Marijuana Education Initiative
Marijuana Prevention Program for Middle School Students
South Routt Middle School
Oak Creek, CO

Evaluation Report: June 2016

Prepared by: Hope Cornelis

Prevention Research Center
Colorado State University

Table of Contents

Executive Summary

Marijuana Education Initiative (MEI) provides innovative prevention and intervention curricula and services aimed to foster informed understanding of the impact of youth and adolescent marijuana (MJ) use. MEI's Middle School Prevention Curriculum was designed to inform middle school youth about the harmful effects of marijuana on their bodies, brains, behavior, and mental health prior to MJ usage and long-term problematic habits are formed.

In order to achieve these goals, the MEI team created a 5-unit prevention curriculum of 45-minute sessions to be administered by a school teacher to middle school students. The MEI Middle School Prevention Curriculum is designed to engage students in age-appropriate in-depth exploration of how marijuana affects the brain and body. Visual images and engaging activities drive reality-based discussions about the common uses of marijuana and the risks associated with adolescent marijuana use. The curriculum is standards-based and grade-level appropriate.

The current evaluation used a single group pretest-posttest design to examine the effectiveness of this curriculum on various outcomes targeted by the program. This evaluation primarily examined changes in participants' knowledge of marijuana and its effects and their perceptions of marijuana's harm to themselves.

This prevention sample included 16 participants between ages 12 and 13 years old in 7th grade at South Routt middle school in Oak Creek, CO. Fourteen participants identified as white/Caucasian, with two identifying as non-white. There were 9 boys and 7 girls, and 4 of the 16 students were of low socioeconomic status (SES). Because of the small sample size, this evaluation did not have the statistical power to detect statistical significance. Therefore, pre and post-prevention mean scores on the outcome variables were examined to provide an assessment of program impact.

Although there are acknowledged limitations of the evaluation design and small sample size that limit the ability to make causal inferences about program effectiveness, MEI's Middle School Prevention Curriculum shows promise in meeting its goals and objectives. Results of this evaluation indicate an increase in participants' understanding of marijuana and its effects, as well as an increase in participants' perceptions of the harmful effects of marijuana use on overall health and well-being. Furthermore, participants found multiple aspects of the program to be helpful in improving their knowledge of marijuana and the impact of marijuana use.

Marijuana Education Initiative: Middle School Prevention Curriculum

Brief Description

MEI provides educators, schools, and families with information and resources to aid them in navigating marijuana legalization and its effects on today's students. The Middle School Prevention Curriculum is specifically designed for middle school students to engage in developing a greater understanding of MJ and its effects in an interactive and age-appropriate manner.

Mission

"Marijuana Education Initiative is committed to supporting communities, schools, families, and organizations, by providing standards-based curricula, materials, and training to help navigate marijuana legalization." (MEI, 2016).

Learning Objectives

The primary objectives of the Middle School Prevention Curriculum are to assist participants in their ability to:
- Understand the impact marijuana has on different parts of the brain
- Identify how THC mimics Anandamide
- Discuss the potential for dependence on marijuana
- Identify impacts marijuana has on different body systems
- Identify how the different methods of use impact the body system (ingestion or topical or inhaled)
- Identify what medical conditions medical marijuana is generally accepted to treat and how medicinal marijuana is delivered
- Understand which components of the cannabis plants can be considered medicinal and why
- Understand the impact marijuana has on physical and mental health
- Understand how marijuana use impacts behavior

Program Components

The Middle School Prevention Curriculum is comprised of 5 units that are approximately 45 minutes long. The curriculum is to be administered on a weekly or bi-weekly basis by a school science or health teacher. The units are described below:

1. **Unit 1: How Marijuana Works**
   - This session examines how marijuana works in the brain and body. Students learn how marijuana mimics brain chemicals naturally made by the body. Students explore how marijuana works in the brain and how habitual users can become dependent on marijuana.
2. **Unit 2: Marijuana and the Brain**

- Students explore the different parts of the brain and how marijuana use affects the brain. Students get a visual idea of the effects of marijuana use by viewing several brain images and reviewing case studies.

3. **Unit 3: Marijuana and the Body**
   - Students learn about the effects marijuana has on the different parts of the body including the lungs, liver, reproductive organs, heart, stomach, etc. Students explore how different methods of marijuana use (vaporizer, eating, smoking) impacts the body. Two activities illustrate how inhaling foreign substances impacts the lungs.

4. **Unit 4: Marijuana as Medicine**
   - This session examines how marijuana is used as medicine and what conditions it helps. It also examines the difference between the two main cannabinoids in the cannabis plant: THC and CBD.

5. **Unit 5: Risks of Using Marijuana**
   - This session explores the ways in which marijuana use can affect physical and mental health as well as decision-making and behavior. Students explore how marijuana can impact their decisions regarding driving, academics, relationships, and other risky behaviors.

Program Evaluation

Goals of the Evaluation

This evaluation aims to assess the effectiveness of MEI's Middle School Prevention Curriculum at South Routt Middle School in Oak Creek, CO. Because this is a relatively small sample of participants, the evaluation is not intended to provide a rigorous statistical assessment of program effectiveness. However, it aims to shed light on the impact of this curriculum to those in need of it at South Routt Middle School. Insights gained from this evaluation will be utilized to improve both the prevention curriculum as well as the measurement tools used to assess it. Furthermore, these findings will be provided to school personnel who have a vested interest in the outcomes of this program for their students. Evaluation goals can be summed into three key elements:

- Provide objective insight into the curriculum's effectiveness in meeting program objectives
- Provide information that will be used to improve the prevention curriculum and measurement
- Provide helpful and easily comprehensible information that can be used for public communication and promotion

Evaluation Design

The evaluation consists of pre and post-prevention comparisons of mean scores on the curriculum's targeted outcome variables: perceived knowledge of MJ and how it works and perceived harm of marijuana use. The baseline measures for the middle school prevention were taken just prior to program implementation in March of 2016, and post-prevention measures were taken just after program completion in May 2016. Because of the small sample size, mean scores will be compared from pretest to posttest without testing for statistical significance.

It is acknowledged at the outset that the design is limited due to the lack of a control group to compare participants' responses as well as the small sample size, which eliminates the possibility of testing for statistical significance. These limitations mean that for any changes in participants' scores from pre to posttest, the prevention curriculum cannot be considered the sole cause. Other factors aside from the program cannot be ruled out as responsible for any changes. However, the evaluation does provide valuable information about the potential impact of MEI's Middle School Prevention Curriculum for students in need of this service at South Routt Middle School.

Measures

The pre and post survey measures were designed by Hope Cornelis of the Colorado State University Prevention Research Center in collaboration with MEI personnel. These measures were tailored to assess the outcome objectives of this particular prevention curriculum. Variables assessed in the pre and post survey measures include the following:

- Demographic information
- Marijuana (MJ) use history
- Knowledge of MJ and its effects
- Perceived harm of MJ
- Program Impact

For a detailed list of all measures, please see the Appendix on pages 15-17.

Data Collection

Pretests were administered to participants immediately prior to beginning the prevention curriculum on March 24th, 2016. The pretests were administered through the Qualtrics Survey website. Posttests were administered immediately following completion of the prevention curriculum on May 12th, 2016 in the same manner.

Baseline Data

Participants

Sixteen students completed both the pretest and posttest. Therefore, those sixteen participants' responses were included in this evaluation ($N = 16$). Participants ranged in age from 12-13 years old, all in 7th grade. A majority of participants ($n = 12$) were 13 years old, with four participants who were 12 years old at baseline. There were nine males (56.3%) and seven females (43.8%) in this sample. Most participants ($n = 14$, 87.5%) identified as White/Caucasian, while one participant (6.25%) who identified as Indian/Alaskan native, and one participant (6.25%) who identified as Hispanic or Latino at baseline. Half of the participants ($n = 8$) reported they receive mostly A's in school, three participants indicated they receive mostly B's in school, and the remaining participants ($n = 5$) reported they receive mostly C's in school. Four out of the 16 participants (25%) indicated they receive free lunch at school, while the remaining 12 participants (75%) do not.

Marijuana Use History

All 16 participants reported that they had never tried marijuana in their lives at both pretest and posttest time points. Therefore, this population is an appropriate sample to target for a marijuana prevention program, because no problematic MJ use habits have been developed among participants in this sample.

Outcome Data

Sources of MJ Knowledge

Participants were able to select as many options as they'd like on the question assessing where they derive their perceptions and knowledge of marijuana. The most notable change from pre to posttest was that participants were more likely to list teachers/counselors as sources of their MJ knowledge at posttest ($n = 11$) than at pretest ($n = 4$). Please see Figure 1 below.
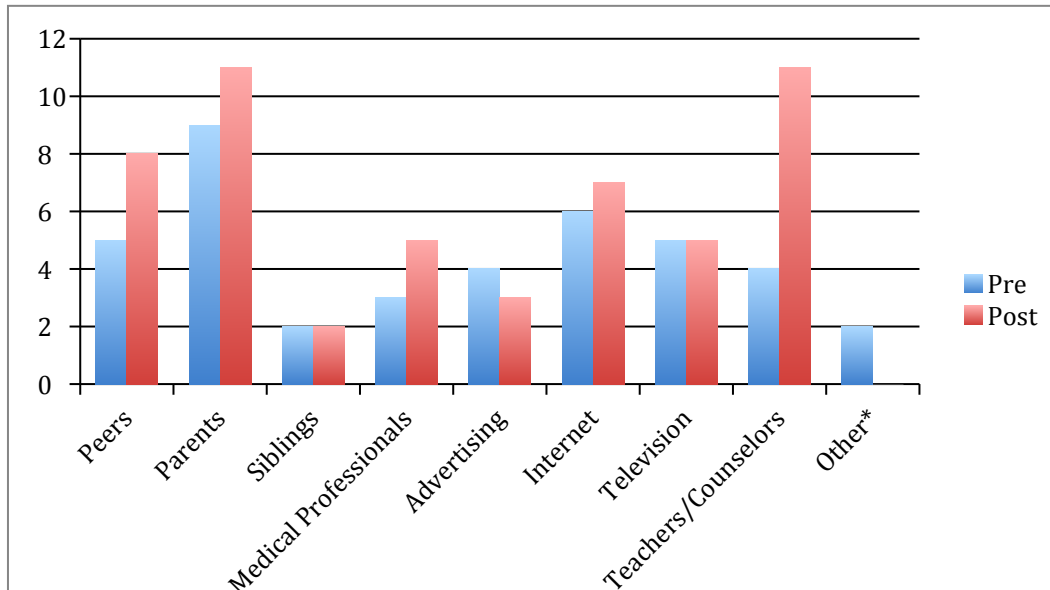

Figure 1. Participants' sources of knowledge about MJ at pre and posttest
*Other responses: "Oak Creek and pot shops"

Peer Use

Participants' perceptions of how frequently their peers use marijuana were compared from pretest to posttest. Young people often believe others use drugs more frequently than they actually do. Participants' responses were in the anticipated direction, demonstrating a decrease in perceptions of how frequently their peers use marijuana from pretest ($M = 2.75$) to posttest ($M = 1.938$). See Figure 2 below.
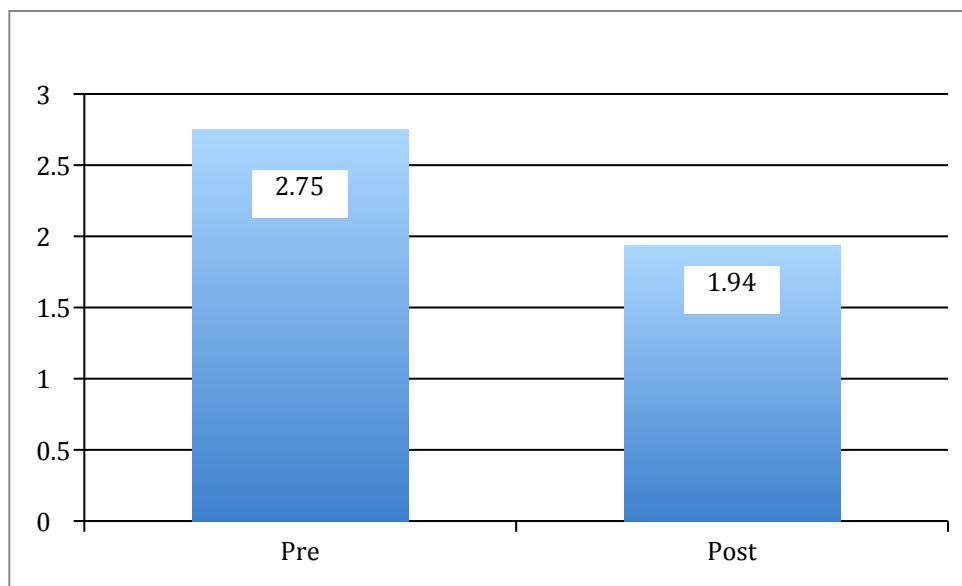
Figure 2. Participants' perceptions of how frequently their peers use marijuana at pre and posttest

Perceptions of Harm

Overall understanding of marijuana's effects. Combined mean scores on five items assessing participants' overall understanding of MJ's effects were compared from pre to posttest. Higher scores indicate a greater level of understanding. Participants' responses demonstrated an increase in overall understanding of the effects of MJ from pretest ($M = 4.113$) to posttest ($M = 4.488$). Participants' changes in overall understanding are displayed in Figure 3 below.

Body. Combined mean scores on four survey items assessing participants' knowledge of the effects of marijuana on the body were compared from pre to posttest. Higher scores indicate greater knowledge. Participants' responses indicated an increase in knowledge of MJ's effects on the body from pretest ($M = 3.984$) to posttest ($M = 4.328$). Participants' changes in knowledge of MJ's effects on the body are displayed in Figure 3 below.

Brain/intelligence. Combined mean scores on four items assessing participants' knowledge of the effects of marijuana on the brain and cognitive abilities were compared from pre to posttest. Higher scores indicate greater knowledge. Participants' responses indicated an increase in knowledge of MJ's effects on the brain/intelligence from pretest ($M = 3.938$) to posttest ($M = 4.375$). Participants' changes in knowledge of MJ's effects on the brain are displayed in Figure 3 below.

Mental health. Participants' responses to one survey item that asked: "Using marijuana increases risk for developing mental health problems" was compared from pre to posttest. Higher scores indicate greater knowledge of the harmful effects marijuana can have on mental health. Participants' responses indicated an increase in knowledge of MJ's effects on mental health from

pretest (M = 3.875) to posttest (M = 4.438). Participants' changes in knowledge of MJ's effects on mental health are displayed in Figure 3 below.

THC and CBD. Combined mean scores on two survey items assessing participants' knowledge of the differences between two prominent chemicals in marijuana, THC and CBD, were compared from pre to posttest. Higher scores indicate a greater understanding of these differences. Participants' responses indicated an increase in understanding of the differences between THC and CBD from pretest (M = 2.782) to posttest (M = 4.344). Participants' changes in knowledge of the differences between THC and CBD are displayed in Figure 3 below.

Compared to tobacco. Combined mean scores on two survey items assessing participants' understanding of the harmful effects of MJ compared to tobacco were compared from pre to posttest. Higher scores indicate a greater understanding of these effects. Participants' responses indicated an increase in understanding of these effects from pretest (M = 2.782) to posttest (M = 3.563). Participants' changes in knowledge of the effects of MJ compared to tobacco are displayed in Figure 3 below.
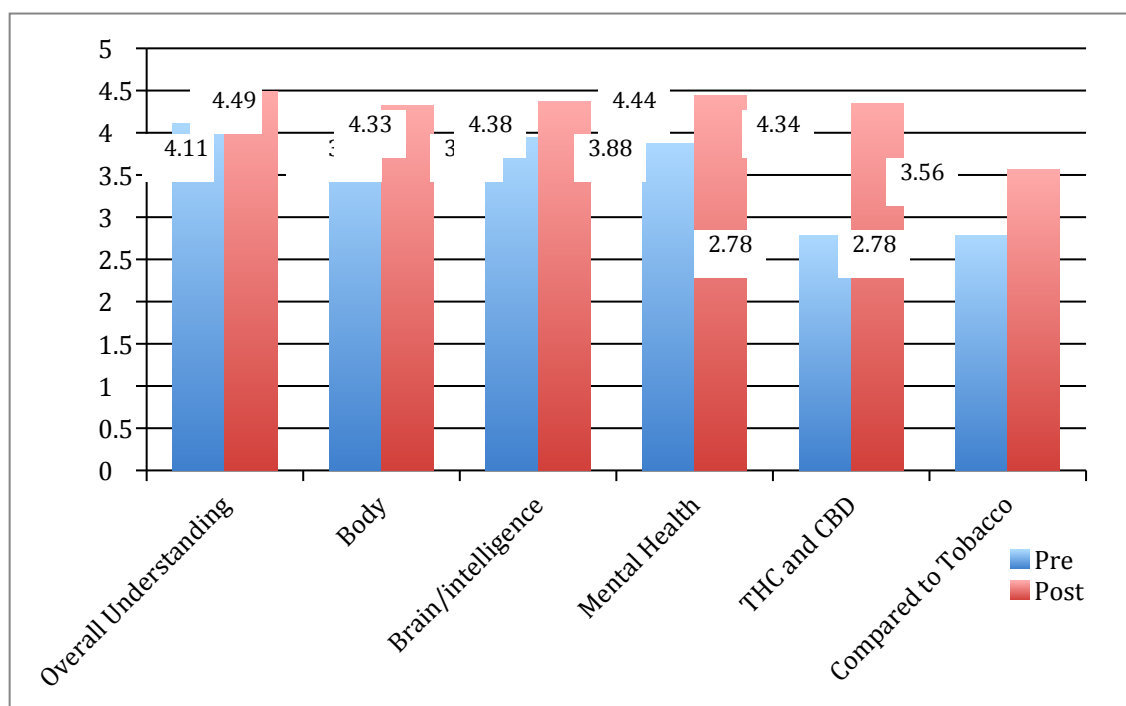

**Figure 3. Participants' perceptions of the harmful effects of MJ at pre and posttest**

Summary. Although it is not possible to test for statistical significance, changes in participants' knowledge and perceptions of harm regarding marijuana are in the anticipated directions. Participants' understanding and perceptions of the harmful effects of marijuana increased from pre to posttest in terms of their overall understanding, MJ's impact on the body, MJ's impact on the brain/intelligence, MJ's impact on mental health, MJ's impact compared to tobacco, and the difference between THC and CBD.

Program Impact

On the posttest survey, participants were first asked to select all aspects of the program that were most helpful to them in improving their knowledge and understanding of marijuana and its impact. Then, they were asked to select only one aspect that was most impactful for them. Figure 4 below depicts participants' responses when they could select multiple aspects of the program, and Figure 5 depicts participants' responses to the single most impactful aspect of the program.
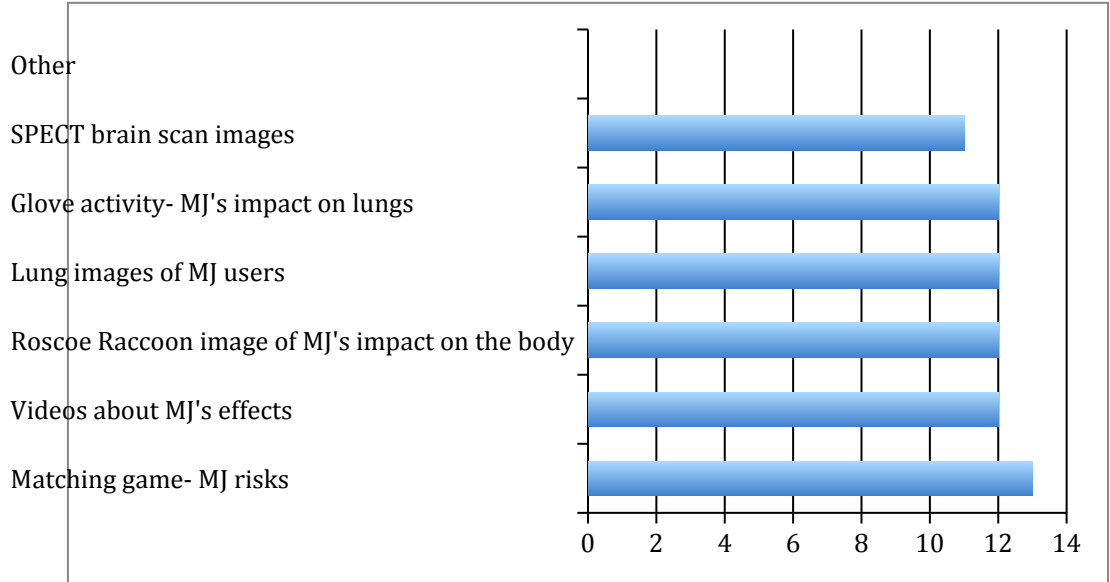
Figure 4. Participants' reports of the most impactful aspects of the prevention curriculum
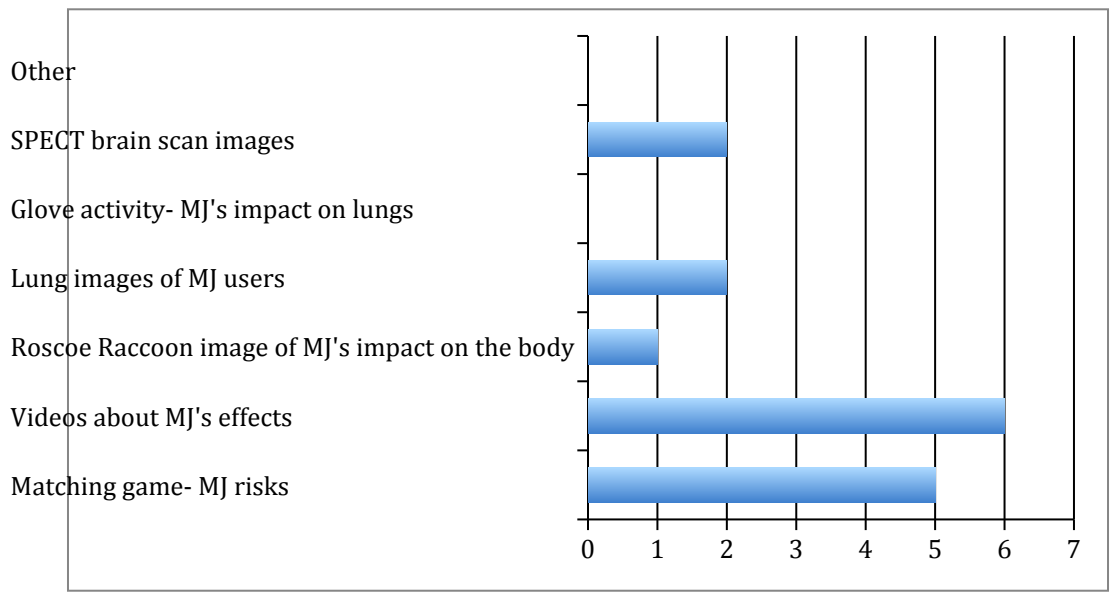
Figure 5. Participants' reports of the single most impactful aspect of the prevention curriculum

Summary. With such a small sample of participants, it is impossible to make definitive conclusions about which aspects of the program are most impactful on a broad scale. However, based on these results, it appears that all aspects of the program were found to be impactful to at least some of the participants, with the videos about the effects of MJ and the matching game about risks associated with MJ use as the most impactful aspects for this sample.

Conclusion

The purpose of this evaluation was to determine the short-term impact of this marijuana prevention program at South Routt Middle School in Oak Creek, CO. Although the sample size in this report is too small to test for statistical significance, the mean comparisons are descriptive and offer hopeful insight for program effectiveness. Changes in mean scores from pre to posttest for each of the outcome variables were in the anticipated direction, offering support for positive program impact. Increased sample sizes in future data collection will be of prime importance in assessing whether pre and post-prevention changes are statistically significant.

Appendix

Measures

Demographic Variables

       Age. Age was assessed using two questions: One that asked participants' birthdays and other that asked participants to select their age from 7 options ranging from "12 years old or younger" to "18 years or older."

       Grade. Participants' grade in school was measured using a single question with a dropdown list of 7 options ranging from 6-12.

       Sex. Sex was measured as a dichotomous variable. Participants identified as either male or female.

       Ethnicity. Participants' ethnicity was measured using a single survey item asking participants to select from 8 options the one that best describes them. Participants were able to select an "Other" option with text entry if they did not fall into the other 7 options.

       Academic grades. Participants' academic grades were measured using a single survey item asking participants what grades they typically earn in school. There were 4 options ranging from "Mostly A's" to "Mostly D's or below."

       Socioeconomic status (SES). SES was measured as a dichotomous variable using a single item asking whether the student receives free lunch at school. The two options were "yes" or "no."

       School, district, and state. Participants were asked to write in the name of their school, district, and the state their school is in.

Marijuana (MJ) History

       Previous marijuana use. Previous MJ use was assessed using three survey items which asked if they've ever tried marijuana (answer responses included "Yes" and "No," how old they were when they first tried marijuana (with a scale ranging from "8 years old or younger" to "17 years or older"), and an item asking how many times in their lives they have used marijuana (with a 7-point scale ranging from "I have never used marijuana" to "100 or more times").

       How MJ was introduced/obtained. One item asked participants who introduced them to their first marijuana experience with 8 options including "I have never experienced marijuana," "my sibling(s)," "my parent(s)," "an older peer/friend," "other (please describe)," etc. Another item asked participants, "If you have used or are currently using marijuana, where have you gotten it or how do you typically get it?" – with 9 options including "I have a medical card," "from friends/siblings for FREE," "from friends/siblings when I PAY," "from parents who know I take it," etc.

First method. Participants' first method of marijuana tried was assessed using a single item asking, "What method did you first start using when you began using marijuana?" with 5 options including "None (I have never tried marijuana)," "smoking," "vaping," "edibles," and "other (please describe)."

Reasons for use. Participants' reasons for using marijuana were measured using a single survey item in which participants could select as many options as they liked. Options included "to reduce anxiety/stress," "to help you fall asleep," "to increase recreational enjoyment," etc.

*Note: For all the above questions, there was an option for participants to select that stated: "I have never tried marijuana."

MJ Knowledge and Perceptions of Harm

Sources of knowledge. Participants' sources of knowledge about MJ was assessed using a single survey item asking, "My knowledge and ideas about marijuana come from the following sources:" with nine options including peers, parents, siblings, medical professionals, advertising, internet, television, teachers/counselors, and other. Participants could select as many options as they liked.

Overall understanding of marijuana's effects. Participants' levels of understanding of marijuana's effects were measured using five survey items (e.g., "I understand the ways marijuana affects the body" with a 5-point rating scale ranging from "Strongly disagree" to "Strongly agree").

Body. Participants' perceptions of marijuana's effects on the body were assessed using four survey items (e.g., "Using marijuana can increase heart rate and lower blood pressure" with a 5-point rating scale ranging from "Strongly disagree" to "Strongly agree").

Brain/intelligence. Participants' perceptions of marijuana's effects on the brain were measured using four survey items (e.g., "Using marijuana in adolescence can cause more brain damage than starting to use later in life" with a 5-point rating scale ranging from "Strongly disagree" to "Strongly agree").

Mental health. Participants' perceptions of marijuana's effects on mental health were assessed using one survey item (i.e., "Using marijuana increases risk for developing mental health problems." - with a 5-point rating scale ranging from "Strongly disagree" to "Strongly agree.").

THC and CBD. Participants' understanding of the differences between THC and CBD in marijuana was assessed using two survey items (e.g., "Medical marijuana has the same levels of CBD and THC as recreational marijuana." with a 5-point rating scale ranging from "Strongly disagree" to "Strongly agree").

Compared to tobacco. Two items were used to measure perceptions of the effects on marijuana on overall health compared to tobacco (e.g., "Marijuana has way less chemicals in it than tobacco" - with a 5-point rating scale ranging from "Strongly disagree" to "Strongly agree").

Program Impact

Program impact. Participants' opinions regarding impactful aspects of the program were assessed using two survey items on the post-prevention survey only. There were seven options describing various curriculum activities and components. The first question asked participants to select as many options as they wanted and the second question included the same options but asked participants to select only one aspect that was the single MOST impactful aspect of the curriculum.