The Short-Term Efficacy of a Brief Motivational Intervention Designed to Increase Physical Activity Among College Students

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Background: Research has shown that many college students do not meet recommended national guidelines for physical activity. The objective of this pilot study was to examine the short-term efficacy of a brief motivational intervention (BMI) designed to increase physical activity. Methods: Participants were 70 college students who reported low physical activity (83% women, 60% African American). Participants were randomly assigned to either the BMI condition or to an education-only (EO) condition. They completed measures of physical activity at baseline and 1-month follow-up. Results: Those in the BMI condition reported more vigorous-intensity physical activity at a 1-month follow-up than those in the EO condition. Conclusions: The findings from this study provide preliminary support for the efficacy of a BMI designed to increase physical activity among college students. Future studies should continue to examine and refine the intervention in an effort to improve health-related behaviors among this group.

Keywords: motivational interviewing, personalized feedback, exercise

A high percentage of college students meet the Center for Disease Control and Prevention classifications for being either overweight or obese. For example, national surveys of college students have found that 21.9% to 26.8% of students were overweight (ie, a Body Mass Index of 25.0–29.9) and 8.4% to 10.0% were obese (ie, a Body Mass Index ≥ 30.0). Further, studies have shown that college students gain weight at a higher rate than the national average and that being overweight or obese in late adolescence is a risk factor for a number of negative health-related outcomes and their associated costs.

There are a host of genetic, environmental, and individual factors associated with overweight and obesity. One of the most important of these factors that, unlike risks such as genetic factors and many environmental determinants, is also potentially amenable to intervention efforts is low physical activity. Low physical activity has been consistently identified as a risk factor for obesity and weight gain. Low physical activity has also been shown to be associated with physical and mental health problems among college students.

Further, national surveys have indicated that less than half of college students met American College of Sports Medicine (ACSM) and American Heart Association (AHA) guidelines for vigorous-intensity and/or moderate-intensity physical activity. Studies have also shown that physical activity decreases between high school and college. One study involving a national sample of over 10,000 college students found that 47.6% of the sample reported currently meeting national guidelines for vigorous-intensity physical activity, whereas 70.7% met such guidelines while in high school. Similarly, another study found that 66.2% of the students in their sample reported meeting physical activity guidelines during their last 2 months of high school, compared with only 44.1% during their first 2 months of college. Given the health-related problems associated with obesity and lack of physical activity, developing interventions to increase physical activity among college students is warranted.

A number of studies among adult populations have examined the effectiveness of behavioral interventions intended to increase physical activity. In particular, several studies have examined motivational interviewing (MI), a client centered yet directive strategy designed to help people change behaviors by addressing, and ideally resolving, ambivalence toward change. These studies have generally shown that MI-based interventions were effective relative to control conditions at increasing physical activity. To date, however, we are aware of no studies that have examined the efficacy of MI-based interventions at increasing physical activity among college students or other late adolescence/young adult populations.
A single-session, MI-based intervention that incorporates personalized feedback about physical activity may be a particularly promising approach among college students. This intervention model is well established at reducing alcohol use among this group, but has yet to be examined in terms of its effectiveness in the area of physical activity. The single-session nature of the intervention may be more appealing to college students than more intensive models, may be more appropriate in the context of a nonmedical or treatment seeking population, and, if shown to be efficacious, easier to disseminate and implement on other college campuses. Thus, the purpose of this study was to pilot test a brief intervention designed to enhance physical activity among college students. We hypothesized that participants in a MI condition would report greater physical activity at follow-up than those in an education-only control condition.

**Methods**

**Design**

In this randomized trial participants were assigned, stratified by gender, to either a condition where they received a 30 minute, 1-time, 1-on-1 brief motivational intervention (BMI) or an education-only (EO) control condition. In the BMI condition participants received an MI-based intervention that included personalized feedback designed to enhance motivation to increase physical activity (described in detail below). In the EO condition participants received informational packets about diet and exercise. Local IRB approval was received before initiating data collection, and all participants provided signed informed consent before participating in the study.

**Participants**

Approximately 1100 students completed screening measures for this study at the beginning of the academic semester, 300 of whom met our eligibility criteria. Eligibility criteria were as follows: a) self-report of 2 or fewer days of 30+ minutes of moderate physical activity in the past week and b) self-report of 0 days of 20+ minutes of vigorous physical activity in the past week. We contacted 163 of these students by telephone to solicit participation. Our goal was to enroll 70 participants, so we stopped contacting students once we achieved that number. Fifty-seven students declined to participate, while 36 reported current physical activity levels that exceeded our screening threshold when asked again about their current physical activity habits. Of the remaining 70 students who enrolled in the study, all but 1 (98%) completed the follow-up questionnaire. Recruitment began in the fall semester, 2008 and continued through the summer semester, 2009.

**Procedures**

Participants completed the screening questionnaires either via the psychology subject pool (ie, undergraduate students who sign up for studies to meet requirements of a class or for extra credit) or during a college “survival skills” course made available to new students at the university. Those eligible for the current study were contacted via telephone and invited to participate. We verified among those interested in participating that their current physical activity was not above our screening threshold. When participants arrived for their scheduled appointment they were provided more details about the nature of the study, completed the consent forms, and then completed the physical activity and demographic questionnaires on a computer in our laboratory. While completing the questionnaires they were randomized to an intervention condition by drawing a card listing the condition, the order of which was created via a random number table and was stratified by gender. The research assistants conducting the enrollment and assessment were thus blind to condition. Those randomized to the BMI condition (n = 34) met 1-on-1 with a facilitator, while those in the EO condition (n = 36) were provided with the educational packets and encouraged to read them. Participants in the BMI condition completed a series of questions immediately postsession to gauge their evaluation of the session content. Participants returned to our laboratory at 1-month follow-up and again completed measures on a computer. Six participants who could not return to the laboratory completed their follow-ups online (only 1 participant did not complete a follow-up).

**Conditions**

**Brief Motivational Intervention (BMI).** The BMI was a 30-minute, 1-on-1 intervention that was delivered in a MI-based framework. Facilitators were 3 graduate students in counseling or clinical psychology, all of whom had prior MI training and experience (eg, 20+ hours of MI training, experience delivering brief interventions on other clinical trials). Before initiating the current trial the facilitators received specific training on the BMI that was developed for this project, including reviews of the treatment manual and conducting mock sessions that were reviewed by the project’s principal investigators (MPM and JGM), both of whom are licensed psychologists with extensive MI experience. All BMI sessions were audiotaped and reviewed in weekly supervision meetings.

Interventions were conducted using MI principles such as expressing empathy, rolling with resistance, and using reflections to help participants explore ambivalence about changing behaviors. The content of the intervention is provided in Figure 1. After greeting the participant and establishing initial rapport, the intervention began...
with a decisional balance exercise that was designed to elicit change talk, where participants were asked to discuss pros and cons about engaging in physical activity. Next, participants received personalized feedback on how their moderate-intensity and vigorous-intensity physical activity compared with national guidelines and perceived barriers to engaging in physical activity. The facilitator and participant then set specific physical activity goals for those who expressed an interest in changing behavior, although, consistent with MI, participants were not required to set specific goals. Interest in setting specific goals was ascertained via direct comments from the participant during the session or via a specific question about interest in changing behaviors and/or setting goals in this portion of the session. Finally, participants were provided with tip sheets that included strategies for increasing physical activity and were asked to discuss their overall impression of the session.

**Education-Only.** Participants in the EO condition were provided with tip sheets that included strategies for increasing physical activity. They were encouraged to read and use the information included in the brochures, but did not meet 1-on-1 with a clinician.

**Measures**

**Physical Activity.** We assessed physical activity in 2 different ways: 1) via AHA/ACSM guidelines that recommend that adults engage in at least 3 days of 20+
minutes of vigorous-intensity aerobic activity or at least
5 days of 30+ minutes of moderate intensity aerobic
activity per week and 2) via 2008 Physical Activity
Guidelines for Americans that recommends at least 75
minutes of vigorous intensity aerobic activity per week
or at least 150 minutes of moderate-intensity physical
activity per week.23 Examples of vigorous intensity phys-
ical activities include jogging, swimming laps, boxing,
and using an exercise machine in a manner that results in
heavy breathing; examples of moderate intensity physical
activities include walking or other aerobic activities that
do not result in heavy breathing. To assess for physical
activity consistent with AHA/ACSM guidelines particip-
ants were asked to indicate over how many of the preceed-
7 days they engaged in vigorous-intensity physical
activity for at least 20 minutes and over how many of
the preceding 7 days they engaged in moderate-intensity
physical activity for at least 30 minutes. Soon after we
initiated the trial, though, the United States Department
of Health and Human Services released the 2008 Physi-
cal Activity Guidelines for Americans that recommended
the aforementioned minutes of physical activity per week
without imposing a daily recommendation. Thus, for 83%
of our sample (n = 58) we included separate items that
asked participants to indicate on how many days per week
over the past month they engaged in vigorous-intensity
and moderate-intensity physical activity, and for how
long they typically engaged in each activity. This allowed
us to calculate specific minutes of vigorous-intensity
activity and minutes of moderate intensity for these
participants. Personalized feedback on physical activity
were presented in terms of the 2008 Physical Activity
Guidelines for those participants who completed the
measures that allowed us to determine specific minutes
of vigorous and moderate physical activity per week. For
all other participants personalized feedback was based on
the AHA/ACSM guidelines. Our self-report measures
of physical activity are similar to other measures used
in national research studies examining physical activity
among college students and adolescents.1,8

**Session Evaluation.** Participants in the BMI condi-
tion completed 8 investigator-generated postsession
questions that were designed to assess participants’
or overall evaluation of their session. All items began with
the stem “The person I met with,” and example items
included “was easy to talk to,” “gave me the opportunity
to express my thoughts,” and “seemed competent and
well-trained.” Responses were scored on a 4-point scale
ranging from 1 (strongly disagree) to 4 (strongly agree).
Internal consistency of the 8 items was .79.

**Demographics.** Participants completed a brief demo-
graphics questionnaire that assessed information such
as gender, age, and ethnicity.

**Data Analytic Plan**

Our primary analyses involved using ANCOVA to
calculate between-group differences in physical activity
at the 1-month follow-up, with baseline values on the
dependent variable included as covariates. We chose
this strategy because there were baseline between-
rope differences on some of our dependent measures
(described below). We conducted separate analyses for
each dependent variable because we were interested
in determining if there were differential effects of the
intervention on vigorous versus moderate physical
activity. Our primary outcome variables were number
of days of 20+ minutes of vigorous-intensity physical
activity in the preceding week, number of days of 30+
minutes of moderate-intensity physical activity in the
preceding week, average number of vigorous-intensity
physical activity minutes per week, and average number
of moderate-intensity physical activity minutes per week
(for those who completed the latter 2 measures). We also
examined the percentage of participants in each condi-
tion who met the most recent federal physical activity
guidelines at follow-up, although these findings should be
interpreted with caution because of baseline differences
in physical activity.

**Results**

At baseline there were 3 participants who reported
engaging in 20+ minutes of vigorous-intensity physical
activity on 5 or more of the preceding 7 days, despite
meeting our enrollment criteria at screening. These 3
participants were excluded from additional data analysis.
Demographic and baseline characteristics, by condition,
of the remaining 67 participants are presented in Table 1.
There were no significant differences between the 2
conditions on any demographic variable, nor were there
between-group baseline differences on vigorous-intensity
or moderate-intensity physical activity minutes per week.
There were differences (with those in the MI condi-
tion reporting higher values) on number of 20+ minute
vigorous-intensity physical activity days and number of
30+ minute moderate-intensity physical activity days
(P < .04). Therefore, for the between-group analyses
we compared follow-up values while controlling for
baseline values.

In general participants in the BMI condition had
favorable impressions of their 1-on-1 sessions. Mean
ratings for the 8 session evaluation items ranged from
3.56 (“The person I met with was concerned about me”) to
3.94 (“The person I met with was easy to talk to”).
Items were scored on a 4-point scale where a score of 3
represented “agree” and 4 represented “strongly agree.”

**Outcome Analyses**

**Vigorous-Intensity Physical Activity.** After controlling
for baseline values, there were between-group differ-
ences in number of 20+ vigorous-intensity physical
activity days in the preceding 7, \( F(1, 63) = 6.13, P = .02, \)
\( \eta^2 = .09, \) and average number of vigorous-intensity physi-
ical activity minutes per week, \( F(1, 54) = 6.86, P = .01, \)
\( \eta^2 = .11 \) (see Figure 2). Participants in the MI condition
Table 1  Participant Characteristics by Condition

<table>
<thead>
<tr>
<th>Variable</th>
<th>MI</th>
<th>EO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender: female</td>
<td>84.4%</td>
<td>80.0%</td>
</tr>
<tr>
<td>Ethnicity: African American</td>
<td>65.6%</td>
<td>57.1%</td>
</tr>
<tr>
<td>Ethnicity: White</td>
<td>34.4%</td>
<td>37.1%</td>
</tr>
<tr>
<td>Ethnicity: Other</td>
<td>0.0%</td>
<td>5.8%</td>
</tr>
<tr>
<td>Mean age in years</td>
<td>19.61 (2.41)</td>
<td>19.61 (2.14)</td>
</tr>
<tr>
<td>Mean vigorous PA days/week, baseline</td>
<td>0.53* (0.98)</td>
<td>0.14(0.43)</td>
</tr>
<tr>
<td>Mean moderate PA days/week, baseline</td>
<td>2.53* (2.63)</td>
<td>1.17 (1.79)</td>
</tr>
<tr>
<td>Mean vigorous PA minutes/week, baseline</td>
<td>12.18 (21.43)</td>
<td>5.50 (10.61)</td>
</tr>
<tr>
<td>Mean moderate PA minutes/week, baseline</td>
<td>13.96 (18.38)</td>
<td>9.00 (14.35)</td>
</tr>
</tbody>
</table>

Abbreviations: PA, physical activity; MI, motivational interviewing; EO, education-only.

Note. Data are presented as mean (standard deviation) unless otherwise noted.

* Indicates statistically significant differences ($P < .05$) between the 2 groups.

Figure 2 — Differences in physical activity between conditions.
reported more days of 20+ minutes of vigorous-intensity physical activity and more vigorous-intensity physical activity minutes per week than those in the EO condition. In addition, at follow-up a higher percentage of those in the BMI condition than the EO condition reported meeting the most recent vigorous-intensity physical activity guidelines (39% vs. 9%), $\chi^2(1, N = 66) = 8.50, P < .01$.

**Moderate-Intensity Physical Activity.** After controlling for baseline values there were no between-group differences in number of 30+ moderate-intensity physical activity days in the preceding 7, $F(1, 63) = 1.29, P = .26, \eta^2 = .02$. Difference on moderate-intensity physical activity minutes per week approached statistical significance, $F(1, 54) = 3.31, P = .07, \eta^2 = .06$. Further, at follow-up a higher percentage of those in the BMI condition than the EO condition reported meeting the most recent moderate-intensity physical activity guidelines (52% vs. 23%), $\chi^2(1, N = 66) = 5.87, P = .02$.

**Comments**

The primary purpose of this study was to determine if a BMI that incorporated personalized feedback was effective at increasing physical activity among a sample of sedentary college students. Results from the study partially supported our hypotheses, as participants in the BMI condition reported greater vigorous-intensity physical activity at follow-up than those in the control condition. Findings regarding moderate-intensity physical activity were more equivocal. Between-group differences approached statistical significance for one measure of moderate-intensity physical activity (total minutes per week), but not the other (days of 30+ minutes of moderate-intensity physical activity). Overall, these findings are consistent with studies among other populations that have supported the efficacy of MI-based interventions at increasing physical activity.14–19

Results from this study indicated that the greatest impact of the BMI occurred in terms of vigorous-intensity physical activity. Those students who received the BMI reported approximately twice as many days per week of 20+ minutes of vigorous-intensity physical activity and approximately 3 times as many vigorous-intensity physical activity minutes per week at follow-up than those in the EO condition, after controlling for baseline differences. Prior clinical trials have generally not explicitly addressed the effects of MI-based interventions on vigorous versus moderate physical activity. Most of these studies used more general measures of total physical activity such as total kcal/week14 or overall physical activity minutes per week.15,17–19 One study with adults at risk for coronary heart disease found that a MI-based intervention was effective at impacting total physical activity per week, but not vigorous or moderate activity when assessed separately.16 Findings from this study support the importance, at least with the college student population, of assessing vigorous and moderate physical activity separately.

It is possible that in the current study the intervention had a greater effect on vigorous versus moderate physical activity because when participants and the facilitator in the BMI condition were addressing physical activity they were either explicitly or implicitly focusing on vigorous intensity rather than moderate-intensity physical activity. When college students think of physical activity they may not think of less intensive activities like walking; instead, their concept of physical activity may primarily involve more intensive activities like basketball or football, running, or vigorously working out on a cardiovascular machine. Thus, an intervention that is effective at increasing a college student’s motivation to increase physical activity may primarily result in an attempt to increase more vigorous intensity behaviors. We encourage future research efforts to explore this premise.

In contrast to the vigorous-intensity physical activity findings, intervention effects on moderate-intensity physical activity were less robust. One possible explanation for this finding is that despite receiving education to the contrary, college students may not recognize the health-related benefits of moderate-intensity physical activity. It is also possible that young adults are less motivated by the health-related benefits of physical activity and are instead more motivated by factors that they attribute primarily to vigorous physical activity, such as improved appearance and greater weight control. Young adults/older adolescents may thus believe that the benefits of moderate-intensity physical activity only apply to other groups (eg, older adults), so if they are motivated to change behavior they are more likely to do so by attempting to engage in more intensive physical activities.

Although it would be desirable for interventions to increase both vigorous-intensity and moderate-intensity physical activity among college students, it may be especially beneficial to increase vigorous-intensity physical activity within this group. Most college students do not have health conditions that prevent them from being able to engage in vigorous-intensity physical activity, and, in general, there is a dose-response effect with exercise where more intensive efforts result in more beneficial outcomes.22,23 Thus, we were particularly encouraged by the aforementioned findings regarding the efficacy of a BMI at increasing vigorous-intensity physical activity among our sample. On the other hand, a vigorous physical activity program may be difficult to maintain over the
long-term, so addressing ways to also enhance moderate physical activity among this groups is an important future direction.

Strengths and Limitations

There were limitations to the current study. First, we chose to examine moderate-intensity and vigorous-intensity physical activity separately as opposed to creating a total physical activity measure. The national guidelines do indicate that bouts of vigorous-intensity and moderate-intensity physical activity can be combined in a given week to meet the criteria, but such judgments are made on a case by case basis rather than through a definitive calculation strategy. A second limitation is that data were only collected from a single university, the sample size was relatively small, and women were over-represented. Third, the specifics of the personalized feedback in the BMI condition differed between those students who were enrolled before and after the release of the most updated physical activity guidelines. The former received feedback regarding number of 20+ vigorous-intensity and 30+ moderate-intensity physical activity days per week; the latter received feedback regarding the total number of vigorous-intensity and moderate intensity physical activity minutes per week. Fourth, due to logistical limitations, we relied exclusively on simple self-report questionnaires. Finally, the follow-up period in the trial was relatively brief, so long-term effects of the intervention are unknown. These limitations were balanced to some degree by strengths of this study, including its randomized controlled design, high response rate, and high percentage of racial/ethnic minority students (60%).

Conclusions

Despite these limitations, this study represents an important first step in developing effective brief interventions designed to increase physical activity among college students. We encourage future researchers to improve upon this trial by conducting additional research with larger, more representative samples and with longer follow-up points, and to consider incorporating other components into a BMI that might serve to enhance its effectiveness. We also encourage researchers to move beyond sole reliance on relatively simple self-reported physical activity measures in research with college students and use designs that also incorporate biological/physiological measures or more rigorous interview methods (e.g., accelerometers). Meaningful changes in overweight, obesity, and healthy behaviors among college students will likely require environmental and individual efforts across multiple domains. Findings from our study, along with prior research efforts, suggest that individual BMIs may be considered as useful components in the larger effort to improve healthy behaviors among college students.

Acknowledgments

This study is registered at clinicaltrials.gov #NCT01075139.

Notes

1. Participants also received personalized feedback on fruit/vegetable intake, which was not a focus of the current study. The intervention had no impact on this variable.

References


