

Adolescent Mental Health and the Choking Game

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abstract

OBJECTIVES: To examine the demographic and health risk factors associated with participation in the choking game (CG), a dangerous and potentially fatal strangulation activity in which pressure is applied to the carotid artery to temporarily limit blood flow and oxygen.

METHODS: We obtained data from 2 cross-sectional studies realized respectively in 2009 and 2013 among French middle school students. The 2009 ($n = 746$) and 2013 ($n = 1025$) data sets were merged ($N = 1771$), and multivariate modeling was conducted to examine demographic and clinical characteristics of youth reporting a lifetime participation in the CG. The 2 studies included questions about risk-taking behaviors and substance use, and standardized assessments were used to collect conduct disorder symptoms and depressive symptoms.

RESULTS: In the merged 2009 and 2013 data set, the lifetime prevalence of CG participation was 9.7%, with no statistically significant differences between boys and girls. A multivariate logistic regression revealed that higher levels of conduct disorder symptoms (odds ratio: 2.33; $P < .001$) and greater rates of depressive symptoms (odds ratio: 2.18; $P < .001$) were both significantly associated with an increased likelihood of reporting CG participation.

CONCLUSIONS: The significant relationship between elevated levels of depressive symptoms and participation in the CG sheds new light on the function of self-asphyxial activities. However, with the finding that higher rates of conduct disorder symptoms were the most important predictor of CG participation, it is suggested that the profile and the underlying motivations of youth who engage in this activity should be reexamined.



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WHAT'S KNOWN ON THIS SUBJECT: Previous research has revealed significant associations between choking game participation and health risks, such as substance use, risk-taking behaviors, poor nutrition, poor mental health, exposure to violence, and even suicide contemplation and attempts.

WHAT THIS STUDY ADDS: The likelihood of middle school students engaging in the choking game was higher in those having reported greater levels of conduct problem symptoms and higher rates of depressive symptoms. This unprecedented finding has important theoretical and pragmatic implications.

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The “Choking Game” (CG) is a thrill-seeking activity in which self-strangulation or strangulation by another person is used to restrict oxygen flow to the brain and induce a temporary and brief euphoric state caused by cerebral hypoxia.¹⁻³ Youth who engage in this risky behavior often relate experiencing a pleasurable “high” before they lose consciousness as well as a “rush” when the blood flow to the brain is restored and consciousness is regained.^{3,4} A variety of techniques are deployed to achieve the state of unconsciousness, including self-induced hyperventilation, strangulation, chest and neck constriction, or ligatures.⁵⁻⁸ An abundance of CG information is now available on video-sharing Web sites, such as YouTube.^{7,9} This extensive propagation of videos of asphyxial games may potentially render this type of activity normal despite its dangerousness. In fact, various negative short- and long-term health outcomes from engagement in the CG have been reported, including chronic headaches, changes in behavior, confusion, short-term memory loss, recurrent episodes of syncope, seizures, retinal hemorrhage, visual impairments, neurologic damages, and death.^{1,5,10-15}

Given the newness of this area of research, the data concerning the CG are still limited, and relatively little is known about the clinical characteristics and the underlying motivations of adolescents involved in this potentially lethal behavior. Hence, continued scientific investigation is necessary to advance research in this field.

Our overall aim for the current study was to establish predictive risk profiles by identifying important demographic and health risk factors associated with participation in the CG, including adjustment for several demographic confounders. One of the underlying purposes was to confirm the contribution of substance use and

risk-taking behaviors as strong predictors of CG participation.¹⁶⁻¹⁹ Nonetheless, our main goal for this research was to identify additional predictors of this dangerous activity, which is crucial for designing adequate preventive interventions.

Although previous exposure to violence has been identified as a risk factor predicting participation in the CG,^{17,18} the possible influence of aggressive and antisocial tendencies has never been investigated until now. For this reason, we examined the relationship between CG participation and conduct disorder symptoms. We were also interested in whether participation in the CG had a significant association with high levels of depressive symptoms. Although several studies have revealed that adolescents reporting a lifetime participation in the CG are more likely to report suicidal ideation and attempts than nonparticipants,^{16,18,20} we were unable to find any studies in which the possible co-occurrence of the CG and depression was examined. Therefore, with our research, we fill this important gap by investigating via a standardized questionnaire the potential cross-sectional association of the CG with depressive symptoms.

METHODS

Data Sources and Study Design

This search was based on the merger of 2 preexistent databases stemming from 2 cross-sectional studies conducted respectively in 2009 and 2013 (Supplemental Tables 5–7). The data were collected from French middle school students aged 9 to 16 years (mean age: 13.0; SD: 1.3) and distributed within 13 randomly selected public establishments located in different regions in France. After the 2009 ($n = 746$) and 2013 ($n = 1025$) data sets were merged by retaining only the youth who responded to the CG question, the final sample consisted of 1771

participants. Their demographic characteristics are displayed in Table 1.

It should be noted that the 2 studies were based exactly on the same research protocol (eg, same variables, same measures, same recruitment method, etc). They were implemented independently to obtain 2 research sites from 2 different regions. The time lapse between the 2 studies is only due to the fact that the ethical agreements took more time to obtain than initially foreseen for the second study. At last, it should be specified that there were no particular trends, changes, or events between the 2 surveys related to awareness or efforts to mitigate the CG.

Ethics approvals were obtained from the French ethical research committee (Comité de Protection des Personnes Ile de France IV) and from the French Commission on Data Privacy and Public Liberties. The directors of each selected middle school also approved the study procedures. The parents and/or guardians of students provided written informed consent before data collection. After the presentation of the objectives of the study, the assessment instruments were collectively administered and collected in the classroom by a doctoral student. All questionnaires were anonymous, so participants were assured that their responses were confidential. No compensation was offered to participate in the study.

Measures

The dependent variable (lifetime participation in the CG) was assessed by the following question: “Have you ever participated in the Choking Game?” Responses were limited to “yes” or “no,” and respondents who answered yes were defined as having a history of CG participation. Thus, by “participation” or “have participated,” we mean having oneself participated at least once in the CG during one’s

TABLE 1 Descriptive Statistics of Demographic Variables

	% (n)
Demographic variables	
Sex	
Female	51.1 (905)
Male	48.9 (866)
Age, y	
9–13	63.0 (1115)
14–16	37.0 (656)
Family characteristics	
Living arrangement	
Both parents	67.7 (1195)
Non–2-parent family	29.0 (511)
Other	3.3 (59)
Siblings	
0	8.7 (152)
1	39.0 (682)
≥2	52.3 (915)
Schooling	
Grades in school	
Sixth	26.5 (469)
Seventh	21.5 (380)
Eighth	28.3 (501)
Ninth	23.8 (421)
Have repeated a grade	22.0 (386)
Schooled in ZEP ^a	19.3 (342)
Geographic location	
Urban	67.0 (1187)
Rural	33.0 (584)
School academy	
Tours	42.1 (746)
Bordeaux	57.9 (1025)
Health variables	
Risk-taking behaviors	
High-risk sports activities currently	17.9 (317)
2-wheeled vehicle risk currently	26.3 (465)
Substance use	
Tobacco experimentation	30.6 (541)
Current tobacco use	10.9 (193)
Alcohol experimentation	50.9 (901)
Current alcohol use	32.9 (582)
Marijuana experimentation	7.2 (128)
Current marijuana use	4.0 (71)
Conduct disorder symptoms	
Conduct disorder ^b	8.4 (149)
Depressive symptoms	
Depression ^c	9.4 (164)
Lifetime participation in the CG	
I have ever participated in the CG	9.7 (171)

ZEP, Priority Education Zone.

^a Schools located in ZEP are classified by the Ministry of Education as areas of low socioeconomic status.

^b Participants with the highest 10% of conduct disorder symptoms (with a score in the ≥90th percentile of symptoms).

^c Participants with the highest 10% of depressive symptoms (with a score in the ≥90th percentile of symptoms).

lifetime, whether alone or with other people. Those who responded negatively formed a control group of adolescents who were not involved in any form of choking activities. Before the question was given, participants were read the following description of the CG (known as “jeu d’asphyxie”

or “jeu du foulard” in France): “The Choking Game, also called Blackout, the Dream Game, the Pass-out Game, or The Fainting Game, is an activity in which self-strangulation or strangulation by another person is used to obtain a ‘high’ by restricting blood and oxygen flow to the brain.”

Demographic variables were assessed with questions used to collect information concerning sex (male or female), age, family characteristics (living arrangement and siblings), and schooling (grade level, grade repetition, and geographic location of schools).

Depressive symptoms were investigated with the French version of the Children’s Depression Inventory (CDI).^{21,22} The CDI is a 27-item self-report measure originally designed to assess cognitive, behavioral, and affective symptoms of depression in children and adolescents. Each item consists of 3 statements that represent different levels of severity of a specific symptom of depression, and the child is required to choose 1 statement that best describes him or her. Scores range from 0 to 54, with higher scores indicating more depressive symptoms. The CDI is the most widely used measure of childhood depressed affect²³ and has revealed sound psychometric properties, including internal consistency, test-retest reliability, and discriminant validity.^{21,24}

Risk-taking behaviors and substance use were assessed with a self-report measure composed of 8 yes-or-no items used to assess current practice of high-risk sports activities; current risk-taking in a 2-wheeled vehicle; lifetime history of using alcohol, tobacco, and marijuana; and current consumption of alcohol, tobacco, and marijuana. Response options were dichotomous (eg, 0 = never used, and 1 = ever used). Thus, for each item, participants were classified into 2 categories (eg, no history of tobacco use versus lifetime history of tobacco use; no current consumption of alcohol versus current consumption of alcohol).

To measure the conduct problem symptoms of the teenagers, we constructed a self-report questionnaire on the basis of the

Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision criteria for conduct disorder²⁵ (unchanged in the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition*²⁶). In the current study, not all the criteria of the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision* ($N = 15$) were held, according to the wishes of the school inspectorate. Three deleted criteria were the following: “has forced someone into sexual activity,” “has deliberately engaged in setting fire with the intention of causing serious damage,” and “has broken into someone else’s house, building, or car.” Finally, our measure of conduct disorder symptoms consisted of a 12-item self-reported scale that included 7 questions referring to aggressive symptoms and 5 questions used to assess the nonaggressive but rule-breaking form of antisocial behavior. The measurement of these 2 distinct but correlated dimensions made it possible to consider heterogeneity within antisocial behaviors.²⁷ The timescale for all violent and antisocial behavior questions referred to the past 12 months, and respondents were asked to report responses limited to yes or no. The total score, ranging from 0 to 12, represented the number of conduct problem symptoms that were present. In the current study, Cronbach’s α coefficient for this self-administered questionnaire was 0.72.

Statistical Analysis

First, we categorized the sample into 2 groups: (1) youth who had reported participating in the CG versus (2) those who had never participated in it. Then, bivariate logistic regressions were conducted to examine the possible association between CG participation and (1) certain demographic characteristics, (2) conduct disorder symptoms, (3) depressive symptoms, (4) risk-taking behaviors (high-risk sports activities and 2-wheeled vehicle risk), and (5)

substance use (experimentation and current consumption of tobacco, alcohol, or marijuana). The logistic regression models were fitted to each of the variables independently. Demographic and health risk-factor variables revealing a significant bivariate association with CG participation were then used for the multivariate logistic regression, controlling for key and potentially confounding demographic variables (sex, age, grade repetition, and geographic location [urban or rural]) to better predict CG participation. Odds ratios and 95% confidence intervals (CIs) are presented to reflect association strength. All statistical analyses were conducted with R software (R Core Team, Vienna, Austria), and statistical significance levels were fixed at $P < .001$.

RESULTS

The lifetime prevalence of CG participation in this study was 9.7% for middle school students. We did not find any statistically significant differences in lifetime participation according to selected demographic variables (see Table 2).

With respect to other activities, 7.2% of middle school students reported having ever used marijuana at least once, and 4% occasionally consumed it at the time of the study. The substance most commonly consumed was alcohol (32.9%), but it was also the most experimented (50.9%). Tobacco had been tried at least once by 30.6% of adolescents, and 10.9% still consumed it. Furthermore, 17.9% of middle school students practiced at least 1 risky sport at the time of the study, and current high-risk vehicle use was found in 26.3% of participants.

The results of bivariate relationships between health risk variables and CG participation are provided in Table 3. Logistic regression revealed that participation in the CG was significantly associated with the

following health risk factors: substance use (experimentation and current consumption of tobacco and marijuana), high rates of depressive symptoms, and high levels of conduct disorder symptoms. Alcohol use, high-risk sports activities, and risky 2-wheeled vehicle use were not related to CG participation (Table 3).

Each of the variables with a statistically significant bivariate relationship was then put through a forward stepwise multivariate logistic regression, controlling for sex, age, grade repetition, and geographic location (urban or rural) to better understand which variables were associated with increased risk of CG participation and thus to establish a predictive risk profile. The final model (Table 4) revealed that higher levels of depressive symptoms as well as higher rates of conduct disorder symptoms emerged as the only 2 predictors of CG participation.

DISCUSSION

According to a systematic review of the scientific literature, the median lifetime prevalence rate of CG participation is 7.4%.⁸ Therefore, the lifetime prevalence of engagement observed in the current study (9.7%) is consistent with that observed in other published studies. Contrary to results of previous studies revealing that the CG is more common among young adolescent boys,^{4,7,14,28,29} we found no statistically significant difference in participation according to sex. However, this finding confirms the results of more recent research revealing an absence of significant sex difference in lifetime participation.^{16,17,20} The results of multivariate modeling (Table 4) revealed that elevated levels of depressive symptoms and high rates of conduct disorder symptoms both appear to be significantly related to an increased likelihood of reporting participation in the CG. This substantial association of the CG with

TABLE 2 Unadjusted Odds Ratios for the Association Between Demographic Characteristics and Lifetime Participation in the CG (Bivariate Analyses)

Demographic Variable	CG Participation (<i>n</i> = 171; 9.7%), % (<i>n</i>)	No Participation (<i>n</i> = 1600; 90.3%), % (<i>n</i>)	Odds Ratio (95% CI)	<i>P</i>
Sex				
Female	49.7 (85)	51.3 (820)	1.06 (0.77–1.45)	—
Male	50.3 (86)	48.7 (780)	1.00	.701
Age, y				
9–13	58.5 (100)	63.4 (1015)	1.00	—
14–16	41.5 (71)	36.6 (585)	1.23 (0.89–1.69)	.203
Family characteristics				
Living arrangement				
Both parents	63.1 (108)	68.2 (1087)	1.00	—
Non-2-parent family	32.2 (55)	28.6 (456)	1.21 (0.85–1.70)	.267
Other	4.7 (8)	3.2 (51)	1.57 (0.67–3.23)	.246
Siblings				
0	10.1 (17)	8.5 (135)	1.00	—
1	40.2 (68)	38.9 (614)	0.87 (0.51–1.58)	.655
≥2	49.7 (84)	52.6 (831)	0.80 (0.47–1.43)	.435
Schooling				
Grades in school				
Sixth	29.8 (51)	26.1 (418)	1.00	—
Seventh	16.4 (28)	22.0 (352)	0.65 (0.39–1.04)	.082
Eighth	25.1 (43)	28.6 (458)	0.76 (0.50–1.17)	.229
Ninth	28.7 (49)	23.3 (372)	1.07 (0.71–1.63)	.718
Have repeated a grade				
No	70.2 (120)	78.9 (1256)	1.00	—
Yes	29.8 (51)	21.1 (335)	1.59 (1.11–2.24)	.008
Schooled in ZEP				
No	81.3 (139)	80.6 (1290)	1.00	—
Yes	18.7 (32)	19.4 (310)	0.95 (0.63–1.41)	.835
Geographic location				
Urban	59.6 (102)	67.8 (1085)	1.00	—
Rural	40.4 (69)	32.2 (515)	1.42 (1.02–1.96)	.031
School academy				
Tours	43.3 (74)	42.0 (672)	1.00	—
Bordeaux	56.7 (97)	58.0 (928)	0.94 (0.69–1.30)	.748

ZEP, Priority Education Zone; —, not applicable.

depressive symptoms helps clarify the relationship found in previous studies between suicidal contemplation and CG participation.^{16,18,20} Indeed, 1 plausible interpretation of this result and those of earlier research is that CG participation is a self-medicating mechanism against an internal distress accompanied by suicidal thoughts. According to this affect-regulation model, the CG may primarily represent an attempt to decrease one's depressive feelings or dysphoric affect, as is so frequent among youth who engage in nonsuicidal self-injury.^{30–36} Other researchers have already proposed that the CG may serve to regulate negative emotions stemming from a depressed mood or painful depressive affects.^{16,20} However, we

are the first to use a standardized questionnaire to examine the possible co-occurrence of CG participation and depression. Therefore, by showing that high levels of depressive symptoms appear to be linked to an increased likelihood of participation in the CG, in the current study, we offer new arguments supporting the idea that this behavior serves as a specific coping mechanism for distressed adolescents.

Nevertheless, the results of our final model (Table 4) also reveal that the CG is primarily pursued by adolescents with more aggressive and nonaggressive but delinquent antisocial behaviors. Indeed, a high level of conduct disorder symptoms emerged as the most important

health predictor for participation in this life-threatening game.

Although our results are robust, they should be considered in the light of several limitations. Firstly, given the cross-sectional nature of our design, the direction of causal connections between the variables is unclear. As such, the reported findings cannot be used to clarify the temporality of health risk factors nor the etiologic relationship between the CG and conduct problem symptoms nor even that between the CG and symptoms of depression. For example, the association between the CG and conduct problems could reflect the role of antisocial tendencies in causing participation in the CG, but it is also plausible that CG participation precedes the emergence of severe

TABLE 3 Unadjusted Odds Ratios for the Association Between Health Risk Factors and Lifetime Participation in the CG (Bivariate Analyses)

Health Variable	CG Participation (<i>n</i> = 171; 9.7%), % (<i>n</i>)	No Participation (<i>n</i> = 1600; 90.3%), % (<i>n</i>)	Odds Ratio (95% CI)	<i>P</i>
Risk-taking behaviors				
High-risk sports activities currently				
No	80.1 (137)	82.3 (1317)	1.00	—
Yes	19.9 (34)	17.7 (283)	1.16 (0.77–1.71)	.455
2-wheeled vehicle risk currently				
No	66.5 (114)	74.5 (1192)	1.00	—
Yes	33.5 (57)	25.5 (408)	1.47 (1.04–2.05)	.024
Substance use				
Tobacco experimentation				
No	54.4 (93)	71.0 (1137)	1.00	—
Yes	45.6 (78)	29.0 (463)	2.05 (1.49–2.83)	<.001
Current tobacco use				
No	78.9 (135)	90.2 (1443)	1.00	—
Yes	21.1 (36)	9.8 (157)	2.44 (1.61–3.63)	<.001
Alcohol experimentation				
No	40.9 (70)	49.9 (798)	1.00	—
Yes	59.1 (101)	50.1 (800)	1.43 (1.04–1.98)	.025
Current alcohol use				
No	56.1 (96)	68.3 (1092)	1.00	—
Yes	43.9 (75)	31.7 (507)	1.68 (1.21–2.31)	.001
Marijuana experimentation				
No	83.0 (142)	93.8 (1501)	1.00	—
Yes	17.0 (29)	6.2 (99)	3.09 (1.94–4.78)	<.001
Current marijuana use				
No	88.3 (151)	96.8 (1547)	1.00	—
Yes	11.7 (20)	3.2 (51)	4.01 (2.28–6.81)	<.001
Conduct disorder symptoms				
Conduct disorder ^a				
No	79.4 (135)	92.9 (1483)	1.00	—
Yes	20.6 (35)	7.1 (114)	3.37 (2.19–5.07)	<.001
Depressive symptoms				
Depression ^b				
No	80.1 (137)	91.8 (1451)	1.00	—
Yes	19.9 (34)	8.2 (130)	2.79 (1.81–4.19)	<.001

—, not applicable.

^a Participants with the highest 10% of conduct disorder symptoms.^b Participants with the highest 10% of depressive symptoms.

conduct problems. Therefore, future research should incorporate a longitudinal design, which would be a way to elucidate the causal structure of this link between conduct problems and the CG. Secondly, our

data on the CG did not include information on frequencies of participation. Thirdly, no differentiation was made between youth who engage in the CG alone and those who participate in a group. It

would have been interesting to compare the level of conduct problem symptoms of adolescents who engage in choking activities alone with that of youth who do so in a group. Lastly, further research with a larger sample

TABLE 4 Multivariate Model: Adjusted Odds Ratios for the Relationship Between Significant Risk Factors and Lifetime Participation in the CG

Variable	Odds Ratio (95% CI)	<i>P</i>
Tobacco experimentation	1.36 (0.89–2.05)	.140
Current tobacco use	0.99 (0.54–1.76)	.989
Marijuana experimentation	1.14 (0.48–2.47)	.739
Current marijuana use	1.78 (0.71–4.68)	.222
Conduct disorder ^a	2.33 (1.43–3.72)	<.001
Depression ^b	2.18 (1.38–3.36)	<.001

Data were adjusted for sex, age, grade repetition, and geographic location. McFadden's pseudo R^2 for this multivariate model: 0.32.^a Participants with the highest 10% of conduct disorder symptoms.^b Participants with the highest 10% of depressive symptoms.

size is needed to confirm or refute our findings.

Despite these limitations, the present findings provide new epidemiological and clinical insights into the problem of self-asphyxial activities. There has been much debate about the underlying motivations leading to participation in the CG. Is it due to impulsivity, poor coping skills, or negative emotionality? Our finding of a significant relationship between the CG and high rates of depressive symptoms offers some elements of response and reveals that participation in this life-threatening game may be a coping mechanism favored by distressed adolescents. Parents, school personnel, and clinicians should therefore have this dangerous game in mind when interacting with distressed adolescents. This finding also reveals that organizers of prevention campaigns used to target depressive disorders should consider participation in the CG as a useful semiological marker because adolescents reporting CG activity were also more likely to report higher levels of depressive symptoms. On the other hand, the substantial association of CG participation with conduct problems suggests the need to rethink the status and the function of this thrill-seeking activity as well as the underlying motivations of its

participants. This result represents a research paradigm shift. Understanding the genetic and environmental mechanisms linking conduct problems with CG participation should be a major goal for future research.

Another interesting issue raised by the current study concerns how we are to interpret this intriguing interconnection of the CG with 2 apparently different variables: elevated levels of conduct disorder symptoms and high rates of depressive symptoms. Should we, for example, consider that these violent and antisocial behaviors reported by participants constitute a facade of a “masked depression”? This kind of question reveals how much further research is needed to understand more fully and better delineate the respective influence of these 2 health risk factors as well as their interaction.

CONCLUSIONS

With the data presented in this article, we throw new light on the psychiatric and behavioral correlates of choking activities that has important implications for clinical practice, prevention, and research. So far, no empirical studies had explored the possibility that a high level of conduct disorder symptoms could

represent a health risk factor contributing to increasing the probability of participating in the CG. Similarly, the predictive role of depressive symptoms had never been examined. Therefore, in the current study, we provide a new arena for research by enlarging the field of investigation concerning the risk factors that may predict the course of asphyxial activities.

In terms of prevention, interventions designed specifically for at-risk individuals seem to be required. One may assume that young people with conduct problems and/or depressive affects would benefit from clear communication from providers about the risks of CG participation and about how they can be helped by mental health services. Furthermore, prevention programs supporting the development of emotion-regulating skills should be developed. Interventions that are focused on emotion management might help these youth to cultivate the ability to regulate their negative affects rather than CG participation.

ABBREVIATIONS

CDI: Children’s Depression Inventory
CG: choking game
CI: confidence interval

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