Effect of a Medical Student-Led Curriculum on Teen Health Knowledge and Intentions: An Evaluation of the MiHealth Pilot Program

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Abstract

Introduction: Adolescents are often thought of as a healthy population, however, they routinely engage in high-risk behaviors that can lead to health problems. Medical students designed MiHealth, a program in which medical students teach health lessons in the high school classroom to help address these behaviors.

Methods: A series of six lessons were created and implemented in the classroom for this pilot study focused on sexual health, intimate partner violence, mental health, smoking and marijuana, nutrition, and physical fitness. High school students in grades nine through twelve at a public high school in southeast Michigan receiving the MiHealth curriculum (N=52) or the standard health education curriculum (N=61) were surveyed on health knowledge, attitudes, and intentions before and after the program.

Results: Six weeks after program completion, high school students who received the MiHealth curriculum scored significantly higher on health knowledge (P=0.007), and expressed significantly healthier attitudes and intentions toward risk behavior compared to controls (P=0.025). Among individual themes, MiHealth resulted in significant knowledge gains in sexual health (P=0.001) and mental health (P<0.025), and significantly healthier attitudes regarding sexual health (P=0.047), nutrition (P=0.040), and smoking and marijuana (P=0.012).

Conclusions: MiHealth demonstrated promising improvements in health knowledge retention and attitude changes in adolescents 6 weeks after program completion. An interactive curriculum targeting key adolescent health topics given by near-peer medical student educators may provide benefits beyond traditional high school health curricula.

Introduction

Adolescents are often thought of as a healthy population, however, they routinely engage in behaviors that can lead to health problems.[1-5] Many US teens engage in behaviors such as smoking, unprotected sexual intercourse, or physical inactivity.[6]

High-risk behavior may be preventable with appropriate intervention. Well-implemented sexual health education, for example, has been shown to reduce risk by delaying sexual debut and increasing condom use.[7] Many schools nationwide lag in providing comprehensive, quality health curricula, and the lack of universal, high-quality health education leaves teens vulnerable to making uninformed, potentially dangerous choices.[8]

Medical students at the University of Michigan Medical School (UMMS) reviewed local data on adolescent risk behavior to better understand the prevalence of these behaviors in their community, and identified potential opportunities for intervention. A program, MiHealth, was created in which medical students serve as instructors in the high school classroom. The pilot year consisted of six lessons delivered to two classes at a local high school, emphasizing topics related to high-risk behaviors prevalent among local teens. This study aims to assess MiHealth's impact on high school students' knowledge, attitudes, and intentions related to health and risk behavior.

Methods

A high school in Washtenaw County, MI was chosen as the pilot site due to its population of economically disadvantaged students (41% received free or reduced lunch in 2016-2017)[9] and its participation in the Regional Alliance for Healthy Schools (RAHS), a network of school-based clinics run by Michigan Medicine (MM). The school requires all students to take a one-semester health course, offered during four class periods each semester. Baseline risk behavior of the student body was gathered through the Rapid Assessment for Adolescent Preventive Services (RAAPS), a survey for high-risk behaviors completed yearly by each student visiting the school's RAHS clinic (Table 1).

Using RAAPS-identified areas of highest risk behavior, medical students created six 60-minute lessons with the themes sexual health, smoking and drugs, mental health, healthy relationships, nutrition, and fitness and exercise. Lessons focused on teaching through interactive, engaging learning activities (Table 2).

Over 2 months in early 2016, groups of four to six medical students administered the MiHealth curriculum to two of the four high school health classes. The remaining two health classes served as the control group and received only the standard high school health curriculum that incorporates units entitled Making Healthy Choices, Managing Stress, Mental Health, Building Healthy Relationships, Eating Well, Fitness and Health, and Protecting Oneself and Others.

Evaluation of MiHealth was granted "not regulated" status by the MM Institutional Review Board as a quality improvement initiative. A 44-item questionnaire was created based on lesson learning objectives.[10] The anonymous questionnaire was administered to all four health classes in the week directly preceding the program (preprogram) and 6 weeks after program completion (postprogram). All questions used a 5-point Likert scale (1=strongly disagree, 5=strongly agree). For analysis, responses were coded so that 5 always represented the most healthy or least risky answer, eg a response of 1 (strongly disagree) to the statement, "depression can be controlled through willpower," would be recoded as a 5 for analysis. Mean composite and lesson-specific scores were calculated for MiHealth and control classes, for knowledge items and for items assessing attitudes and intentions. These were compared at preprogram and postprogram time points. Due to questionnaire anonymity, unpaired t-tests were utilized; significance was set at $P<0.05$.

Results

Fifty-two high school students received the MiHealth curriculum; 61 served as the control group. The students were mixed-grade (ninth-twelfth), reflecting the general characteristics of the full student body (Table 3). Eighteen preclinical medical students participated as lesson planners and instructors.

MiHealth and control preprogram health knowledge scores were not significantly different overall or in any of the six lesson themes. Six weeks after program completion, the composite health knowledge score was significantly higher for the MiHealth than the control group ($P=0.007$). Among individual lesson themes, the postprogram knowledge score was significantly higher for the MiHealth group compared to controls in mental health and sexual health ($P=0.025$, $P<0.001$; Table 4).

MiHealth and control preprogram attitudes and intentions toward high-risk behavior were not significantly different overall or in any specific theme. Six weeks after the program, students in the MiHealth group expressed significantly healthier attitudes and reduced intention to participate in high-risk behaviors compared to controls overall ($P=0.025$)

and within the themes of sexual health, nutrition, and smoking and marijuana (P=0.047, P=0.040, P=0.012; Table 5).

Conclusions

Adolescents navigate myriad choices related to health behaviors that affect them into adulthood. The school plays a vital role in providing core curricula to promote positive health behavior.[11] Yet, the quality of high school health education is variable. MiHealth aimed to fill this gap by presenting core concepts in an evidence-based, optimally effective learning environment. We used an engaging, interactive curriculum and young guest instructors with a health care background.[7,12-15] The use of such instructors provided benefits of near-peer teaching, since medical and high school students share social congruence as students and young people.[16,17] MiHealth produced promising improvements in high school students' health knowledge and decreased intentions toward risky behavior, although directly measuring behaviors would be needed to fully elucidate MiHealth's effect.[18-20]

MiHealth did not improve health knowledge or attitudes within every specific lesson theme. This may be due to students' differing baseline levels of familiarity with the themes; for example, knowledge was significantly increased in sexual health and mental health, the themes with the two lowest preprogram scores. Alternatively, the array of our results could have been due to differences in lesson quality, or influenced by students from the MiHealth group sharing information with those in the control group.

Our limited pilot program involving one high school and one medical school demonstrates that an interactive curriculum targeting key adolescent health topics given by near-peer, medical student educators may provide benefits beyond existing high school health curricula. MiHealth is a successful example of an interactive, teen-focused educational intervention that can serve as a model for other health professional students and medical educators as they strive to improve the health of their communities.

Tables and Figures

Table 1: Selected Results of the Rapid Assessment for Adolescent Preventative Services (RAAPS) Computerized Survey Completed by All High School Students Visiting the School's RAHS Clinic During the 2016-2017 School Year (N=343)

Question	Risk Answer	Risk Answer Responses
Have you ever had any type of sex (vaginal, anal, or oral sex)?	Yes	127 (37%)
If you have had sex, do you always use a method to prevent sexually transmitted infections and pregnancy (condoms, female barriers, other)?	No	42 (33%)
During the past month, did you often feel sad or down as though you had nothing to look forward to?	Yes	98 (29%)
Do you eat some fruits and vegetables every day?	No	56 (16%)
Are you active after school or on weekends (walking, running, dancing, swimming, biking, playing sports) for at least 1 hour, on at least 3 or more days each week?	No	66 (19%)
In the past 3 months, have you smoked marijuana, used other street drugs, steroids, or sniffed inhalants ("huffed" household products)?	Yes	50 (15%)
Has anyone ever abused you physically (hit, slapped, kicked), emotionally (threatened or made you feel afraid) or forced you to have sex or be involved in sexual activities when you didn't want to?	Yes	29 (8%)
In the past 3 months, have you smoked cigarettes or any other form of tobacco (cigars, black and mild, hookah, e-cigarettes, other) or chewed/used smokeless tobacco?	Yes	35 (10%)

Table 2: Outline of Lessons

Lesson Theme	Topics Covered
Smoking and marijuana	The effects of using tobacco products (including e-cigarettes) and marijuana. Example activity: demonstration of effects of smoking one pack of cigarettes using a "lung" modeled by cotton balls in a 2-liter bottle.
Mental health	The definition of depression, symptoms of depression, and barriers to getting help. Example activity: real depression narratives shared by medical students.
Healthy relationships	Attributes of a healthy relationship, the signs and effects of interpersonal violence, and barriers to seeking help. Example activity: make paper "tweets" about #healthyrelationships for the classroom wall.
Sexual health	The definition of consent, sexual orientation and gender identity, contraception, STIs, and physiology and prevention of pregnancy. Example activity: small group stations covering each topic.
Nutrition	The food groups, guidelines for a balanced diet, and recommended portion sizes. Example activity: mystery food labels game.
Fitness and exercise	The benefits of exercise, recommended daily activity for teens, using pedometers, and barriers to getting regular exercise. Example activity: taking our pulse with sitting vs standing vs jumping jacks.

Table 3: Characteristics of the Selected High School's Student Body During the 2016-2017 School Year as Provided by the State of Michigan[9]

Attribute	Number of Students
Male*	547 (52%)
Female*	502 (48%)
9th grade	279 (27%)
10th grade	269 (26%)
11th grade	252 (24%)
12th grade	249 (24%)
African American	309 (29%)
American Indian/Alaska Native	5 (0.5%)
Asian	20 (2%)
Hawaiian/ Pacific Islander	2 (0.2%)
Hispanic/Latinx	46 (4%)
Two or more races	54 (5%)
White	613 (58%)
Economically disadvantaged	425 (41%)
English language learners	13 (1%)

Note: The total student population was 1,049.
*Non-cisgendered populations were not reported.

Table 4: Average High School Student Responses to Knowledge Items on the Preprogram and Postprogram Questionnaires (1=Least Correct, 5=Most Correct), With Results of *t*-tests Comparing Means Between the MiHealth and Control Groups

Knowledge		Preprogram	Postprogram	MiHealth Pre-Compared to Control Pre-	MiHealth Post-Compared to Control Post-
Overall	MiHealth	3.54	3.73	*P*=0.617	*P*=0.007*
	Control	3.50	3.52		
Smoking and marijuana	MiHealth	3.67	3.71	*P*=0.342	*P*=0.135
	Control	3.56	3.54		
Mental health	MiHealth	3.25	3.46	*P*=0.609	*P*=0.025*
	Control	3.20	3.24		
Healthy relationships	MiHealth	3.46	3.69	*P*=0.972	*P*=0.058
	Control	3.46	3.48		
Sexual health	MiHealth	3.44	3.77	*P*=0.236	*P*<0.001*
	Control	3.29	3.27		
Nutrition	MiHealth	3.79	4.00	*P*=0.370	*P*=0.171
	Control	3.90	3.83		
Fitness and exercise	MiHealth	3.66	3.91	*P*=0.851	*P*=0.278
	Control	3.68	3.80		

*Significance set at *P*<0.05.

Table 5: Average High School Student Responses to Attitude and Intention Items on the Preprogram and Postprogram Questionnaires (1=Least Correct, 5=Most Correct), With Results of *t*-tests Comparing Means Between the MiHealth and Control Groups

Attitudes and Intentions Toward Risk Behaviors		Preprogram	Postprogram	MiHealth Pre-Compared to Control Pre-	MiHealth Post-Compared to Control Post-
Overall	MiHealth	3.83	4.05	*P*=0.680	*P*=0.025*
	Control	3.87	3.85		
Smoking and marijuana	MiHealth	4.07	4.28	*P*=0.497	*P*=0.012*
	Control	3.95	3.90		
Mental health	MiHealth	3.45	3.61	*P*=0.829	*P*=0.068
	Control	3.48	3.67		
Healthy relationships	MiHealth	3.87	4.07	*P*=0.777	*P*=0.103
	Control	3.83	3.81		
Sexual health	MiHealth	4.00	4.42	*P*=0.076	*P*=0.047*
	Control	4.24	4.16		
Nutrition	MiHealth	3.77	3.94	*P*=0.719	*P*=0.040*
	Control	3.72	3.69		
Fitness and exercise	MiHealth	3.73	3.88	*P*=0.745	*P*=0.167
	Control	3.76	3.72		

*Significance set at *P*<0.05.

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