

An Evaluation of Emily's Hope Substance Use Prevention Curriculum Among Early Elementary School Students: Preliminary Indications of Effectiveness – a Cross-Sectional Study

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Abstract

Introduction: Substance use is a major cause of preventable morbidity and mortality, and national data show that many adolescents initiate use by middle school. Earlier prevention is critical, yet traditional approaches. There is growing recognition of the need for school-based strategies that are interactive, developmentally appropriate, and culturally relevant to promote healthy decision-making from an early age.

Methods: An age-appropriate substance use prevention curriculum targeted at early elementary school students (KG, 1st and 2nd grades) was developed by a multidisciplinary educational committee. The curriculum was administered to 662 early elementary students in 16 school districts in South Dakota, North Dakota, Minnesota, and Iowa over the 2023-2024 school year.

Results: All grades displayed statistically significant gains in awareness about body systems as measured by post-curriculum survey responses. Early elementary school students demonstrated an increased understanding of brain function, physical health, emotional regulation, and medication safety.

Conclusion: This study highlights that a well-structured substance use prevention curriculum can promote early elementary school students' understanding about personal health, brain function, and safe medication use.

Introduction

Substance use disorders remain a critical area of concern among youth. Substance use is a leading cause of preventable morbidity and mortality. In 2023, data from the Monitoring the Future study indicated that 11% of 8th graders, 20% of 10th graders, and 31% of 12th graders reported any illicit drug use in the past year.¹ The brain undergoes continuous development from prenatal period through mid-20s, and exposure to substances during this crucial period can influence brain development. Adverse childhood experiences and impaired childhood mental health negatively impact brain development and increase vulnerability for substance use. Early substance use/experimentation is associated with greater risk of developing a substance use disorder.² Early prevention interventions aimed at enhancing protective factors and decreasing risk factors can reduce initiation of substance use and improve social-emotional-psychiatric-substance use-economic outcomes. The existing times need substance use prevention interventions which have been

tested in the real-world setting. A major focus is needed to understand how prevention programs can strengthen students' protective factors or intervene to reduce vulnerability long before problem behaviors develop.

The elementary school-based setting would be an ideal environment to pursue this important goal of prevention by promoting general wellbeing, health, school connectedness, and parent engagement. Such school-based strategies are needed to help prevent substance experimentation, medication misuse, and eventual development of substance use disorders. Early elementary school educational interventions may cultivate and foster lifelong understanding surrounding personal health, brain function, safe medication use, and potential harms from substance use. Risk or fear based educational programs delivered in a didactic form, like Drug Abuse Resistance Education (DARE), have struggled to achieve desired prevention outcomes among young people.³ To address better decision making to help prevent substance use, early educational interventions are much needed.

To address this need, we assembled an educational committee with the goal of developing an evidence-based elementary school substance use prevention curriculum that can be utilized by schools locally and beyond. The *Emily's Hope* substance use prevention curriculum was designed with the help of local educators, school administrators, school counselors, addiction medicine specialists, addiction psychiatrists, and local physicians to address growing concerns surrounding substance use and overdose in the upper Midwest. *Emily's Hope* substance use prevention program is designed to address risk and protective factors for substance use and other healthy behaviors. The program is designed to encourage healthy habits, healthy eating, exercise, emotional identification, emotional regulation, and education about harmful effects of substances on the body. This school-based curriculum provides opportunities for hands-on engagement that involves educational videos, books, and group activities, along with continued engagement with teachers. The program is tailored to meet developmental age in each grade to improve social skills, emotional regulation, self-management, and resistance to substance use. The program focuses on promoting healthy coping skills, positive self-esteem, child-development, decision-making skills, goal setting, peer bonding, and effective communication in an educational environment.

A previous study, piloting *Emily's Hope* curriculum, in 3rd grade student body (n=324), demonstrated statistically significant gains in 3rd grade students' knowledge about the brain and its function, attitudes toward substance use, and harm perception, the curriculum was expanded to early (kindergarten through 2nd grade) grades.⁴ This study was aimed to evaluate effectiveness of a pilot health promotion and substance use prevention curriculum introduced at kindergarten to 2nd grade level.

Methods

The school administrators gathered consent from parents at the beginning of the school year to allow the administration of *Emily's Hope* curriculum in the classroom. The curriculum committee conducted orientation sessions for educators and counselors involved in the study. Schools were finally equipped with the necessary teaching aids, including lesson books, lesson plans, models, and video animations. The accompanying books, tailor-made for each grade level, were developed to present educational content in an age-appropriate manner. Each lesson incorporates interactive elements such as group activities, discussions, and student-driven interactions to ensure active engagement. To further

augment learning, animated videos, narrated stories, and quizzes are also incorporated. The students complete lesson-based surveys after lesson completion. Additionally, each lesson has an exit ticket to assess student learning.

A pilot version of the *Emily's Hope* substance use prevention program was administered to early elementary school students (n= 662) from kindergarten through 2nd grade in 16 different school districts over the 2023-2024 school year. The students completed baseline knowledge surveys prior to receiving the curriculum. During kindergarten, the curriculum focused on basic concepts like my body, my health, emotional recognition. In 1st grade, the added lessons include medication safety and emotional regulation. During 2nd grade, assertive communication skills, coping skills to deal with peer pressure, and health advocacy to peers, were included. After a year of instruction, the survey was re-administered, and students demonstrated significant improvements regarding knowledge of physical health, brain function, emotion identification, emotional regulation, medication safety, and effective decision making.

School students from multiple districts in South Dakota, North Dakota, Minnesota, and Iowa participated in the study. The curriculum's efficacy was assessed via pre and post curriculum surveys evaluating students' knowledge of curriculum content. The median class size was 33, 36, and 33 students in kindergarten, 1st, and 2nd grades, respectively. The survey instruments were administered via Google Forms at the start of the academic year, capturing baseline data from 152, 130, and 380 students from kindergarten, 1st, and 2nd grades, respectively. All surveys were completed voluntarily, and no identifying information was collected. The curriculum was delivered over the course of the 2023-2024 academic year, with educators given the flexibility to pace lessons according to their classroom dynamics. Each lesson took roughly 30 minutes to complete. All school districts reported completion of all lessons in the curriculum. The initial survey was re-administered at the conclusion of the academic year. Of the initial early elementary school cohort, 72, 106, and 195 students in kindergarten, 1st, and 2nd grades completed surveys at the end of school year, for student retention rates of 47%, 82%, and 51% respectively.

The pre- and post-curriculum survey data were analyzed using ANOVA and repeated measures t-test on SAS. Nonparametric tests, including the Kruskal-Wallis and Wilcoxon tests, were used for non-normal data.

All grades displayed statistically significant gains in awareness about body systems as measured by difference between correct post- and pre- curriculum survey responses (Figure 1). The knowledge gain ranged from 5% in kindergarten, 28% in 1st grade, and 7% in 2nd grade. The kindergarten students were able to comprehend brain function better ($\Delta = 14\%$). The first-grade students showed considerable improvement in brain function ($\Delta = 13\%$), body function ($\Delta = 23\%$), healthy habits/behaviors ($\Delta = 57\%$), medication safety ($\Delta = 9\%$), and skills to regulate emotions ($\Delta = 30\%$). In 2nd grade, significant gains were seen in consequential thinking “Pause-Think-Act” ($\Delta = 52\%$) and assertive behaviors ($\Delta = 12\%$). The results

support enhanced knowledge and improved perceptions towards body function and brain health, with marked improvement in consequential thinking to help prevent substance experimentation and use in future.

Discussion

An important goal of prevention is to alter the balance between risk and protective factors so that protective factors outweigh risk factors leading to substance use. This pilot study involving early elementary school students affirms that a well-designed age- and developmentally- appropriate substance use disorder prevention curriculum can significantly enhance understanding of personal health, brain function, medication safety, and emotional recognition/regulation. The curriculum participation led improved knowledge and better perception thereby increasing protective factors that can suppress escalation to substance experimentation and use. Early educational interventions are pivotal and need to be reinforced during each grade level during early elementary years to help build effective foundation for better coping strategies and drug refusal skills, leading to decreased exposure to substances during middle and high school.

Our post-curriculum survey indicated an overall enhancement in the percentage of correct answers for all questions when compared to the pre-curriculum baseline. These findings show that targeted, age-appropriate educational interventions can positively impact students’ knowledge base surrounding general health, brain function, emotional recognition/regulation, and medication safety, thereby strengthening protective factors to positively impact substance-use refusal skills, decreasing substance experimentation and use. Our study strengths include broad curriculum implementation across diverse settings, ranging from rural school districts to small urban towns. The study included a considerable sample-size across many schools in the upper Midwest.

Figure 1. Skill gains.

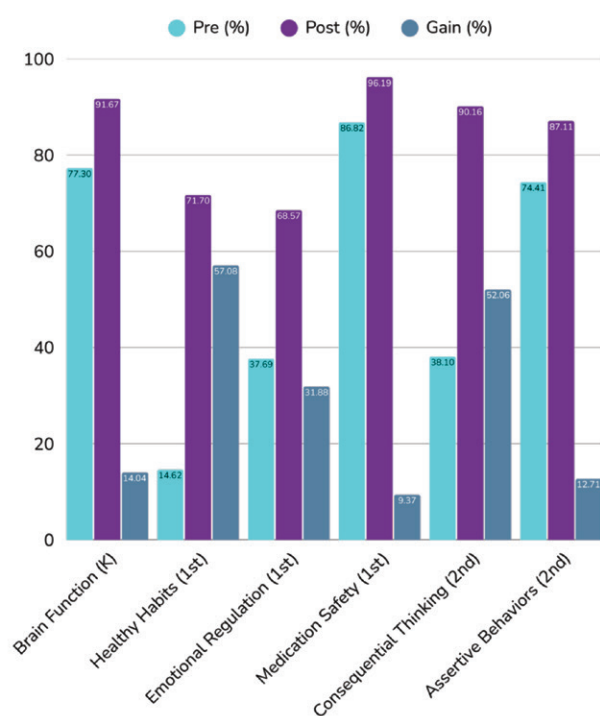


Table 1. Kindergarten results - curriculum group.

Question	Question (answer)	Baseline correct (N = 152)	Post-curriculum correct (N = 72)	Difference
1	My brain works even when I'm sleeping. (True)	77.63%	91.67%	+14.04% (p = 0.01)
2	Click on how you can keep your body healthy? Multiple correct answers. (Washing hands, Brushing teeth)	71.71%	79.17%	+7.46% (p = 0.24)
3	Click on the person who is feeling unhappy. (Emily)	78.29%	75.00%	-3.29% (p = 0.59)
4	Who should I take medication from? (A trusted adult)	78.95%	80.56%	+1.61% (p = 0.78)
Mean totals		76.64%	81.60%	+4.95% (p = 0.047)

Table 2. 1st grade results.

Question	Question (answer)	Baseline correct (N = 130)	Post-curriculum correct (N = 106)	Difference
1	My brain looks like a _____. (walnut)	41.54%	69.81%	+28.27% (p < 0.0001)
2	Match your internal body parts to their functions			
2a	Lungs _____. (help you breathe)	70.77%	94.17%	+23.40% (p < 0.0001)
2b	Heart _____. (pumps blood)	70.77	86.41%	+15.64% (p=0.005)
2c	Brain _____. (controls body)	79.23%	92.31%	+13.08% (p = 0.005)
3	Click on all the ways to protect your brain. Multiple correct answers. (sleeping, washing hands, eating vegetables, riding a bike)	14.62%	71.70%	+57.08% (p < 0.0001)
4	Who should I take medication from? (A trusted adult)	86.82%	96.19%	+9.37% (p = 0.013)
5	Who is not a trusted adult? Multiple correct answers. (a kid/peer, a stranger)	10.08%	45.71%	+35.63% (p < 0.0001)
6	I need to be careful around harmful substances like poison. (yes)	93.85%	90.57%	-3.28% (p = 0.35)
7	When I have emotions that feel too big to handle, I can _____. Multiple correct answers. (close eyes, count to 10, talk to an adult)	37.69%	68.57%	+30.88% (p < 0.0001)
Mean totals		51.15%	79.49%	+28.34% (p < 0.0001)

Table 3. 2nd grade results.

Question	Question (answer)	Baseline % correct (N = 380)	Post-curriculum % correct (N = 195)	Difference
1	Match the sense to the body part. (Total)	85.00%	85.64%	+0.64% (p = 0.84)
1a	Taste (mouth)	96.05%	96.92%	+0.87% (p = 0.60)
1b	Touch (hand)	94.74%	95.85%	+1.11% (p = 0.56)
1c	Smell (nose)	92.84%	92.27%	-0.57% (p = 0.81)
1d	Hear (ears)	92.80%	95.26%	+2.46% (p = 0.26)
1e	See (eyes)	92.57%	92.23%	-0.35% (p = 0.88)
2	Who should I take medication from? (a trusted adult)	87.86%	83.85%	-4.01% (p = 0.19)
3	The neocortex is my _____. (thinking brain)	76.78%	74.35%	-2.44% (p = 0.52)
4	The limbic system is my _____. (feeling brain)	58.05%	64.74%	+6.69% (p = 0.12)
5	My brain looks like a _____. (walnut)	56.08%	74.23%	+18.14% (p < 0.0001)
6	What does PTA stand for? (Pause-Think-Act)	38.10%	90.16%	+52.06% (p < 0.0001)
7	Sometimes, being assertive can help you stay safe. (yes)	74.41%	87.11%	+12.71% (p = 0.0004)
Mean totals		78.77%	86.05%	+7.28% (p<0.0001)

In addition, the completion of lessons by all curriculum providers highlights the program's feasibility and ease of implementation in school settings.

Given the promising results, we have expanded the availability of *Emily's Hope* curriculum to multiple states. During the 2023-2024 school year, schools in 4 states participated (South Dakota, North Dakota, Minnesota, and Iowa). During the 2024-2025 school year, there were participating schools in 5 states (South Dakota, North Dakota, Minnesota, Iowa, and Indiana). Additionally, one elementary school in Uganda also adopted *Emily's Hope* curriculum during 2024-2025. Initially launched in the 2023-2024 school year, *Emily's Hope* kindergarten-5th grade substance use prevention curriculum intends to address unique needs of young students, delivered in age-appropriate content within school setting to address risks and protective factors for substance use and other health behaviors. The *Emily's Hope* educational committee

plans to continue evolving the elementary school curriculum into middle and high school years.

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