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Impact of Education on School-aged Children's Knowledge of and Participation in "The Choking Game"

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ABSTRACT

Objectives: To better understand school-aged children's awareness of and attitudes about the Choking Game (TCG). To determine if education can increase awareness of the risk of injury when playing TCG and to determine if education can decrease interest in TCG participation.

Design: Anonymous pre- and post-education surveys.

Setting: Two middle/high schools; one in Utah and one in California.

Subjects: 291 participants (163 in Utah, 128 in California) aged 9-18, 68% under age 15, 32% 15 and older; 65% white, 35% non-white; 52% female, 48% male.

Results: 76% of participants knew about TCG, of those 62% heard about it at school. 32% knew someone who had played, and twelve (4%) had played, usually with others. Most frequently cited as reasons for participation were curiosity, peer pressure, and competition. School was the most common location for playing. In California education significantly increased risk awareness, and significant positive attitude changes were observed regarding interest in playing TCG. Utah participants also exhibited attitude changes in the desired direction (less interest in playing TCG, would warn friends, and realized it was not safe to stop breathing), although results were not statistically significant, possibly due to previous education and four recent and highly publicized TCG deaths in the community.

Conclusion: Results indicate that interactive, standardized, and skills-based education can increase student awareness of TCG risks and decrease interest in participation. Students reported that the schools were often where they first heard about TCG and where TCG was commonly played. Educators and associated health care professionals should therefore be encouraged to provide preventative education as part of school curricula.

INTRODUCTION

"The Choking Game" (TCG) or self-asphyxial risk taking behavior is defined as self-strangulation or strangulation by another person with the hands or a noose to achieve a brief euphoric state caused by cerebral hypoxia^[1]. Loss of consciousness may occur, with potential injury from subsequent falling, and hypoxic injury, along with bloodshot eyes, visual impairments, severe headaches,

altered mental status, and recurrent episodes of syncope and changes in behavior. Death may also occur; nevertheless, young people do not seem to understand the dangers associated with this activity. Adolescent awareness of TCG ranges from 36% to 91%. The lifetime prevalence of engaging in TCG ranges from 3.8% to 17.1% in the United States. Often students mention their first introduction to TCG comes through friends at school [2]. Macnab et al. [3] found that 40% of children perceive no risk from participation in asphyxial games. Although prevention education programs designed to dispel the common misconception that TCG is not dangerous appear to be a likely solution [4] there are concerns among educators that education may have an adverse effect on youth even though authors have concluded that education does not increase likelihood of experimenting with or engaging in risky behaviors [4,5]. Poland reported that a controversial issue in schools is how much if anything should be said to students in group settings about choking games [6]. RN Davis-Alldritt, as cited in Sutton p.3 states, "There is always the fear that, if you talk about something, it will encourage people to try it" [7]. Further compounding the problem, McClave found that one third of surveyed doctors were unaware of TCG and its warning signs, which may lead to injury misidentification and lost opportunity to provide prevention education [5]. The 2009 Oregon Healthy Teens survey of eighth- and eleventh-graders questioned lifetime prevalence and frequency of TCG participation [8]. About 6 percent of eighth-graders and 7.5 percent of eleventh-graders said they had participated in TCG, with no difference seen between males and females. This translates to approximately 5,200 eighth- and eleventh-grade students. Among those who had participated, one in five, or about 450 eighth-graders had done so more than five times. These youth are exposed to an even greater risk of injury, especially if they participate alone.

Dake et al. [9] surveyed 3,408 middle and high school students in the Midwestern states and found that, in contrast to findings in the Oregon survey, that male participation (11%) exceeded female participation (7%). High school students (11%) were more likely to participate than middle school students (5%). Another survey of 2,504 youths aged 9 to 18 conducted in Texas and Ontario found 68% had heard about the game, 45% knew somebody who played it, 6.6% had tried it, and 40% felt there was no risk associated with participating in TCG [3].

We found no prior studies that addressed either the effect of education in reducing the lack of understanding of the risks of TCG, or the impact of education on interest in participation in this activity. Although they were not studying the effect of education, McClave et al. [5] did conclude that educators and other adults who work with adolescents should educate students regarding the dangers of TCG and reiterated that no evidence exists to suggest that offering education increases the risk of engaging in risky behavior. This study was developed to explore these issues, and to better understand school-aged children's awareness of and attitudes about TCG. Two primary study objectives were identified: the first to determine if education would increase awareness of the risk of injury when playing TCG; the second to determine if education would decrease interest in TCG participation.

This study was approved by the Institutional Review Board (IRB) of the University of California Davis, and supported by the University of California Davis Medical Center Nursing Research Mentorship Program and the National Center for Advancing Translational Sciences, National Institutes of Health.

METHODS

Human subject's approval and surveys used

A waiver of written consent was approved by the Institutional Review Board (IRB). Pre- and post-education surveys were designed by the authors and developed independent of the education program based on a literature review. Two authors reviewed the survey questions for face validity and pilot tested the survey questions with 4 adolescents. Surveys included multiple-choice questions to explore awareness of and attitudes about TCG using the eight Likert Scale statements shown in **Table 1 through 3**. A demographics section was included with the post-education survey to determine participant's age, sex and race.

Table 1. Changes in disagreement from pre- to post-education Likert scale responses and difference in change between sites.

Statement	Cedar City, UT		Rocklin, CA		Difference between sites
	Mean Change Pre-Post (std)	p	Mean Change Pre-Post (std)	p	p
1. I am interested in playing TCG.	0.025 (0.56)	0.17	0.34 (0.71)	<0.001	<0.001
2. TCG is dangerous.	0 (0.88)	1.0	-0.38 (0.88)	<0.001	<0.001
3. If invited to play TCG I would say 'no'.	-0.189 (0.76)	<0.001	-0.26 (0.99)	<0.001	0.023
4. I would warn my friends not to play TCG.	-0.064 (0.72)	0.15	-0.32 (0.76)	<0.001	<0.001
5. It is safe to stop breathing for less than one minute.	0.013 (1.2)	0.73	0.35 (1.1)	<0.001	<0.001
6. Playing TCG can be addictive.	-0.37 (0.98)	<0.001	-0.22 (0.76)	<0.001	0.27
7. I am likely to play TCG.	-0.044 (0.91)	0.73	0.17 (0.95)	0.015	0.005
8. Playing TCG is safer than using drugs or alcohol.	0.41 (1.1)	<0.001	0.83 (0.94)	<0.001	<0.001

Education provided

Erik's Cause, an independent not-for-profit organization whose mission is to bring TCG awareness into the national spotlight so parents and children understand its true dangers conducted the education at both survey locations ^[10]. An interactive, standardized, 45 min skills-based education program utilizing PowerPoint, video, and oral presentation methods was provided in a classroom setting during six sessions of approximately 15 to 30 students each.

Sampling procedure

Convenience sampling was used to choose the schools. The Cedar City School in Utah was selected because Erik's Cause had a scheduled education event occurring at that location. The Cedar City students were attending a voluntary Friday-Saturday leadership conference offered to all area public junior and senior high students by Leaders for Life, a regional not-for-profit organization whose mission is to provide a unique opportunity for youth/students to escape the cycle of destructive behavior through education ^[11]. Rocklin Academy Charter School was selected because it is a Charter School and the California based sample represented a different population than the public, Utah based Cedar City School. Rocklin junior and senior high students were participating in a weeklong "Hero Week" during regular school hours. Participants at both sites were 9 to 18 years of age, had parental consent to receive the education, were physically and mentally capable of completing the survey, and were willing to participate in the study. Students were instructed that participation was voluntary, that they should not put their name on the surveys, and that all results would remain anonymous. Surveys were distributed to 163 participants in Cedar City, Utah on March 28, 2014, and 128 students in Rocklin, California on September 15, 2014. All students who attended these two events voluntarily agreed to complete surveys.

Data collection

The pre-education survey was administered immediately prior to each education session. The post-education survey remained in sealed envelopes at the student's desk during the session so that the surveys could not be viewed during the program. Two study authors were present during the entire process to monitor compliance. The post-education survey was administered immediately following each education session. Study data were collected and managed using REDCap (Research Electronic Data Capture) ^[12]. REDCap is a secure, web-based application designed to support data capture for research studies.

Data analysis

Age was dichotomized as 'under 15' and '15 and older' to avoid problems with chi square approximations and with logistic regression associated with low numbers of students within the age categories. Race was dichotomized as 'white' and 'non-white' because of the small numbers of individuals in racial and ethnic categories other than white. To measure the effect of education on student attitudes, each student's post-education responses to the eight Likert scale statements were subtracted from their pre-education responses. The Likert scale was coded from 0 to 4, where 0 indicated 'strongly disagree' and 4 indicated 'strongly agree'. The resulting variable had a possible range of -4 to 4, and represents the degree of disagreement with the statement – a positive value indicates an *increase* in disagreement, and a negative value indicates a *decrease* in disagreement. This variable will be referred to as 'change in attitude' hereafter. A significant p-value (<0.05) indicates that the change is significantly different from 0.

Differences between the two sites in age, race, and sex distribution were tested using Fisher's exact test. Significant differences in the demographic variables would imply that the attitude variables (change in Likert scale responses to the eight statements) would need to be analyzed separately for the two sites to avoid confounding. A multifactor ANOVA was fit for each statement, controlling simultaneously for site, age, sex and race. However, due to the discrete nature of the response variable, violations of the normal assumption were evident; and given the large sample sizes required for non-normal, multivariable models, these models were deemed inappropriate and results are not shown.

Differences in the proportion of students who had previously heard of TCG associated with site, age, sex, and race were tested using Fisher's exact test. Changes in attitude due to education (significantly different from zero) were tested using the Wilcoxon signed rank test. Differences in change in attitude associated with site, sex, age, race, and previous knowledge were tested using the Wilcoxon rank sum test. All analyses were performed using SAS[®] software version 9.4 (SAS Institute, Cary, NC).

RESULTS

Multiple choice pre-education survey questions

Participants were allowed to select more than one answer for all multiple choice questions. A large proportion (76%) were aware of activities that included either getting dizzy or passing out with a majority (91.9% Cedar City; 59.8% Rocklin) being familiar with the term "Choking Game" (**Figure 1**). Hereafter all pass-out activity names will be referred to as TCG. Of those participants aware of TCG, "at school" (62%) and "friends" (49%) were reported as the top two sources of information (**Figure 2**). 32% of the participants knew someone who had played TCG. Twelve students (4%) had played, usually with others (94%). Locations for playing TCG were reported as school (50%), home (33%), friend's home (22%), and other (17%). Most frequently cited as reasons for participation were peer pressure or dare, curiosity, and competition (**Figure 3**).

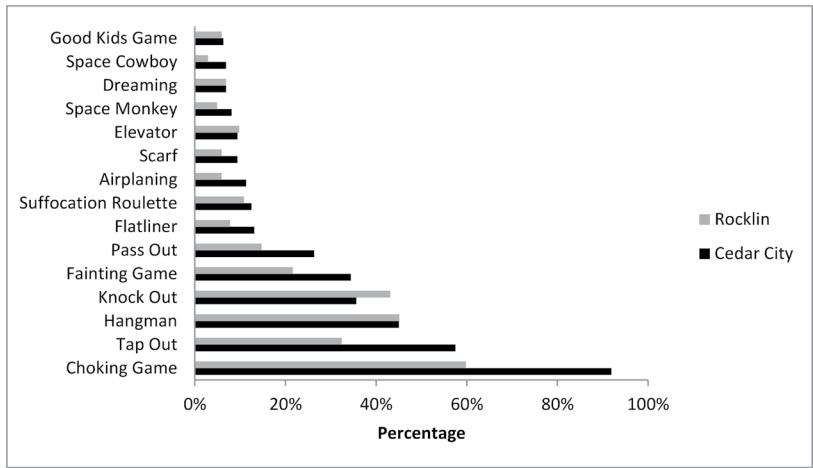


Figure 1. Awareness of pass-out activity names.

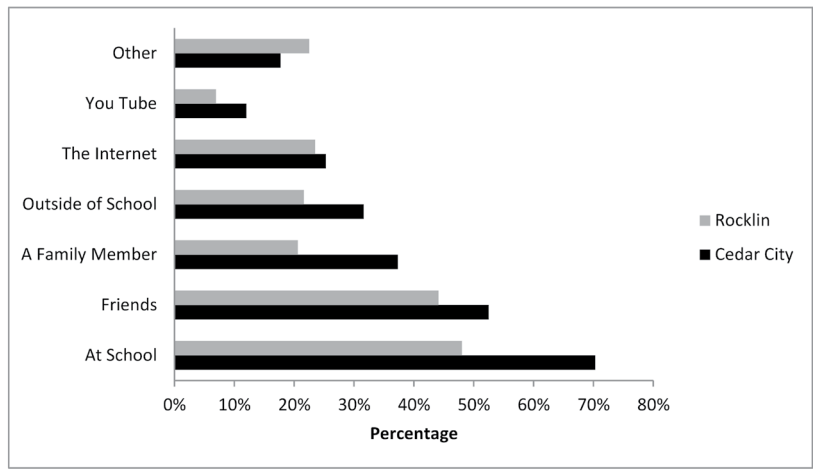


Figure 2. How students heard about pass-out?

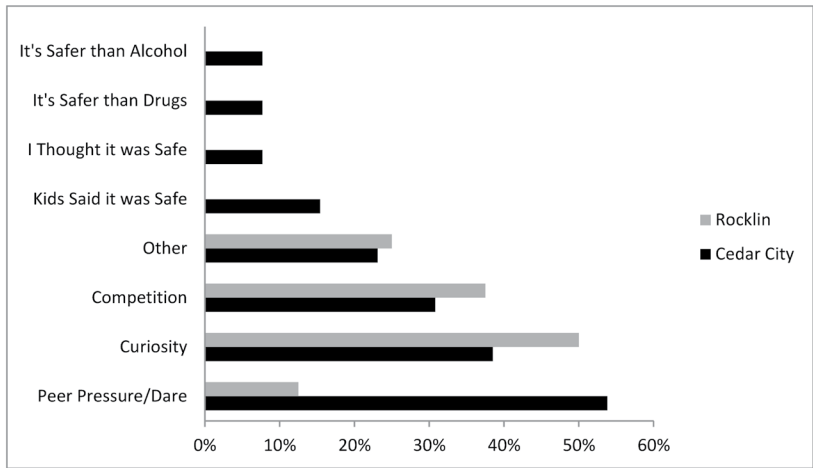


Figure 3. Why students participated in TCG?

Likert scale survey results

In assessing changes in student attitudes a Likert Scale survey was used. The results of the change in attitude analyses are presented in **Table 1 through 3**. For all data a significant p-value (<0.05) indicates that the change is significantly different from 0.

Change in student attitude within and between sites

As indicated in **(Table 1)** for statements 3, 6 and 8 in Cedar City, and for all statements in Rocklin, the data provide significant evidence that education changed participant attitudes in the expected positive direction. In Cedar City for statement 3 students concluded they would say no if invited to participate. For statement 6, Cedar City students agreed that playing can be addictive and for statement 8, students agreed playing TCG is not safer than using alcohol. For statements 1, 4 and 5 in Cedar

City the attitude changes were in the expected direction, but were not statistically significant. Although not statistically significant after the education session Cedar City students agreed they were less interested in playing TCG (statement 1), would warn friends about the dangers of playing (statement 4) and realized it was not safe to stop breathing (statement 5). The Cedar City average change for statement 7 was not in the expected direction, but was not statistically significant. Students concluded they were still likely to play TCG although their responses were not statistically significant.

The right-most column in **Table 1** compares the mean change in attitude between the two sites. Except for statement 6 (playing can be addictive) there were statistically significant differences between the Cedar City and Rocklin results, with Rocklin student attitudes demonstrating a greater mean change.

Prior knowledge

Across both sites 76% of students had previously heard of the choking game (89% at Cedar City, 59% at Rocklin). **Table 2** compares the impact of education on those students with prior knowledge compared to those without prior knowledge of TCG. Responses to statements 1 (I am interested in playing TCG) and 2 (TCG is dangerous) indicated that those without prior knowledge had statistically significantly larger attitude changes than those with prior knowledge.

Demographic differences

The 291 participants ranged in age from 9 to 18 with 191 (68%) under age 15. 189 (65%) were white, and (151) 52% were female. Of the non-white participants 15.7% indicated Latino/Hispanic, 8% Asian/Southeast Asian, 5.2% African American, 2.7% Middle Eastern, and 5.2% Other.

Table 2. Differences between those with/without prior TCG knowledge for changes in Likert Scale responses (numbers in this table are combined across both sites).

Statement	Had previously heard of TCG (76%)	Had not previously heard of TCG (24%)	
Positive values indicate increased disagreement. Negative values indicate increased agreement.	Mean Change Pre-Post (std)	Mean Change Pre-Post (std)	p
1. I am interested in playing TCG	0.033 (0.53)	0.23 (0.69)	0.036
2. TCG is dangerous	-0.067 (0.91)	-0.19 (0.85)	0.048
3. If invited to play TCG I would say 'no'	-0.19 (0.93)	-0.24 (0.84)	0.28
4. I would warn my friends not to play TCG	-0.20 (0.91)	-0.16 (0.67)	0.42
5. It is safe to stop breathing for less than one minute	0.09 (1.3)	0.20 (1.2)	0.089
6. Playing TCG can be addictive	-0.34 (0.83)	-0.28 (0.92)	0.90
7. I am likely to play TCG	-0.02 (0.75)	0.026 (1.0)	0.40
8. Playing TCG is safer than using drugs or alcohol	0.43 (0.91)	0.68 (1.1)	0.07

Table 3 compares attitude changes between two age groups. Of those who completed the demographic survey the proportion of students under 15 was 64% at Cedar City compared to 73% at Rocklin (p-value=0.13). The data for statements 1 (were less interested in playing TCG) and 8 (playing TCG is not safer than using alcohol) showed that those younger than 15 had significantly greater changes in attitude in the expected direction than older students. For statements 2 through 7 (TCG is dangerous, I would say no if invited to play, I would warn my friends not to play, it is safe to stop breathing, playing TCG can be addictive, and I am likely to play TCG) the data provide insufficient evidence that age influenced student attitudes.

Table 3. Differences between age groups and between racial groups for changes in Likert scale responses.

Statement	<15 years Mean Change Pre-Post (std)	15+ years Mean Change Pre-Post (std)	p	White Mean Change Pre-Post (std)	Non-White Mean Change Pre-Post (std)	p
Positive values indicate increased disagreement. Negative values indicate increased agreement.						
1. I am interested in playing TCG	0.22 (0.64)	0.022 (0.63)	0.004	0.14 (0.59)	0.21 (0.75)	0.18
2. TCG is dangerous	-0.19 (0.19)	-0.11 (0.89)	0.59	-0.09 (0.79)	-0.31 (1.1)	0.008
3. If invited to play TCG I would say 'no'	-0.24 (0.88)	-0.20 (0.84)	0.092	-0.21 (0.88)	-0.25 (0.84)	0.06
4. I would warn my friends not to play TCG	-0.20 (0.79)	-0.092 (0.66)	0.096	-0.093 (0.64)	-0.33 (0.90)	0.004
5. It is safe to stop breathing for less than one minute	0.27 (1.1)	0.056 (1.3)	0.067	0.11 (1.1)	0.26(1.3)	0.12
6. Playing TCG can be addictive	-0.25 (0.89)	-0.44 (0.90)	0.61	-0.34 (0.93)	-0.24 (0.81)	0.62
7. I am likely to play TCG	-0.04 (0.89)	0.023 (1.1)	0.81	-0.048 (1.0)	0.053 (0.67)	0.47
8. Playing TCG is safer than using drugs or alcohol	0.71 (1.1)	0.32 (0.91)	0.006	0.51 (1.1)	0.77 (0.96)	0.042

Table 3 also compares attitude changes between white and non-white participants. The proportion of non-white students at Cedar City was 28% compared to 44% at Rocklin (p-value=0.007). For all statements and for both racial groups, the data shows that changes in attitude were in the expected direction, except for statement 7 (I am likely to play TCG) for the white group. For statements 2 (TCG is dangerous), 4 (I would warn my friends not to play), and 8 (playing TCG is safer than using alcohol) there

were statistically significant differences between white and non-white student responses, with the non-white group showing greater positive attitude change. There were no significant differences between white and non-white students for statements 1 (I am interested in playing TCG), 3 (if invited I would say no), 5 (it is safe to stop breathing), 6 (playing can be addictive) and 7 (I am likely to play TCG).

There were no significant observed differences between male and female survey responses (all p-values were >0.12).

DISCUSSION

There was strong evidence to support the premise that education is effective in changing student attitudes about the risks of injury when playing TCG. At both sites there was increased agreement with the statement “TCG is dangerous”, with the measured change in attitude being statistically significant for the Rocklin students. This finding is important because research supports the fact that between 17% and 40% of adolescents who have not been educated believe TCG is not dangerous ^[2] even though it can result in death.

There was also strong evidence to support the premise that education is effective in decreasing student interest in TCG participation. At both sites there was a statistically significant increased agreement with the statement “If invited to play the choking game I would say no”. The positive response to “I am interested in playing the choking game” decreased at both sites and was again statistically significant for Rocklin students. This finding reinforces a conclusion by McClave et al. ^[5] that education does not increase the likelihood of participating in risky behaviors.

Although there was one reported TCG death in a nearby community in 2010 ^[13], Rocklin students had less pre-education TCG awareness and more significant attitude change post education than the Cedar City participants. At Cedar City, the differences were in the expected direction (a positive change in attitude after education), but were less statistically significant. This difference may be attributed to four recent, highly publicized TCG deaths in Cedar City and prior TCG education provided to students in 2013 ^[14]. These events may have raised awareness and negative attitudes toward TCG at Cedar City prior to this study, which is supported by lower mean changes from pre- to post-education results. These observations are consistent with the study demographics which indicated 59 percent of the Rocklin participants reported having previously heard of TCG as compared to 89 percent of the Cedar City participants. It is likely that although education is effective, repeated education is not as effective as is initial education and that education is most valuable with individuals without substantial prior knowledge of TCG. Unlike the findings of Dake et al. ^[9] and AlBuhairan et al. ^[15] but consistent with the Oregon Healthy Teens Survey ^[8] and Ramowski et al. ^[16] we found there were no statistically significant differences between male and female attitudes toward TCG. We found some significant differences between white and non-white racial groups which is consistent with the findings of Ramowski et al. ^[16]. While our findings suggest that diverse students may benefit the most from education, additional studies are needed to confirm this possibility.

Our study showed mixed results in terms of the influence of age. Only for statements 1 (I am less interested in playing TCG) and 8 (playing TCG is not safer than using alcohol) did individuals under the age of 15 show more positive results. For all other statements (TCG is dangerous; If invited to play TCG I would say ‘no’; I would warn my friends not to play TCG; It is safe to stop breathing for less than one minute; Playing TCG can be addictive, and I am likely to play TCG) there were no differences based on age. Other authors have reported that older adolescents were more likely than younger individuals to participate in TCG. Additional research regarding which age groups are most at risk is needed as is further research regarding when is the optimal time for providing education ^[5,8].

We found no evidence that education was harmful and clear evidence that education is helpful in increasing student awareness about TCG injury risks. Most significantly our results indicate that education can decrease student interest in playing TCG. Given that our results showed that friends and school were the most likely place students received information about TCG, 50% of students reported playing at school, and peer pressure was a significant reason for participating, education efforts offered by trained individuals that are located in the schools show great promise of success.

LIMITATIONS

Limitations of the study include the self-report nature of the survey, and the inability to control prior attitudes. The answer “at school” to the pre-education survey multiple choice question asking students how they had heard about pass-out activities lacks the specificity needed to determine who (school administrators, faculty, or other students) told participants about TCG while on campus. This question should be modified in future surveys to discern both the location and source of the acquired knowledge. Due to difficulties in finding willing host schools our study was limited to one school in each of two Western U.S. states, and neither school was randomly selected. Information about the impact of repeated education may have also been useful, but the survey did not address this issue. Although we did not have the funds to do a second post education evaluation, future research should survey the same students at six months to one year after the training to determine if attitude changes persist over time.

Future studies should assess difference in charter vs. public school education as well as in-state, interstate and international variability. Subsequent research should utilize larger sample sizes, so that education can be tailored to address local needs, and to determine the most appropriate age range for education. Qualitative studies would provide richer detail regarding the

motivating and restraining factors influencing student attitudes. Research is needed to determine if local factors influence youth attitudes towards TCG. Factors may include prevalence of TCG activity, injury or death, concurrent drug or alcohol use, bullying, or athletic participation. Additional qualitative studies are needed to determine what motivates students to play TCG even when aware of the dangers.

RECOMMENDATIONS

Based on the fact that unintentional injury is the leading cause of death in children, adolescents and young adults in the United States ^[17], and the fact that students reported that the schools were often where they first heard about TCG and where TCG was commonly played, standardized TCG education should be further developed and provided to parents, educators, first responders, physicians, nurses, law enforcement, coroners and other primary care providers. With education these educators, parents, and providers will be more able to recognize the signs and symptoms of TCG activity or injury, and will be able to educate and support youth. Educators, parents and health care personnel should be alert to teens who complain of chronic headaches, amnesia, or visual impairments; wear high neck clothing in warm weather or have marks on the neck; or experience episodes of dizziness, bloodshot eyes, or behavior changes ^[1]. Educators and school health care professionals should also be encouraged to provide preventative education as part of school curricula. It is critical to prevent TCG activity, to intervene when activity is discovered, and to educate before injuries occur or more lives are lost.

KEY MESSAGES

What is already known on this subject:

- The 2009 Oregon Healthy Teens survey reported that about 6% of eighth-graders and 7.5% of eleventh-graders said they have participated in TCG ^[8]. This translates into approximately 5,200 eighth and eleventh grade students.
- Macnab et al. found that 40% of children perceived no risk from participation in asphyxial games ^[3].
- Educators are fearful that if they talk about choking it will encourage students to try it ^[6].

What this study adds:

- Students reported that the schools were often where they first heard about TCG, and where TCG was commonly played.
- Curiosity, peer pressure and competition were the most frequently-cited reasons for participation.
- Education can increase student awareness of TCG risks and decrease interest in participation.

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