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Health behaviors of mandated and voluntary students in a motivational intervention program ☆

Donna M. Kazemi [a,*], Maureen J. Levine [b], Jacek Dmochowski [c], K. Roger Van Horn [d], Li Qi [e]

[a] College of Health and Human Services, School of Nursing, University of North Carolina at Charlotte, 9201 University City Blvd., CHHS 444C, Charlotte, NC 28223, United States
[b] College of Social and Behavioral Sciences, Walden University,155 5th Ave, South, Minneapolis, MN, 55401, United States
[c] Department of Mathematics and Statistics, University of North Carolina at Charlotte, 9201 University City Blvd., CHHS471, Charlotte, NC 28223, United States
[d] Department of Psychology, Central Michigan University, Mt. Pleasant, MI 48859, United States
[e] Department of Mathematics and Statistics, University of North Carolina at Charlotte, 9201 University City Blvd, Fretwell 345c, Charlotte, NC 28223, United States

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ABSTRACT

College students engage in many unhealthy behaviors, one of these, heavy alcohol use, is a major global public health problem.

Objective. This longitudinal study examined whether students' mandated/voluntary status in a program to reduce college drinking was associated with overall health, ethnicity, gender, and personality traits. Both mandated and voluntary groups participated in the Motivational Intervention (MI) program to prevent high risk drinking.

Methods. Freshmen (710 voluntary, 190 mandated, $n = 900$) between the ages of 18 and 21, received the MI at baseline and again at 2 weeks, with boosters at 3, 6 and 12 months. Participants completed three measures: the Daily Drinking Questionnaire (DDQ); the Substance Use Risk Profile Scale (SURPS), and the Health Promoting Lifestyle Profile II (HPLPII). Mandated and voluntary participants were compared at baseline and following the intervention using two sample t-tests for continuous variables (overall health, personality traits, drinking measures), and chi-square for categorical variables (gender, ethnicity). Linear mixed models were used to identify associations between HPLP II scores and mandated/voluntary status, time, ethnicity gender and SURPS scale scores.

Results. In both groups, alcohol consumption dropped significantly by 12 months. Overall health-promoting behaviors, physical activity, stress management, and interpersonal relations improved in both groups between baseline and 12 months. Associations were found between alcohol consumption, personality traits, gender, and lifestyle health-promoting behaviors. In particular, impulsivity and hopelessness were associated with poor health behaviors.

Conclusions. Intervention programs to reduce drinking by college students need to address developmental dynamics of freshmen students, including gender, psychosocial factors, personality, and lifestyle health-promoting behaviors.

Introduction

College freshmen experience a dramatic transition from adolescence to adulthood that is characterized by rapid changes in cognitive maturity, social relationships, and self-reliance (Egan and Moreno, 2013; Kuhlmann and Tigges, 2012). College brings excitement as well as challenges, with greater independence, academic and social duties, burdens and stressors (Kazemi et al., 2012). The freshman year is also often marked by unhealthy habits including poor eating habits, physical inactivity and heavy drinking (Larson et al., 2011; Osberg et al., 2012).

Negative alcohol-related consequences include drinking and driving, physical/sexual assault, serious injury, and fatalities (Hingson, 2010; White et al., 2011). Personality factors predispose college students to heavy drinking and alcohol-related risks (Ham et al., 2010). Hustad et al. (2014), for example, found that both impulsivity and hopelessness had direct effects on alcohol-related problems. A lack of positive coping skills and self-esteem has also been found to be associated with the use, intensity, and consequences of drinking alcohol (Lewis and Myers, 2010). These factors also reduce the effectiveness of

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* Corresponding author. Fax: +1 704 687 7018.
E-mail addresses: dkazemi@uncc.edu (D.M. Kazemi), Maureen.levine@waldenu.edu (M.J. Levine), jdmoch@uncc.edu (J. Dmochowski), roger.vanhorn@cmich.edu (K. Roger Van Horn), lqi@uncc.edu (L. Qi).

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alcohol intervention programs and contribute to students' denial of problematic drinking and lack of willingness to stop drinking excessively (Kazemi et al., 2014).

To reduce drinking many colleges have established alcohol intervention programs that are mandated for students who violate campus alcohol policies (Alfonso et al., 2013; Mastroleo et al., 2011). Some studies have found that physical activity was also a factor in drinking behaviors of students (Barry and Piazza-Gardner, 2012; VanKim and Laska, 2012). For example, Barry and Piazza-Gardner (2012) found that college students who were physically active were more likely to binge drink than their nonactive peers.

The current study examined the lifestyle health-promoting behaviors and the role of high-risk personality factors in two groups of students, one mandated and one voluntary, participating in a motivational intervention (MI) program to reduce college drinking. Specifically, the study assessed factors associated with lifestyle health-promoting behaviors including physical activity, spirituality, nutrition, stress management, personality risk factors, and interpersonal relationships of voluntary and mandated students enrolled for a year in an MI program. The primary aims of the study were to identify factors associated with lifestyle health-promoting behaviors of freshmen college students participating in the intervention program over a period of a year and to determine whether these differed in mandated and voluntary participants. The study also considered gender as a potential factor in differences between groups since recent research has shown gender disparities in lifestyle health-promoting behaviors and high-risk drinking (Bhullar et al., 2012; Kelly-Weeder and Edwards, 2011). The following research questions were addressed in the study:

1. Are there differences in health behaviors between the mandated and volunteer groups participating in the MI program at baseline, 3 months, 6 months, and 12 months?
2. Is there an association among health behaviors and personality risk factors (hopelessness, anxiety, impulsivity, and sensation seeking) at baseline, 3 months, 6 months, and 12 months?

Method

The MI program was implemented at a large southeastern public university to address underage drinking among freshman students. The study reported here was part of a larger study that examined the outcomes of the program in this age group. Mandated participants had violated a campus alcohol policy and were required by the dean of students to complete an alcohol education program. Of 278 students mandated during the recruitment period, a total of 190 were recruited to the study. In addition, a total of 710 volunteer students were recruited from freshman seminar classrooms and residence halls on campus. Eligibility criteria for both mandated and voluntary students included enrollment as freshman students, age 18 to 21 years, consumption of alcohol within the previous 90 days, ability to read and speak English, and willingness to participate. Interested students were phone screened to determine their eligibility. Approval for the study was granted by the institutional review board, and participants signed informed consent prior to entering the study. Following determination of eligibility and consent procedures, participants were invited to meet with peer interventionists for an initial, baseline visit. The MI program was then delivered in two brief 50-minute therapy sessions, one following the baseline assessment and the other after 2 weeks, with 50 min booster interventions at 3, 6, and 12 months, and assessments at baseline and at the booster interventions. Volunteer students received a $20 gift card to the university bookstore after completion of each visit. Mandated students had the $50 fee for the university-required alcohol prevention program waived, and after completing the initial two visits, they were given a $20 gift card after completion of each visit.

Participants met individually with trained peer interventionists, who delivered the MI program, which incorporated alcohol education and personalized feedback on drinking patterns. The peer interventionists were graduate students aged 21–25 in counseling, public health, and social work. The peer interventionists were trained in MI techniques and used MI to enhance collaboration with participants and encourage discussion about the participants' drinking behavior. Intervention sessions were modeled after the harm-reduction/alcohol skills training approach (Dimeff et al., 1999).

Measures

Participants completed the Daily Drinking Questionnaire (DDQ; Collins et al., 1985); the Substance Use Risk Profile Scale (SURPS; Woicik et al., 2009) and the Health Promoting Lifestyle Profile II (HPLPII) (Walker et al., 1987) at baseline and again at 3, 6, and 12 months postintervention. Each of these instruments has demonstrated reliability and validity (Allen and Wilson, 2003). During the standardization process, the instrument designers piloted them on college students, ensuring that the instruments were appropriate for use with that population.

The brief, 5-minute DDQ (Collins et al., 1985) measures drinking patterns, including quantity, frequency, and peak drinking events daily over a typical week, averaged over the past 4 weeks. The mean number

Table 1
Comparison of baseline characteristics between mandated and voluntary (*M* and *SD* for continuous variables) and % and counts for categorical variables.

Variable	Category	Mandated ($n = 190$)	Voluntary ($n = 710$)	p-Value
Age		18.2 (2.1)	18.2 (1.8)	.1272
Gender	Females	40% (76)	61.6% (437)	<.0001
	Males	60% (114)	38.4% (273)	
Race (3 categories)	European Americans	76.8% (146)	61.7% (438)	.0002
	African American	6.8% (13)	16.6% (118)	
	Other	16.3% (31)	21.7% (154)	
Drinking	Number of drinks	8.4 (8.0)	12.4 (10.5)	<.0001
SURPS*	Hopelessness (HD)	10.3 (2.8)	10.3 (2.7)	0.387
	Anxiety (ASD)	12.6 (2.5)	13.0 (2.5)	
	Impulsivity (IMD)	10.5 (2.5)	10.7 (2.5)	
	Sensation seeking (SSD)	16.7 (3.3)	16.5 (3.4)	
HPLP** lifestyle subscales	Health	2.2 (0.6)	2.2 (0.5)	.2098
	Physical	2.7 (0.6)	2.6 (0.6)	
	Nutrition	2.5 (0.6)	2.5 (0.5)	
	Spiritual	3.3 (0.5)	3.3 (0.5)	
	Interpersonal	3.2 (0.5)	3.3 (0.5)	
	Stress	2.7 (0.5)	2.6 (0.5)	
HPLP** global		2.8 (0.4)	2.7 (0.4)	.8447

* Substance Use Risk Profile Scale (SURPS).
** Health Promoting Lifestyle Profile (HPLP II).

of drinks per week is calculated by multiplying the amount by the frequency of drinking. The DDQ has demonstrated high reliability, with Cronbach's alphas ranging between .66 and .75. The DDQ also has demonstrated reliability and validity when used with college students, and it has been used to assess the number of drinks consumed and the average number of hours typically spent during the week consuming alcohol (Allen and Wilson, 2003).

The brief, 23-item SURPS (Woicik et al., 2009) assesses personality profiles for alcohol and drug use in addictive behavior. The SURPS has good psychometric properties; its four scales measure four personality risk dimensions: Hopelessness (HD), Anxiety Sensitivity (ASD), Sensation Seeking (SSD), and Impulsivity (IMD). Reliability and construct validity have been established through internal consistency, factor, test–retest, and correlational analyses. Coefficient alphas for SURPS scales ranged from .61 to .84 (Krank et al., 2011; Woicik et al., 2009).

The Health Promoting Lifestyle Profile (HPLP II; Walker et al., 1987) scale used in this study was developed based on the Pender Health Promotion Model (Pender, 1975). This model is a holistic predictive approach to promoting healthy behavior. According to the model, individuals have unique personal characteristics and experiences that affect subsequent actions. Motivation for healthy behavior may be based on a desire to prevent illness (primary prevention) or to achieve a higher level of well-being and self-actualization (Peterson and Bredow, 2004). Health-promoting behavior is a desired outcome. The HPLP II is a 52-item behavior rating scale that employs a 4-point response format to assess self-reported lifestyle health-promoting behaviors. Item score range from 1—Never (N), to 2—Sometimes (S), 3—Often (O), and 4—Routinely (R). The instrument assesses patterns and determinants of health-promoting lifestyles, as well as the effects of interventions to alter lifestyle. The HPLP II has six subscales: Spiritual Growth, Interpersonal Relations, Nutrition, Physical Activity, Health Responsibility, and Stress Management.

Sample HPLP II subscale items include Nutrition, "Eat 2–3 servings of milk, yogurt or cheese each day", Physical Activity; "Do stretching exercises at least 3 times per week", Interpersonal Relations, "Find ways to meet my needs for intimacy", Health Responsibility, "Discuss my health concerns with health professionals", Stress Management, "Practice relaxation or meditation for 15–20 min daily", and Spiritual Growth "Feel connected with some force greater than myself". The alpha reliability coefficient for the total scale is .92; alpha coefficients for the subscales range from .70 to .90 (Walker et al., 1987). The HPLP II total score (global health) represents overall health promoting behaviors. The HPLP II has demonstrated reliability and validity when used with college students (Hacıhasanoğlu et al., 2011; Lee and Loke, 2011). The model has been used extensively with younger populations including college students (Grund, 2013; Pedroza, 2014; Dehdari et al., 2014).

Statistical analysis

We summarized study variables at each time point, using means and standard deviations for continuous variables, and percentages and frequencies for categorical variables. Mandated and voluntary participants were compared at baseline using two sample t-tests for continuous variables (global health, drinking measures), and chi-square for categorical variables (gender, ethnicity). The Hotelling T^2 test was used to compare baseline HPLP II dimensions (health, physical, stress, nutrition, spiritual, interpersonal) and SURPS dimensions (anxiety, impulsivity, hopelessness, sensation seeking) between the groups. The statistical models described below used all available values at each time point (baseline, 3, 6, and 12 months). Unadjusted analyses of longitudinal change in the HPLP II Global measure were conducted using time contrasts in repeated measures ANOVA. We performed analyses with all participants and also with participants stratified by mandated status. A linear mixed model with compound symmetry of a within person covariance matrix was used to examine the associations of the HPLP II measure with demographic variables, measures of drinking, SURPS dimensions, and time. The following strategy was used in the final model selection. The main effect of mandated status (mandated/voluntary) was always kept in the model, regardless of its significance. Potential covariates consisted of gender, race, time, drinking measures, and SURPS dimensions. First, we used backward elimination to identify important covariates, and then in the next step, we examined potential interactions between variables remaining in the model. Models with smaller values of the Bayesian Information

Table 2
Lifestyle subscales and global health over time stratified by mandated and voluntary status (M, SD, p-value $0–t_0$ vs t_3, $3–t_3$ vs. t_6, $6–t_6$ vs. t_{12}, $12–t_0$ vs. t_{12}). Time contrasts in repeated measures ANOVA were used.

					Lifestyle							
	Health				Physical				Nutrition			
Time (months)	0	3	6	12	0	3	6	12	0	3	6	12
Mandated *M*,	2.15	2.21	2.24	2.32	2.60	2.73	2.71	2.82	2.48	2.57	2.53	2.73
SD,	(0.52)	(0.56)	(0.57)	(0.58)	(0.59)	(0.64)	(0.63)	(0.71)	(0.53)	(0.61)	(0.58)	(0.60)
p-value	.1512	.5791	.9705	.1812	.0198	.9077	.3203	.0155	.0650	.6055	.0807	.0091
Mandated vs. voluntary p-value	0.7765	0.2827	0.6254	0.3222	0.4094	0.0076	0.0830	0.0162	0.6050	0.2205	0.9902	0.0122
Voluntary *M*, *SD*, p-value	2.14	2.16	2.21	2.23	2.55	2.54	2.59	2.55	2.45	2.49	2.52	2.49
	(0.51)	(0.54)	(0.52)	(0.55)	(0.61)	(0.64)	(0.62)	(0.66)	(0.52)	(0.55)	(0.54)	(0.55)
	.3122	.0056	.2900	<.0001	.4085	.0602	.5633	.0588	.0202	.0425	.3681	.0023
Total *M*,	2.14	.17	2.21	2.24	2.57	2.59	2.62	2.57	2.46	2.51	2.52	2.52
SD,	(0.51)	(0.54)	(0.53)	(0.55)	(0.60)	(0.65)	(0.62)	(0.67)	(0.52)	(0.57)	(0.55)	(0.56)
p-value	.1110	.0085	.3222	<.0001	.0640	.1290	.7093	.0105	.0033	.1409	.805	.0003
	Spiritual				Interpersonal				Stress			
Time	0	3	6	12	0	3	6	12	0	3	6	12
Mandated *M*,	3.25	3.35	3.30	3.38	3.18	3.25	3.23	3.36	2.61	2.75	2.73	2.84
SD,	(0.44)	(0.48)	(0.53)	(0.56)	(0.46)	(0.48)	(0.53)	(0.51)	(0.45)	(0.49)	(0.53)	(0.56)
p-value	.0786	.5569	.9529	.4455	.2476	.8829	.7237	.2294	.0035	.8735	.5759	.0200
Mandated vs. voluntary p-value	0.2772	0.0978	0.2286	0.1022	0.3169	0.4461	0.0433	0.1212	0.1318	0.0032	0.0504	0.0091
Voluntary *M*,	3.30	3.26	3.37	3.23	3.22	3.21	3.33	3.24	2.55	2.61	2.62	2.62
SD,	(0.45)	(0.49)	(0.45)	(0.53)	(0.44)	(0.46)	(0.46)	(0.53)	(0.44)	(0.44)	(0.44)	(0.50)
p-value	.2825	<.0001	<.0001	.6438	.8273	<.0001	.0014	.0066	.0023	.2288	.9445	<.0001
Total *M*,	3.28	3.28	3.35	3.25	3.21	3.22	3.31	3.24	2.57	2.65	2.64	2.64
SD,	(0.45)	(0.49)	(0.47)	(0.53)	(0.45)	(0.47)	(0.48)	(0.51)	(0.44)	(0.46)	(0.46)	(0.51)
p-value	.9909	<.0001	<.0001	.8899	.4434	<.0001	.0091	.0029	<.0001	.3962	.9473	<.0001

Criterion (BIC) were selected (Schwarz, 1978). Models included all important associations with outcome measure. SAS 9.3 was used in all calculations, and associations with $p < 0.05$ were treated as significant (SAS, 2014).

Results

Participants in both groups were freshmen aged 18 to 21 years. The mandated group had a higher percentage of males than the voluntary group (60.0% vs. 38.4%, $p < .0001$). Racial composition also differed between the groups ($p = 0.0002$) with the mandated group having a higher percentage of European Americans than the voluntary group (76.8% vs. 61.7%), and a smaller percentage of African Americans (6.8% vs. 16.6%). At baseline there were no significant differences between the groups in mean scores on the HPLP II subscales ($p = 0.21$). The global HPLP II score for the groups was also the same ($p = .84$). At baseline, there were no differences between groups on the SURPS scale; all SURPS dimensions had similar mean scores ($p = 0.39$). Students in both groups significantly decreased their alcohol consumption between baseline and 12 months ($p < .0001$). The mandated students decreased their mean number of drinks from 8.4 at baseline to 1.22 at 12 months; similarly, the voluntary students decreased the mean number of drinks from 12.40 at baseline to 3.96 at 12 months (Table 1).

Lifestyle health-promoting scores increased in both groups between 3 and 6 months ($p = .009$), and between baseline and 12 months ($p < .0001$). The mandated group's physical activity scores were higher than the voluntary group's scores at 3 months ($p = .008$) and at 1 year ($p = .02$). The mandated group's nutrition score increased between baseline and 12 months ($p = .009$). However, while the mandated group's nutrition status improved from baseline to 12 months, the voluntary group's scores did not change over the same time period. There were no significant changes in either group's spiritual scores between baseline and 12 months. Both groups' interpersonal relations scores increased from baseline to 12 months ($p = .003$) and both groups' stress management scores increased from baseline to 12 months ($p < .0001$). The mandated group had higher stress management scores than the voluntary group at 3 months ($p = .003$) and at 12 months ($p = .009$).

Global HPLP II scores for all participants increased at 3 months ($p = .004$), at 6 months ($p < .0001$) and at 12 months ($p < .0001$). The mandated group's scores increased at 3 months ($p = .006$) and at 12 months ($p = .008$), and voluntary group's global health scores increased at 3 and 12 months ($p < .0001$). For both groups, the 12-month global health score was higher than the baseline score ($p = .009$, $<.0001$). However, at 12 months ($p = .01$), the mandated group's global health score was higher than that of the voluntary group (Tables 2 & 3).

The Global HPLP II score was associated with group status, gender, time, hopelessness, anxiety sensitivity, impulsivity, and sensation seeking. Both groups had similar scores on all SURPS scales (HD, ASD, IMD, SSD) at baseline, with no significant changes in the dimensions of the SURPS scales over time. Group status interacted with anxiety sensitivity ($p = .001$), and time interacted with gender ($p = .017$), hopelessness ($p = .007$), and impulsivity ($p = .01$). Females scored higher on the global health score than males over time. In both groups, higher sensation seeking scores were associated with better global health scores, whereas high impulsivity scores were associated with lower global health scores. In addition, higher hopelessness scores were associated with lower global health scores (Table 4).

Table 3
Global Health (HPLP) Over Time and Stratified by Status (M, SD, p-value). p-Value ($0–t_0$ vs t_3, $3–t_3$ vs. t_6, $6–t_6$ vs. t_{12}, $12–t_0$ vs. t_{12})Time contrasts in repeated measures ANOVA.

Global health				
Time	0	3 months	6 months	12 months
Mandated	2.71	2.81	2.79	2.92
SD,	(0.35)	(0.42)	(0.45)	(0.47)
p-value	.0059	.8607	.3244	.0086
Mandated vs. voluntary p-value	0.8447	.0149	.7592	.0112
Voluntary	2.71	2.72	2.78	2.74
SD,	(0.34)	(0.38)	(0.35)	(0.41)
p-value	.0908	<.0001	.1320	<.0001
Total	2.71	2.74	2.78	2.76
SD,	(0.34)	(0.39)	(0.37)	(0.42)
p-value	.0036	<.0001	.3235	<.0001

Discussion

This study examined health patterns, personality traits, and gender disparities in mandated and voluntary students participating in a 12-month alcohol prevention program. In both groups, at baseline all dimensions of the HPLP II (health, physical activity, nutrition, spiritual growth, interpersonal relations and, stress management) were fairly similar. The highest baseline scores for both groups were in the spiritual and interpersonal dimensions (over 3.0 at the "Often" level). At baseline, all other dimensions were scored lower, between 2.0 and 3.0 at the "Sometimes" level. These findings are not surprising since for freshmen, developing a sense of identity and exploring relationships are primary tasks (Zimmermann, 2004). In addition, freshmen are at risk for poor health patterns, such as poor diet, weight gain, increased stress, and lack of proper exercise (Egan and Moreno, 2013; Kuhlmann and Tigges, 2012). At baseline both groups had similar scores on the global health measure (mandated 2.8, voluntary 2.7). In both groups drinking decreased significantly between baseline and 12 months. Despite some variations at 3 and 6 months, global health, physical activity, and interpersonal relation, improved significantly in both groups between baseline and 12 months. Although there was only slight improvement in the voluntary group's nutrition status, the mandated group improved significantly between baseline and 12 months. These results are consistent with prior research which found associations between alcohol consumption, physical activity, and nutritional habits (Barry and Piazza-Gardner, 2012; VanKim and Laska, 2012; Dimatteo et al., 2012). However, contrary to Barry and Piazza-Gardner (2012), we found that less drinking was associated with greater physical activity. Since the current study was carried out over a 12-month period, this discrepancy may have been due to differences in methods. At 12 months, for both groups' scores on

Table 4
Associations of global health (HPLP) with time and other study variables while mandated status (M status) is kept in the model independent of its significance (regression coefficients, β, SE, t-value and p-value). Linear mixed model with compound symmetry of within person covariance matrix was used, and all effects in the table are fixed.

Variable	β	$SE(\beta)$	df	t	p
M status	0.16	0.07	1171	2.35	0.0190
Gender	0.05	0.03	789	2.15	0.0024
African American	−0.05	0.04	789	−1.36	0.1741
European American	0.05	0.03	789	1.74	0.0816
Time	−0.01	0.02	1171	−0.73	0.7282
Time^2	0.003	0.001	1171	2.20	0.0279
HD*	−0.05	0.004	1171	−13.11	<.0001
ASD**	0.03	0.005	1171	5.97	0.0016
IMD***	−0.008	0.004	1171	−2.11	0.0350
SSD****	0.009	0.002	1171	3.85	0.0001
M Status × ASD	−0.02	0.005	1171	−3.29	0.0010
Gender × time	0.006	0.002	1171	2.39	0.0169
Time × HD	0.004	0.001	1171	2.69	0.0073
Time × IMD	−0.001	0.0005	1171	−2.58	0.0100
Time^2 × HD	−0.0003	0.0001	1171	−2.90	0.0038

* Hopelessness (HD).
** Anxiety (ASD).
*** Impulsivity (IMD).
**** Sensation Seeking (SSD).

the spiritual growth and interpersonal relations remained the highest, over 3 (often). Despite improvements, none of the dimensions reached level 4 (routinely). Interestingly, between baseline and 12 months, the mandated group's physical activity ($p < .01$) and nutrition ($p < .01$) dimensions improved more than those of the voluntary group. In both groups stress management subscale scores on the HPLP increased significantly between baseline and 12 months, with the mandated group's stress management increasing more than the voluntary group's ($p < .0091$). Both groups' global health scores increased from baseline to 12 months; but the mandated group had a greater increase than the voluntary group. The results suggest a positive impact of the MI program on participants' health, physical activity, nutrition, and interpersonal relations. Research question 1 was supported since the mandated group had higher scores on stress management and showed greater improvement then the voluntary groups on all other dimensions of lifestyle health-promoting behavior. Similarly, women had better lifestyle health-promoting scores than men at all-time points.

Examination of the associations between HPLP health dimensions and personality traits produced some interesting results. For example, participants who were more sensation seeking on the SURPS scale scored higher on the lifestyle health-promoting behavior dimensions, whereas those with greater impulsivity and hopelessness ($p < .0001$) had poorer scores on lifestyle health-promoting behaviors. These results suggest that personality traits such as impulsivity, hopelessness, and anxiety sensitivity predispose college students to developing poor lifestyle health-promoting behaviors. Therefore, Research Question 2 was supported. Our findings are consistent with prior research indicating that personality traits, including impulsivity and hopelessness, have direct effects on risky behaviors (Hustad et al., 2014; Kazemi et al., 2011). However, contrary to prior findings, we found a positive association between sensation seeking and lifestyle health-promoting behaviors (Jackson et al., 2008; Trocki et al., 2009). Gender and high-risk personality factors also affected the outcomes of the program, similar to findings in prior studies (Kazemi et al., 2014; LaBrie et al., 2014; Shin et al., 2012).

The study had several limitations. For example, because it was conducted at a public university in a Southern state, the findings may not be generalizable to universities in other regions of the country. Other limitations of the study were self-selection in the voluntary sample and potential social desirability bias. The study measures were self-report, so the researchers had to depend on the participants to report truthfully. Since this was a longitudinal study that measured drinking over 12 months, the student's natural maturation or other environmental factors, such as, peers, living away from home and parents, may also have affected outcomes. Future studies therefore need to consider including a control group to further explore the causality relationships between motivational interventional programs and changes in health behaviors.

Conclusion

Despite these limitations, this study will be useful for researchers who engage in developing and implementing alcohol intervention programs on college campuses. Our findings suggest that certain personality traits (sensation seeking, impulsivity, and hopelessness) are associated with poor health behaviors. The period of emerging adulthood is an important age for formation of health behaviors associated with increased risk of chronic disease. This study increases our knowledge of this transition period of college students. Despite the fact that the motivational intervention alcohol reduction program did not focus on lifestyle health-promoting behaviors both mandated and voluntary students improved their lifestyle behaviors. The results indicated some positive changes in selected health behaviors for both groups of freshmen, though more so for those mandated to attend the intervention. Collectively, the findings suggest that alcohol intervention programs on college campuses need to use a comprehensive design/method that effectively addresses the developmental dynamics of freshmen students, including gender, psychosocial factors, personality, and lifestyle health-promoting behaviors.

Conflict of interest statement

Authors declare no conflict of interest.

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