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Brief Multiple Behavior Interventions in a College Student Health Care Clinic

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Abstract

Purpose—This study examined the effects of brief image-based interventions, including a multiple behavior health contract, a one-on-one tailored consultation, and a combined consultation plus contract intervention, for impacting multiple health behaviors of students in a university health clinic.

Methods—A total of 155 college students attending a major Southern university were recruited to participate in a study evaluating a health promotion program titled Project Fitness during the fall 2005 and spring 2006. Participants were randomly assigned to one of three treatments as they presented at the clinic: 1) a multiple behavior health contract, 2) a one-on-one tailored consultation, or 3) a combined consultation plus contract intervention. Baseline and one-month post-intervention data were collected using computer-assisted questionnaires in a quiet office within the student health clinic.

Results—Omnibus repeated measures MANOVAs were significant for drinking driving behaviors, $F(2,136)=4.43$, $p=.01$, exercise behaviors, $F(5,140)=6.12$, $p=.00$, nutrition habits, $F(3,143)=5.37$, $p=.00$, sleep habits, $F(2,144)=5.03$, $p=.01$, and health quality of life, $F(5,140)=3.09$, $p=.01$, with improvements on each behavior across time. Group by time interaction effects showed an increase in the use of techniques to manage stress, $F(2,144)=5.48$, $p=.01$, and the number of health behavior goals set in the last 30 days, $F(2,143)=5.35$, $p=.01$, but only among adolescents receiving the consultation, or consultation plus contract. Effect sizes were consistently larger across health behaviors, and medium in size, when both consult and contract were employed together.

Conclusions—Brief interventions using a positive goal image of fitness, and addressing a number of health habits using a contract and consultation strategy alone, or in combination, have the potential to influence positive changes in multiple health behaviors of college students attending a university primary health care clinic.

Introduction

Risky behaviors among youth are strongly linked to unhealthy habits in adulthood [1]. According to a recent national survey on substance use [2], 84.5% of college undergraduates drank alcohol in the previous year, 41.0% used tobacco products, and 30.1% used marijuana. Moreover, many college students fail to meet recommended nutritional and physical activity guidelines [3,1]. Added to the aforementioned risk behaviors facing American college students, the transition from high school into college is known as a period of increased stress for this

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age cohort [4]. Ironically, while the college years are often viewed as a time for personal growth and development, they also represent a period of increased risk for morbidity, mortality, and injury associated with multiple health behaviors [5].

The majority of interventions aimed at preventing harm or promoting health of adolescents and young adults have been limited to addressing single behaviors, including those considered brief interventions [6]. Single behavior interventions alone do not address epidemiologic data on the prevalence of multiple risk behaviors among youth [7], and some may prove to be more expensive, less easily adopted by colleges, health clinics, schools, and communities, and have less impact on individual and public health than multiple behavior programs [8]. To date, however, few brief interventions have targeted multiple health habits, perhaps due to concerns that multiple behavior interventions in general may overwhelm participants, or be too lengthy or costly, or fail to address any single behavior in sufficient depth [9].

Recent research has shown that brief interventions using structured one-on-one consultations and goal setting may result in multiple behavior change among both younger and older adolescents [10,11]. While brief interventions have been successfully employed with college students [12], multidimensional programs have targeted multiple health behaviors [13], we were unable to find any studies of college students examining brief interventions that addressed multiple behavior change. One unanswered question is whether or not brief multiple behavior health interventions found efficacious for adolescents will translate to older college-aged youth.

From the aforementioned brief intervention studies a framework for planning multiple behavior health programs is emerging, titled the Behavior-Image Model (BIM) [14]. The BIM postulates that multiple health-related behaviors, including both health risk and health promoting habits can be linked or “coupled” and simultaneously influenced through the portrayal of salient other and future self-images for the target audience. This content in turn is thought to activate prototypes and future self-images through processes of social and self-comparison, leading to improvements in risk and protective factors and subsequent change in targeted health promoting and risk behaviors. Supported by Prospect Theory and related literature on message framing [15,16], the Behavior-Image Model proposes that like health habits can be conceptualized as reinforcing each other toward greater or lesser health and personal improvement, while opposing health risk and health promoting behaviors can be viewed as countering each other. The current study is the first to have examined whether various brief intervention strategies, founded on the BIM and targeting both positive and problem health behaviors, could be potentially efficacious for college students in a primary health care setting.

Methods

Participants

A total of 155 college students attending a large Southern university were recruited to participate in this study during the fall 2005 and spring 2006. The majority of participating students were female (66%), with a mean age of 19 years old ($SD=1.12$). The sample was diverse, with a slight majority being Caucasian (52%), followed by Hispanic (14%), African American (11%), and Asian youth (7%). Most participants lived in off-campus housing (56%), or co-educational residence housing (28%). (See Table 1).

Design and Procedures

Students who were currently enrolled at the target university were recruited to participate in a study evaluating a new health promotion program, titled Project Fitness, for college students attending the student health care clinic. Recruitment involved the following: 1) displaying

posters and flyers at the student health care clinic, 2) placing an announcement on the website of the clinic, and 3) distributing flyers and making announcements in selected undergraduate health courses on campus. Participants were randomly assigned to treatments as they presented at the clinic by using packets that were pre-randomized in sets to ensure equivalent groups. Students were assigned to one of three interventions: 1) Contract with calendar log, 2) Consultation, or 3) Combined intervention consisting of a consultation plus contract with calendar log. After providing written consent, baseline data were collected using a computer-assisted questionnaire in a quiet office within the student health care clinic. Immediately after the collection of baseline data, participants were provided with one of the three interventions, and then completed a feedback form collecting process data on the acceptability of the interventions. One-month follow-up appointments were scheduled for students to return to complete post-intervention data. The university's institutional review board approved the research protocol prior to implementing the study.

Interventions

Contract with Calendar Log—Participants in all three groups were first asked to complete the Fitness Behavior Screen, a nine-item instrument designed to elicit responses on selected health behaviors addressed in the contract and consultation. The items asked participants about their physical activity, exercise, diet, sleep, stress management habits, gender, and their alcohol, cigarette, and marijuana use, using primarily yes and no response questions.

After completing the screen, a trained research staff serving as the project's fitness specialist provided participants with a contract and assisted them in completing it. The contract was based on the Behavior-Image Model [14] by linking multiple behaviors using a goal image of fitness, and research indicating that the selection of self-concordant goals reflecting one's image or aspirations facilitates behavioral change [17]. The Behavior-Image Model is an emerging paradigm for creating multiple behavior health interventions. Specifically, the BIM is a unique planning model which proposes the use of image-based gain and loss framed messages believed to activate prototypes and future self-images thereby coupling and motivating multiple behavior change within a single, brief intervention format. Each contract asked students to select at least one behavior from each of four behavior groups to improve in the next week, including physical activity/exercise, alcohol misuse, and substance use (cigarette and marijuana use), and an "other health behavior" category. The contract took approximately 15 minutes to implement. Participants were then given a 12-week calendar log to check off the behavior goals they achieved at the end of each day of the week, and were instructed to mail back only the first week of the log to the research office using a self-addressed, stamped envelope. The three-month (12-week) calendar log was selected to provide additional support and potentially extend the influence of the brief, one-time contract strategy, while not overburdening participants with a long-term commitment. Given this study was an initial pilot test, participants were asked to return only the first week of the log, but encouraged to complete the entire 12-week log period.

Consultation—After participants completed the Fitness Behavior Screen, those assigned to receive the one-on-one consultation were provided with tailored, scripted messages by the fitness specialist using a consultation protocol. Consultations lasted approximately 25 minutes, and like the contracts, were provided in a private office at the student health care clinic. The consultation was based on the Behavior-Image Model [14] by using gain framed messages illustrating how health promoting behaviors promote salient other and self-images, while loss framed messages showed how health risk behaviors interfere with image outcomes and achievement of health promoting habits. The consultation protocol provided tailored content addressing each of the health behaviors in the screen and their relation to salient image

achievement. PowerPoint slides were shown at designated points in the consultation to highlight key images and health behaviors using colorful text and illustrations.

Consultation plus Contract with Calendar Log—Students assigned to this treatment received both of the aforementioned interventions. Specifically, these participants were administered the same screen, followed by the consultation, and then the contract with calendar log by the fitness specialist as described above.

The fitness specialist received a two-day training that included demonstrations, role-playing with other research personnel, feedback from project staff, and take-home practice on how to implement the screen, consultation, and contract. The quality of consultation and contract protocol implementation was monitored over time by audio-taping selected sessions. Periodic meetings were held with the fitness specialist to provide feedback regarding protocol compliance, as well as to discuss specific steps to enhance protocol implementation.

Measures

The Fitness & Health Survey [18] was used to collect data on alcohol, cigarette, and marijuana consumption, physical activity, exercise and other health promotion behaviors, and various image-related factors associated with the Behavior-Image Model [14]. The instrument was pilot tested on a sample of college students to ensure a psychometrically sound and highly readable instrument for the target population, and standardized procedures for administering the questionnaire were developed.

Health risk behaviors measured included alcohol, cigarette, and marijuana use items adopted from standard youth substance use instruments and research [19,20], including three measures of length of use, 30-day frequency, and 30-day quantity for alcohol ($\text{Alpha}=.79$), cigarettes ($\text{Alpha}=.89$), and marijuana ($\text{Alpha}=.92$). In addition, two measures of riding with a drinking driver, and driving while drinking alcohol, were adopted from prior epidemiologic studies [21,22] ($\text{Alpha}=.68$).

Health promoting behaviors measured included physical activity and exercise, nutrition habits, sleep habits, substance use self-control behaviors, stress management techniques, and health behavior goal setting, as well as self-reported health status. Five physical activity and exercise measures were adopted from past research and included length of use, 30-day vigorous physical activity, 30-day moderate physical activity, 7-day strenuous exercise, and 7-day moderate exercise [21,23] ($\text{Alpha}=.76$). Three nutrition habits were based on dietary guidelines from the U.S. Departments of Health and Human Services and Agriculture [24] and included past 7-day servings of fruits and vegetables, and number of times eating foods containing good carbohydrates and fats ($\text{Alpha}=.77$). Sleep habits were measured using both quantity of sleep in hours each night, and frequency of getting enough sleep, taken from prior research on sleep patterns [25,26] ($\text{Alpha}=.78$). A 17-item measure of self-control behaviors used in the past 30-days to avoid or limit alcohol, cigarette, or marijuana consumption was adopted from previous research examining youth alcohol self-control [27,28] ($\text{Alpha}=.88$). Frequency of five techniques used to relieve stress in the past 30-days was adopted from a measure of health promotion for adolescents [29] ($\text{Alpha}=.60$). Setting or trying to achieve six specific health behavior goals in the last 30-days was adopted from related prior research [30] ($\text{Alpha}=.61$). In addition, quality of life was measured using the number of days during the past 30 days that physical health, mental health, spiritual health, and social health was not good, and the number of days that poor health of any kind kept one from doing their usual activities, adopted from research on health quality of life among adolescents [31] ($\text{Alpha}=.73$).

Belief and image-related measures collected for this study included three self-image scales, body image satisfaction, and two sets of health behavior coupling beliefs, one measuring

alcohol interfering with various health habits, and the other measuring physical activity/exercise improving different health habits. The three image scales measured self-images related to being physically active and athletic (four items, Alpha=.73), a drug user (three items, Alpha=.74), and a partier (three items, Alpha=.78), using items adopted from previous published studies of adolescent self-image and prototypes [32–34]. Satisfaction with body image was adopted from prior research on body image self-evaluation among adolescents [35]. Two sets of beliefs about health behavior couplings were adopted from previous research [36], with one assessing whether too much alcohol interferes with other health behaviors (five items, Alpha=.89), and the other measuring if regular physical activity/exercise improves other health behaviors (four items, Alpha=.86). In addition, a number of socio-demographic measures were collected. (See Table 1).

Data Analysis

All analyses were performed using SPSS version 13.0. Baseline measures were compared across treatment group using chi-square tests for categorical data, and analysis of variance (ANOVA) tests for continuous scores. Repeated measures MANOVAs and ANOVAs were used to test intervention effects over time, first, on behavior measures and, second, on image and belief measures. Repeated measures MANOVAs were performed to more efficiently address the multiple health behaviors targeted by the intervention, and because the dependent variables were not perfectly correlated. This approach creates a new dependent variable maximizing group differences, while controlling for Type I error resulting from performing individual tests on multiple dependent variables. Repeated measures ANOVAs were used to examine temporal effects on single health behavior and non-behavior measures. Effect sizes calculated using Cohen's *d* statistic [37].

Response and Intervention Implementation Fidelity

To determine the likelihood of participants responding to questions in a socially desirable manner, students were asked about their willingness to provide honest answers to questions about their alcohol and drug use and other health habits. At baseline, 96% strongly agreed and 4% agreed that they were willing to give honest answers to questions on the outcome instrument, with none disagreeing or strongly disagreeing, indicating little probable influence of social desirability. In addition, to estimate the extent to which responses may have been unreliable due to participant lying or other factors, we included a bogus (i.e., fake) drug (zanatel) among the list of substances that students were asked whether they used or not in the past 30 days. No one reported using the bogus drug, suggesting that widespread error due to lying or sloppy completion of the data collection instrument was unlikely.

To assess implementation fidelity, we collected feedback from participants immediately after administration of each intervention using self-administered questionnaires. These data showed that all three interventions were rated as excellent or good by at least 96% of participants, using a four-point scale of excellent to poor. No differences were found among treatments on any of the quality or fidelity measures ($p's > .05$).

Results

Baseline and Attrition Analyses

Baseline characteristics of participants by treatment group are shown in Table 1. No differences were found on any of the socio-demographic, substance use, or exercise measures across groups. Seven participants were lost to attrition (5%), with attrition distributed across treatment groups.

Outcome Analysis—Estimated marginal means and standard errors of the primary health behavior measures are shown by group and time in Table 2. Omnibus repeated measures MANOVAs were performed for eight groupings of health behavior measures. These analyses were significant for drinking driving behaviors, $F(2,136)=4.43$, $p=.01$, exercise behaviors, $F(5,140)=6.12$, $p=.00$, nutrition habits, $F(3,143)=5.37$, $p=.00$, sleep habits, $F(2,144)=5.03$, $p=.01$, and health quality of life, $F(5,140)=3.09$, $p=.01$, with improvements on each of these behaviors across time. No differences were seen over time on alcohol, cigarette, and marijuana consumption measures.

Univariate analyses showed decreases in the frequency of riding with a drunk driver, $F(1,145)=9.63$, $p=.01$, and a near significant decrease in driving while drunk, $F(1,137)=3.64$, $p=.06$. In addition, a repeated measures ANOVA showed the frequency of substance use self-control behaviors increased over time for all groups, $F(1,142)=12.71$, $p=.00$. Univariate tests also showed increases in length of time engaged in exercise, $F(1,144)=5.60$, $p=.02$, 30-day frequency of moderate physical activity, $F(1,144)=14.96$, $p=.00$, and 7-day moderate exercise $F(1,144)=13.67$, $p=.00$, over time for all three groups. An increase in the consumption of foods containing healthy fats in the past 7-days, e.g., vegetable oil, seeds, nuts, olive oil, or fish, was found over time, $F(1,145)=4.67$, $p=.03$. In addition, an increase in both the number of hours of sleep each night, $F(1,145)=7.68$, $p=.01$, and frequency of getting enough sleep, $F(1,145)=7.15$, $p=.01$, was seen for all groups over time. Univariate tests also indicated a significant reduction over time for all groups in days that their mental health, $F(1,144)=13.36$, $p=.00$, and spiritual health were not good, $F(1,144)=5.09$, $p=.03$, as well as a reduction in days that poor health kept them from doing usual activities, $F(1,144)=7.49$, $p=.01$, indicating improvements in health quality of life. Lastly, group by time interaction effects showed an increase in the use of techniques to manage stress, $F(2,144)=5.48$, $p=.01$, and the number of health behavior goals set in the last 30 days, $F(2,143)=5.35$, $p=.01$, but only among those adolescents receiving the consult, or consult plus contract.

Effect sizes calculated for significant univariate tests ranged from small to medium, but were primarily medium in size for adolescents receiving the consult plus contract. Larger medium effects were seen for 30-day moderate physical activity and 7-day average moderate exercise for adolescents receiving the consult or consult plus contract, with effects approaching a large size for 30-day moderate physical activity for adolescents receiving the consult. Medium size effects for students receiving the consult plus contract were also seen on measures of eating good fats, quality of sleep, self-control behaviors, stress management, setting specific health goals, and activity limitation. Meanwhile, medium effects were seen for students in all groups on improved mental health, and for those receiving the consult and consult plus contract on spiritual health. Lastly, a medium effect was found for adolescents receiving the contract on riding with a drinking driver.

To better understand the differential change in health behavior goal setting by students, we examined the frequency and percentages of participants setting or trying to achieve specific health behavior goals during the past 30 days by group, shown in Table 3. Among participants receiving the contract alone, an increasing proportion set goals related to two health behaviors, while those receiving the consult, and those receiving the consult plus contract, showed increases in goal setting for eight behaviors.

Repeated measures ANOVAs were used to examine a number of belief and image-related factors associated with the underlying Behavior-Image Model. Significant treatment by time interaction effects were found on the self-image of being physically active and athletic, with a decreasing image of being physically active and athletic among students receiving the contract alone, but an increasing image of being physically active and athletic for students receiving the consult, and the consult plus contract, $F(2,144)=4.69$, $p=.01$. A related measure

of body image satisfaction was found to differ over time, with those participants in the contract only group showing no change from pre to post test, but those participants in the consult, and consult plus contract groups showing increased satisfaction with how their body looked, $F(1,144)=4.19, p=.04$. No differences were found on self-image associated with being a partier (e.g., alcohol drinker) or a drug user ($p>.05$). There was a significant difference over time, however, on the alcohol health behavior coupling belief, with participants in all groups more likely to agree that drinking too much alcohol interferes with other health behaviors, $F(1,144)=26.09, p=.00$. Meanwhile, there was a near significant difference over time on the exercise health behavior coupling belief, with students receiving the consult, and those receiving the consult plus contract, more likely to agree that regular physical activity or exercise improves other health behaviors, $F(1,144)=3.70, p=.06$.

Discussion

This study was the first to examine brief multiple behavior health interventions targeting salient images for college students within a campus health care setting. The results indicate that brief interventions providing a positive goal image of fitness, while addressing a number of health habits using a contract and consultation strategy alone, as well as in combination, have the potential to impact multiple health behaviors, including the frequency of both moderate physical activity and exercise, consumption of foods containing healthy fats, the quantity and adequacy of one's sleep, frequency of riding with someone drinking alcohol, use of self-control behaviors to avoid or limit drug consumption, as well as indicators of health-related quality of life.

These findings suggest that the use of a fitness goal image can efficiently link and motivate multiple behavior change. Evidence of the intervention's ability to successfully couple health behaviors was seen in strengthening of beliefs that too much alcohol use interferes with various other health behaviors, and to a lesser extent, that regular physical activity/exercise improves a number of specific health habits. While creating behavior couplings is a goal of the BIM, it is not clear whether or not these linkages resulted in the changes seen across multiple health behaviors. For example, the coupling of excessive alcohol use to other health behaviors did not appear to have an immediate impact on the alcohol consumption of participants. None the less, linking seemingly unrelated health habits (e.g., alcohol use and nutrition) seems important if for no other reason than to be able to create messages targeting multiple health habits within single, efficient interventions. In addition, as suggested in the BIM [14], the use of a salient goal image, such as fitness, may increase awareness of an existing favorable prototype of the physically active peer, leading to changes in related health promoting behaviors.

Meanwhile the consultation, alone and in combination with the contract, appears to have differentially increased both the frequency of using stress management techniques, and setting or trying to achieve health behavior goals. The first finding is important because of the high levels of stress experienced by college students [38,39], whereas the second finding is critical because of the central role that setting and working toward achieving goals plays in successful self-regulation of health behavior [30]. A closer look at goal setting outcomes found that receipt of either consultation intervention was associated with increased proportions of students setting goals on 8 of 10 target health behaviors, compared to increases in goal setting on only two behaviors among students receiving the contract alone. These results suggest the tailored consultations may play an important role in motivating goal setting for a wide range of health habits, beyond what was observed with a behavior contracting strategy alone. In addition, the consult appears to have increased students' self-image as being physically active and athletic, and their body image satisfaction, but did not alter their image of being a partier or drug user. These results are probably due to the emphasis placed on gain framed messages highlighting favorable image attainment for engaging in multiple health promoting behaviors, and indicate

these types of brief communications can enhance positive self-image. Presently, it is unclear whether or not the changes in self-image influenced goal setting or behavior change, as suggested in the BIM. It does appear, however, that the combination of a consult providing salient image messages, along with a multi-behavior contract using a positive goal image, may have the greatest impact on goal setting to improve both health risk and health promoting habits, as well as the size of effects on multiple targeted behaviors.

Unlike our previous trials of brief multiple behavior health interventions for adolescents [10, 11], the current intervention had surprisingly little effect on alcohol, cigarette, and marijuana consumption. Given the apparent increases in the proportion of students setting goals to stop or reduce substance use across all three treatments, this finding may be the result of a post-intervention follow-up period too short to detect change on drug consumption behaviors. For example, our prior studies examined the effects of brief multiple behavior interventions among adolescents at three-months [10] and one-year follow-up [11]. It may also be that the fitness image for college students differs from that of younger students, or those in non-college environments, by including drug using behaviors as consistent, or at least not in conflict, with the prototypical or future self-image of being an active young adult.

This study had a number of limitations which must be considered in interpreting the aforementioned results. First, as previously mentioned, this investigation was limited to a one-month post-intervention follow-up. While an initial pilot trial, additional longitudinal research is needed to determine the full breadth of outcomes that might result from brief multiple behavior health interventions, and the sustainability of these outcomes over time. Second, this study did not include a non-treatment control. Nevertheless, it is highly unlikely that college students would have enhanced so many health habits, set multiple health goals, and even improved in their quality of life without direct intervention. Third, this study examined a relatively small sample from one university. Although the sample was fairly diverse and attempt was made to recruit students both from the health clinic and those taking college coursework, caution should be used in generalizing these results to other college student populations at this time. Lastly, the contract intervention examined in this study included both a goal setting component and a calendar log. Thus, future research is needed to uncouple these two strategies to see which might be the more efficacious component alone, or in combination.

In conclusion, the results of this preliminary pilot trial indicate that brief interventions addressing a salient image of young adults engaged in a physically active lifestyle are acceptable to college-aged youth, and appear to significantly impact a number of health promoting and risk habits. To our knowledge, this is the first time brief interventions linking the co-morbidity of lack of physical activity and substance misuse with positive image messages have been evaluated among college students in a primary health care setting. The emerging Behavior-Image Model provides a rare and much needed framework for planning multiple behavior interventions that may be more cost-effective and feasible than single behavior interventions.

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Table 1

Characteristics of participants at baseline by group

Characteristic	Total sample (n = 155)		Contract (n = 51)		Consult (n = 52)		Consult + Contract (n = 52)		χ^2	df	p-value
	n	%	n	%	n	%	n	%			
Gender											
Male	53	34.2	15	29.4	21	40.4	17	32.7			
Female	102	65.8	36	70.6	31	59.6	35	67.3	1.46	2	.48
Ethnicity											
Hispanic/Latino	33	21.3	12	23.5	10	19.2	11	21.2	.29	2	.87
Race											
White	81	52.3	28	54.9	26	50.0	27	51.9			
Black	17	11.0	4	7.8	7	13.5	6	11.5			
Other	57	36.8	19	37.3	19	36.5	19	36.5	.89	4	.93
Age (M/SD)		19.43/1.12		19.29/1.05		19.48/1.16		19.52/1.16	F = .74	2, 152	.56
School performance (grade)											
Mostly A's	84	54.5	27	52.9	30	57.7	27	52.9			
Mostly B's	59	38.3	21	41.2	18	34.6	20	39.2			
Others	11	7.1	3	5.9	4	7.7	4	7.8	.62	4	.96
Family alcohol/drug problem	57	36.8	20	39.2	19	36.5	18	34.6	.24	2	.89
Health education last year	98	63.2	37	72.5	30	57.7	31	59.6	2.88	2	.24
Living condition											
Single sex residence/dorm	15	9.7	6	11.8	4	7.7	5	9.6			
Co-ed residence/dorm	43	27.7	15	29.4	15	28.8	13	25.0			
Fraternity/sorority	11	7.1	4	7.8	3	5.8	4	7.7			
Off-campus house or apartment	86	55.5	26	51.0	30	57.7	30	57.7	1.13	6	.98
30-day alcohol use											
Yes	120	77.4	39	76.5	42	80.8	39	75.0	.53	2	.77
30-day cigarettes use											
Yes	25	16.1	13	25.5	7	13.5	5	9.6	5.21	2	.07
30-day marijuana use											
Yes	39	25.2	11	21.6	15	28.8	13	25.0	.73	2	.70
30-day moderate physical activity											
Yes	140	90.3	50	98.0	44	84.6	46	88.5	5.62	2	.06
30-day vigorous physical activity											
Yes	148	95.5	50	98.0	48	92.3	50	96.2	2.04	2	.36

Table 2

Estimated marginal means of health behavior measures by group and time

	Contract (n =50)				Consult (n = 49)				Consult + Contract (n =49)				p	d
	Pretest		Posttest		Pretest		Posttest		Pretest		Posttest			
	M	SE	M	SE	M	SE	M	SE	M	SE	M	SE		
Alcohol [*]														
Length of alcohol use	3.82	.23	3.92	.23	4.02	.24	4.00	.24	3.96	.24	3.76	.24	.20	
30-day alcohol frequency	2.74	.19	2.66	.18	2.92	.19	2.83	.19	2.57	.19	2.45	.19	.97	
30-day alcohol quantity	5.16	.47	4.78	.47	5.35	.48	5.08	.48	4.76	.48	4.71	.47	.82	
Cigarettes [*]														
Length of cigarettes use	1.52	.17	1.60	.18	1.54	.18	1.48	.18	1.27	.17	1.29	.18	.71	
30-day cigarettes frequency	1.40	.16	1.42	.16	1.48	.16	1.46	.17	1.20	.16	1.27	.16	.67	
30-day cigarettes quantity	1.36	.10	1.22	.10	1.35	.10	1.33	.10	1.14	.10	1.20	.10	.32	
Marijuana [*]														
Length of marijuana use	1.62	.23	1.74	.23	2.13	.23	2.15	.24	1.96	.23	2.04	.23	.33	
30-day marijuana frequency	1.44	.16	1.38	.18	1.69	.17	1.75	.18	1.49	.17	1.53	.18	.78	
30-day marijuana quantity	1.44	.19	1.42	.20	1.79	.20	1.85	.20	1.55	.19	1.51	.20	.99	
Drinking driving [*]														
Riding with a drinking driver	1.96	.20	1.62	.18	2.20	.20	1.98	.19	1.75	.19	1.56	.18	.01	.32; .14; .15
Driving while drinking	1.38	.16	1.23	.12	1.80	.16	1.53	.12	1.33	.16	1.27	.12	.06	
Exercise														
Length of exercise	4.14	.22	4.18	.20	3.98	.23	4.19	.20	3.55	.22	3.84	.20	.02	.03; .14; .19
30-day vigorous physical activity	4.70	.21	4.58	.21	4.15	.21	4.08	.22	4.14	.21	4.37	.21	.88	
30-day moderate physical activity	4.84	.26	4.94	.20	4.08	.26	5.06	.21	4.33	.26	5.06	.21	.00	.07; .59; .42
7-day average strenuous exercise	4.04	.29	4.14	.25	3.48	.30	3.50	.26	3.84	.29	4.00	.25	.49	
7-day average moderate exercise	4.84	.37	5.14	.32	3.81	.38	4.83	.32	4.18	.37	5.37	.32	.00	.12; .47; .47
Nutrition ^{**}														
Fruits/vegetables	4.62	.33	4.00	.27	3.78	.33	3.86	.28	4.73	.33	4.29	.28	.07	
Good carbohydrates	5.34	.39	4.86	.34	5.37	.39	5.24	.35	6.02	.39	5.76	.35	.22	
Good fats	3.12	.32	3.40	.32	3.53	.32	4.55	.32	4.33	.32	4.27	.32	.03	.15; .45
Sleep habit [*]														
Quantity of sleep	3.24	.15	3.08	.14	3.18	.15	3.08	.14	2.98	.15	2.69	.14	.01	.16; .09; .30
Satisfaction of sleep	2.88	.12	2.66	.12	2.78	.12	2.73	.12	2.67	.12	2.49	.12	.01	.27; .05; .22

	Contract (n =50)				Consult (n =49)				Consult + Contract (n =49)			
	Pretest		Posttest		Pretest		Posttest		Pretest		Posttest	
	M	SE	M	SE	M	SE	M	SE	M	SE	M	SE
Health quality of life [*]	2.22	.17	2.29	.17	2.51	.17	2.24	.17	2.51	.17	2.31	.17
Recent physical health	2.76	.18	2.39	.17	2.71	.18	2.29	.17	2.88	.18	2.47	.17
Recent mental health												
Recent spiritual health	1.86	.24	1.88	.19	2.22	.24	1.71	.19	2.20	.24	1.71	.19
Recent social health	2.04	.16	1.80	.15	2.16	.16	1.92	.15	2.08	.16	2.12	.15
Recent activity limitation	2.12	.16	1.94	.15	2.10	.16	1.84	.15	2.22	.16	1.82	.15
Self-control (total score: 0-17) ^{**}	7.38	.59	8.48	.63	6.69	.59	7.33	.62	6.19	.59	7.96	.63
Stress management (total score: 5-20) ^{**}	12.96	.39	12.26	.38	11.75	.40	12.40	.39	11.86	.39	12.69	.39
Specific health goals (total score: 0-10) ^{**}	5.75	.27	5.27	.35	4.76	.27	5.16	.34	4.71	.27	5.63	.34

* Note.: Higher mean score = higher risk

** Higher mean score = lower risk

^a p value's = Time × Group Interaction

^d Effect size

Table 3
Frequency and percentage of participants setting health behavior goals by group and time

	Contract (n = 49)				Consult (n = 49)				Consult + Contract (n = 49)			
	Pretest		Posttest		Pretest		Posttest		Pretest		Posttest	
	Yes	%	Yes	%	Yes	%	Yes	%	Yes	%	Yes	%
Get more exercise or physical activity	45	91.8	39	79.6	43	87.8	45	91.8	40	81.6	39	79.6
Reduce/stop drinking alcohol	16	32.7	14	28.6	10	20.4	13	26.5	8	16.3	19	38.8
Reduce/stop cigarette smoking	3	6.1	11	22.4	4	8.2	7	14.3	3	6.1	9	18.4
Reduce/stop marijuana use	7	14.3	10	20.4	6	12.2	7	14.3	3	6.1	13	26.5
Eat more healthy/nutritious foods	47	95.9	40	81.6	42	85.7	46	93.9	45	91.8	41	83.7
Control weight better	34	69.4	28	57.1	25	51.0	24	49.0	32	65.3	33	67.3
Get more sleep	41	83.7	37	75.5	36	73.5	31	63.3	39	79.6	41	83.7
Manage stress better	35	71.4	29	59.2	25	51.0	30	61.2	27	55.1	38	77.6
Pray more	24	49.0	21	42.9	16	32.7	21	42.9	13	26.5	20	40.8
Communicate more assertively	31	63.3	25	51.0	26	53.1	29	59.2	21	42.9	23	46.9