabulations were used to perform bivariate analyses between selected variables, with statistical significance based on the chi-square test for independence [16]. The Mantel–Haenszel chi-square test was used to evaluate change in trend [17]. The *t*-test was used to evaluate the null hypothesis that the change in population mean from baseline to follow-up was zero [18]. To clarify the effect of the program on individuals with elevated risk, baseline risk scores were used to categorize program participants according to established risk cut-points. These groups were tracked across time. (Table 4) This analysis provides a more detailed evaluation by isolating those who have elevated risk.

To control for moderating effects, changes from baseline to follow-up for BMI, resting heart rate and cholesterol total, HDL and LDL were adjusted for differences in age, sex, marital status, heart disease, cancer, diabetes, being overweight, asthma/hay fever, live with heavy smoker, smoker, alcohol drinker and exercise using multiple regression. These regression models were calculated, with the best-fitting models determined using backward elimination and the 0.1-level of significance. Analyses were performed using SAS version 9.1 (SAS Institute Inc., Cary, NC, USA, 2003). Procedure statements used in SAS for assessing the data were PROC FREQ, PROC GLM, PROC MEANS and PROC TTEST. Except in the case of model selection, statistical significance was based on the 0.05 level.

Results

A total of 28 video classes were held. The average number of participants was 25.6 (SD = 16.4), the largest class had 68 participants and the smallest had three. Seventeen of these classes were offered through worksites, eight were offered through medical facilities and two were community based. Of the 763 participants who started the video classes, 714 or 93.6% completed the lifestyle evaluation at both baseline and follow-up. Analyses are based on individuals in these groups. The majority of participants were female, married and obese. Selected demographics, chronic disease history and lifestyle behaviors are shown in Table 1.

Two video program formats were offered. Some participants met four times each week for 2 h for 4 weeks and others met twice a week for 2 h for 8 weeks. Comparisons between the participant outcomes from these two formats showed no significant differences.

Changes in health risk factor scores from baseline to follow-up are shown in Table 2. Significant decreases occurred in BMI, weight, systolic blood pressure, diastolic blood pressure, resting heart rate, total cholesterol, HDL cholesterol, LDL cholesterol, triglycerides and glucose across time.

Mean changes in BMI, resting heart rate, total cholesterol, HDL cholesterol and LDL cholesterol were regressed on selected variables in Table 3. Estimates are only shown in the table if they were significant at the 0.10 level. This significance level applies only to a variable being part of the regression equation. *P*-values for a significance difference in risk for each independent variable are superscripted and shown at the bottom of Table 3. Age, history of heart disease, history of cancer and asthma/hay fever were not statistically associated with either BMI, resting heart rate, total cholesterol, HDL cholesterol or LDL cholesterol and were dropped from the model. Decrease in BMI at follow-up of the program was greater in males, married people, those without a history of diabetes, those with a history of being overweight and those who did not exercise at baseline. Decrease in resting heart rate is greater in those who did not exercise at baseline. Decrease in total cholesterol was greater in males, in those who did not live with a heavy smoker and in those who did not exercise at baseline. Decrease in HDL cholesterol was greater in females, in those

Table I. *Selected demographics, chronic disease history and lifestyle behaviors*

	n	%		*n*	%
Age			Exercise		
30–39	91	12.75	None	257	36.66
40–49	176	24.65	Mild 2–3 days week^{-1}	254	36.23
50–59	254	35.57	Moderate 3–5 days week^{-1}	165	23.54
60–69	147	20.59	Vigorous 4–6 days week^{-1}	25	3.57
70–79	46	6.44			
Sex			History of being overweight		
Male	478	33.05	Yes	377	52.80
Female	236	66.95	No	337	47.20
Marital status			Asthma, hay fever		
Yes	519	74.36	Yes	78	10.92
No	179	25.64	No	636	89.08
History of heart disease[a]			Lives with heavy smoker		
Yes	145	20.31	Yes	40	5.60
No	569	79.69	No	674	94.40
History of cancer			Smoker		
Yes	33	4.62	Yes	37	5.18
No	681	95.38	No	677	94.82
History of diabetes			Alcohol drinker		
Yes	97	13.59	Yes	272	38.10
No	617	86.41	No	442	61.90

[a]History of angina, heart attack, angioplasty, bypass, heart failure, abnormal electrocardiogram (last 3 years) or irregular heartbeats.

Table II. *Change in health risk factors from baseline to follow-up*

Health risk factor	Baseline	Mean change (95% CI)	*t*-test, df (*P*-value)
BMI	32.51	−1.27 (−1.35 to −1.18)	−29.07, 707 (<0.0001)
Weight (kg)	92.43	−3.71 (−3.94 to −3.49)	−32.68, 709 (<0.0001)
Systolic blood pressure (mm Hg)	135.49	−6.45 (−7.60 to −5.31)	−11.07, 706 (<0.0001)
Diastolic blood pressure (mm Hg)	78.39	−3.15 (−3.85 to −2.45)	−8.82, 706 (<0.0001)
Resting heart rate (beats min^{-1})	72.34	−3.16 (−3.91 to −2.42)	−8.35, 693 (<0.0001)
Cholesterol (mg dL^{-1})	201.08	−21.89 (−24.11 to −19.68)	−19.43, 709 (<0.0001)
HDL (mg dL^{-1})	48.51	−5.75 (−6.26 to −5.24)	−22.18, 709 (<0.0001)
LDL (mg dL^{-1})	122.27	−14.94 (−16.73 to −13.15)	−16.39, 681 (<0.0001)
Triglycerides (mg dL^{-1})	159.22	−11.77 (−22.29 to −1.24)	−2.20, 709 (<0.0284)
Glucose (mg dL^{-1})	103.52	−6.75 (−8.20 to −5.30)	−9.13, 699 (<0.0001)

without a history of diabetes and in those who drank alcohol. Finally, decrease in LDL cholesterol was greater in males and in those who did not live with a heavy smoker. The decrease in LDL cholesterol was also lowest in those who exercised at moderate levels at baseline.

Health risk prevalence and change in mean scores at follow-up among participants are shown according to standard health risk cut-points for the risk factor variables in Table 4. This analysis stratifies results according to risk status at baseline. Thirty mean comparisons and eight changes in

Table III. *Adjusted[a] mean changes from baseline to follow-up for BMI, resting heart rate and cholesterol according to selected variables*

	BMI	Resting heart rate (beats min^{-1})	Cholesterol (mg dL^{-1})	HDL (mg dL^{-1})	LDL (mg dL^{-1})
Sex					
Male	−1.29***		−24.43***	−3.50***	−19.26***
Female	−0.92		−13.81	−5.95	−8.41
Marital status					
Yes	−1.18				
No	−1.03				
History of diabetes					
Yes	−0.94**			−3.70**	
No	−1.26			−5.75	
History of being overweight					
Yes	−1.33***				
No	−0.87				
Lives with heavy smoker					
Yes			−14.78*		−10.40
No			−23.78		−17.27
Alcohol drinker					
Yes				−5.22	
No				−4.22	
Exercise					
None	−1.23*	−4.42	−22.03*		−14.99**
Mild 2−3 days $week^{-1}$	−1.29	−2.70	−21.50		−16.01
Moderate 3−5 days $week^{-1}$	−1.05	−1.80	−13.68		−8.64
Vigorous 4−6 days $week^{-1}$	−0.84	−3.32	−19.28		−15.71

Estimates are only included in the table for those variables significant at the 0.10 level.
[a]Mean changes are adjusted for all other variables: age, sex, marital status, heart disease, cancer, diabetes, being overweight, asthma/hay fever, live with heavy smoker, smoker, alcohol drinker and exercise. *$P < 0.05$, **$P < 0.01$, ***$P < 0.001$.

proportions were assessed. The alpha level was adjusted downward to avoid obtaining significance by chance [i.e. 0.0017 (0.05/30) for the mean comparisons and 0.0063 (0.05/8) for the comparison in proportions]. These adjusted alphas refer only to the results shown in Table 4. A significant movement occurred from heavy to lighter weight and from higher to lower systolic, diastolic blood pressure, total cholesterol, HDL cholesterol, LDL cholesterol and glucose. Mean changes were significantly different than zero for levels within each of the variables except in people who were underweight, had normal diastolic blood pressure or optimal LDL at baseline. Participants with low risk would not be expected to experience large changes, but risk values considered to be high would be expected to change significantly. All the significant mean changes were negative except among those with normal systolic blood pressure, normal diastolic blood pressure and normal triglycerides, which were positive. For each variable, the negative changes increased with higher baseline risk.

Discussion

Use of the classroom as an instructional setting has been used throughout history. The spoken word as given by a qualified teacher can be an effective agent for change, even when the desired objective is behavior change. This study shows that change can also occur when the instructor is speaking from a video recording. The format is the same as with a live lecturer, except the speaker is on tape and class questions are directed to a trained facilitator.

Table IV. *Health risk prevalence and change in mean scores*

Health risk status	Number (%) of participants at baseline	Number (%) of participants at follow-up	χ^2, df (*P*)[a]	Baseline mean score	Follow-up mean[b] score	Mean change	*t*, df (*P*)
BMI (kg m^{-2})							
Underweight (<18.5)	5 (0.71)	5 (0.71)	12.28, 1 (<0.0005)	17.83	17.47	−0.36	−0.94, 4 (<0.4023)
Normal (18.5–24.9)	78 (11.03)	116 (16.41)		23.13	22.50	−0.63	−5.36, 77 (<0.0001)
Overweight (25.0–29.9)	218 (30.83)	240 (33.95)		27.63	26.52	−1.11	−20.65, 217 (<0.0001)
Obese (⩾30.0)	406 (57.43)	346 (48.94)		37.14	35.65	−1.49	−23.32, 405 (<0.0001)
Systolic blood pressure (mm Hg)							
Normal (<120)	134 (18.98)	215 (30.45)	42.20, 1 (<0.0001)	109.01	113.30	4.29	3.61, 133 (<0.0004)
Pre-hypertensive (120–139)	281 (39.80)	302 (42.78)		128.48	124.24	−4.24	−5.95, 280 (<0.0001)
High (140–159)	208 (29.46)	143 (20.25)		147.38	138.40	−8.98	−8.58, 207 (<0.0001)
Dangerous (⩾160)	83 (11.76)	46 (6.52)		170.76	147.40	−23.36	−11.75, 82 (<0.0001)
Diastolic blood pressure (mm Hg)							
Normal (<80)	358 (50.71)	432 (61.19)	30.70, 1 (<0.0001)	69.92	70.69	0.77	1.66, 357 (<0.0970)
Pre-hypertensive (80–89)	219 (31.02)	214 (30.31)		82.63	77.75	−4.88	−9.20, 218 (<0.0001)
High (90–99)	97 (13.74)	52 (7.22)		91.78	82.79	−8.99	−11.74, 96 (<0.0001)
Dangerous (⩾100)	32 (4.53)	9 (1.27)		103.47	86.25	−17.22	−11.43, 31 (<0.0001)
Total cholesterol (mg dL^{-1})							
Normal (<200)	363 (51.20)	508 (71.65)	65.96, 1 (<0.0001)	169.34	156.31	−13.03	−10.25, 362 (<0.0001)
Borderline (200–239)	235 (33.15)	152 (21.44)		218.47	192.65	−25.82	−16.49, 234 (<0.0001)
High risk (⩾240)	111 (15.66)	49 (6.91)		267.75	224.76	−42.99	−10.24, 110 (<0.0001)
LDL (mg dL^{-1})							
Optimal (<100)	197 (28.93)	295 (43.32)	53.99, 1 (<0.0001)	82.90	80.38	−2.52	−1.69, 196 (<0.0923)
Above optimal (100–129)	211 (30.98)	226 (33.19)		115.62	102.34	−13.28	−10.37, 210 (<0.0001)
Borderline (130–159)	184 (27.02)	123 (18.06)		142.54	122.68	−19.86	−13.00, 183 (<0.0001)
High (160–189)	65 (9.54)	30 (4.41)		172.15	138.82	−33.33	−9.79, 64 (<0.0001)
Very high (⩾190)	24 (3.52)	7 (1.03)		208.48	164.29	−44.19	−6.36, 23 (<0.0001)
HDL (mg dL^{-1})							
High (⩾60)	139 (19.61)	70 (9.87)	46.30, 1 (<0.0001)	70.15	58.95	−11.2	−16.49, 138 (<0.0001)
Normal (40–59)	369 (52.05)	333 (46.97)		48.53	42.92	−5.61	−17.54, 368 (<0.0001)
Low (<40)	201 (28.35)	306 (43.16)		33.74	31.40	−2.34	−6.78, 200 (<0.0001)
Triglycerides (mg dL^{-1})							
Normal (<150)	414 (58.39)	439 (61.92)	1.50, 1 (<0.2198)	94.96	111.29	16.33	6.49, 413 (<0.0001)
Borderline (150–199)	137 (19.32)	119 (16.78)		171.25	155.22	−16.03	−3.36, 136 (<0.0010)
High (200–499)	147 (20.73)	147 (20.73)		271.87	228.22	−43.65	−6.17, 146 (<0.0001)
Very high (⩾500)	11 (1.55)	4 (0.56)		912.27	319.36	−592.91	−2.25, 10 (<0.0484)
Glucose (mg dL^{-1})							
Normal (<110)	543 (77.68)	601 (85.98)	16.75, 1 (<0.0004)	92.79	90.65	−2.14	−4.62, 542 (<0.0001)
Impaired fasting glucose (110–125)	81 (11.59)	46 (6.58)		116.40	106.18	−10.22	−7.39, 80 (<0.0001)
Diabetes (⩾126)	75 (10.73)	52 (7.44)		167.97	131.84	−36.13	−8.02, 74 (<0.0001)

The adjusted alpha for multiple comparisons is 0.0063 for the comparisons in proportions and 0.0017 for the mean comparisons.
[a]Mantel–Haenszel chi-square test was used to test differences within risk status categories.
[b]Follow-up means are from the same individuals in each baseline risk category.

The taped lecturer gives the presentation and teaches the material and the facilitator assists with discussion and questions. Use of trained facilitators in this setting is just an extension of the train-the-trainer method of education and dissemination [19, 20]. In most cases, the actual role of the facilitator was determined by the dynamics of the group. The videos were produced during a live taping. Many audience questions were fielded on video. This has the effect of reducing group questions for video group participants and lessens the need for the facilitator to be a content expert. In most cases, the facilitator played more of an administrative role, helping to explain the materials and conduct the health screenings.

Effective behavior change interventions must educate, motivate, help build new skills and change environments [21]. This video program was designed to do all four. The program consisted of 32 h of video and facilitated group discussion. Participants who completed the program experienced significant and clinically meaningful improvements in a variety of health risks. In a review of 29 randomized studies that delivered dietary advice and information with the intent-to-reduce cardiovascular risk, Brunner *et al*. [22] reported that these programs are effective. Dietary advice can also reduce dietary quantity and improve dietary quality by increasing the consumption of fruits, vegetables and fiber and decreasing consumption of saturated fats. They can also result in significant reductions in total cholesterol, LDL cholesterol and systolic and diastolic blood pressure.

In the present study, the greatest improvements in health risks were experienced by participants who had the highest health risks at baseline. This significant improvement from high-risk participants can be seen in each of the eight health risks included in Table 4. For example, individuals with 'normal' total cholesterol at baseline experienced a 13-mg dL^{-1} decrease, while those at high risk at baseline experienced a 43-mg dL^{-1} decrease on average. Both groups showed significant reductions in total blood cholesterol, but those with the highest baseline levels experienced the largest declines. It is proper to admit that some of the improvements shown by those with high risks may be influenced by regression to the mean—the tendency for high or low values to migrate to the group mean without any intervention. But, this argument does not counter the fact that those with low levels of BMI, total cholesterol, LDL, HDL and glucose saw their follow-up scores actually move further away from the group mean. 'The higher the health risks are, the harder they fall' is the best way to summarize these findings.

Reductions in blood cholesterol levels among those with high cholesterol at baseline exceeds reductions reported by others[23–26] who used slightly different dietary interventions and participant demographics. These studies reported cholesterol reductions ranging from 9 to14% while the participants in the current study experienced a 16% reduction. This program promoted a low-fat diet, with a dietary fat goal of no >20% of total calories, low in animal protein and saturated fat and very low in dietary cholesterol. With these guidelines, it is possible that the improvements in blood lipids could have come from a reduction in total fat, a change in dietary fatty acids or a reduction in dietary cholesterol. In 1995, Nelson *et al*. [27] suggested that reductions in plasma lipid levels when people are on low-fat diets may be due to changes in the fatty acid composition, not the reduction in total fat content. Since this report, there has been a flurry of research attempting to determine if improvements in blood lipids are a function of changes in fatty acid composition or fat content or both.

Following the findings of recent cohort and case–control studies, many have suggested that blood lipids related to coronary risk may be largely determined by the avoidance of saturated and trans fats and the amplification of both poly and mono-unsaturated fats [28]. Clinical trials have been able to demonstrate additional support for this opinion [29–32]. Previously published studies of the CHIP program showed improvements in blood lipids after 6 weeks with a low-fat diet [5, 11, 12, 33]. Others have reported clinical trials that support the role of low-fat diets in the reduction of blood lipid and blood pressure [34–37].

The potential of this program to alter the incidence of diabetes is equally compelling. Of the participants with baseline fasting blood glucose levels >125 mg dL^{-1} (diabetic), 31% were no longer in that category at follow-up. Similarly, there was also a 43% reduction in the number of participants with impaired fasting glucose at follow-up. Several factors may have contributed to the program's apparent success in improving the levels of blood glucose. Participants were encouraged to walk for at least 30 min each day, recording the miles they covered in that time period. Though exercise was not a major emphasis of the program, it is assumed that participants did engage in regular physical activity. This assumption is supported by the significant reductions in resting heart rate. Improvements in nutrition and physical activity are associated with significant improvements in diabetes risk as whole body glucose tolerance improves, insulin sensitivity increases and the amount of glucose transporter (GLUT4) increases [38].

In this study, self-selection is considered to be both a short-coming and delimitation, reducing the generalizability of these results. It can be assumed that because the participants volunteered for the program, they may have already been contemplating the need for lifestyle change. The participants may have possessed motivational, health and economic characteristics not shared by others. Because of the strong correlation between income and education, it is possible that participants represented a more educated or an elevated socioeconomic status. The time commitment to the program was fairly intense which may have made it more difficult for those who may not have had sufficient leisure time to participate.

During the course of the intervention, it is possible that participants could have initiated or terminated medication use. If a participant stopped taking a hypercholesterolemic medication during the program, the follow-up cholesterol measures would have underrepresented the actual impact of the program. Examination of baseline and follow-up data revealed that none of the participants had been recently prescribed any new risk-reducing medications nor were any of the dosages of current medications increased during the study period.

The most valid criticism of this study is the relatively short follow-up period that was used; all of the changes reported here were experienced in a 4- to 8-week period. Long-term studies of behavior change have demonstrated that it is difficult to sustain lifestyle modifications as most newly adopted behaviors tend to be replaced with previous behaviors. Without further research, it is not possible to estimate long-term reductions in risk. Even though these findings show dramatic improvements in risk, causality cannot be demonstrated without evaluating the program in a randomized, controlled design. It is possible that improvements in health risk could be due to season differences, historical effects or maturation.

This video lifestyle change program appears to help participants make significant lifestyle changes. For individuals willing to make dietary and physical activity changes, significant improvements in weight, BMI, blood pressure, total cholesterol, LDL cholesterol, triglycerides and glucose can be experienced in as little as 4–8 weeks.

Conflict of interest statement

None declared.

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