

# Comparison of Smoking, Drinking, and Marijuana Use Between Students Present or Absent on the Day of a School-Based Survey

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**ABSTRACT:** *The aim of this population-based survey was to compare the prevalence of selected risk behaviors between students present or absent on the day of a school-based survey. The study population was a representative sample of all students of secondary schools in the Seychelles (Indian Ocean). Students absent on the day of the survey were traced and requested to complete the same self-administered questionnaire as did present students. Self-reported consumption of cigarettes, alcohol, and marijuana were measured. Of the sample of 1453 eligible students aged 11 to 17 years, 1321 "present students" completed the survey (90.9% participation), 11 refused to answer all questions, and 121 were not present at school. We could trace 105 of the 121 students not present at school on the survey day ("absent students"), and all of them completed the questionnaire over the next 4 weeks. The prevalence of risk behaviors was significantly higher in absent than present students for current smoking and drinking. Inclusion of data from the absent students resulted in a relative increase in the prevalence of the considered behaviors by 3% to 8% as compared to data based on present students only. In conclusion, the prevalence of risk behaviors was higher in absent than present students. Adjusting for data of absent students increased the prevalence estimates in the base population. (J Sch Health. 2006;76(4):133-137)*

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The validity of prevalence estimates in school-based surveys requires that participants represent the base population. Estimates may be biased if eligible participants do not take part in the survey and nonparticipants differ from participants with respect to characteristic under study, for example, if nonparticipants in a survey of smoking habits smoke more often than participants.<sup>1,2</sup> Because response rates to surveys are often suboptimal (eg, 60-80%),<sup>3</sup> nonresponse rates can potentially introduce a bias in the results. Bias due to nonresponse on prevalence of risk behaviors such as smoking, drinking, and marijuana use has been examined in some studies among adults,<sup>1,4-12</sup> and the prevalence of these behaviors was generally higher in nonparticipants than participants.<sup>4,7,11,12</sup> However, similar data are scarce in school children.<sup>13-15</sup> In addition, findings have not been consistent across the studies. For example, nonparticipants consumed alcohol more often than participants in some<sup>13</sup> but not all surveys in teenagers.<sup>15</sup>

In this study in the Seychelles (Indian Ocean), we compared the prevalence of smoking, drinking, and marijuana use among students present and absent at school on the day of a survey, using an anonymous self-administered questionnaire (Global Youth Tobacco Survey [GYTS]). We also examined how the survey estimates would have changed if data from absent students had been included.

## METHODS

The GYTS is an international school-based survey of tobacco in adolescents aged 13 to 15 years. The survey is sponsored by the World Health Organization and the Centers for Disease Control and Prevention, and it has been

conducted one or more times in more than a hundred countries worldwide.<sup>16-18</sup> The GYTS was conducted in the Republic of Seychelles in 2002. The Republic of Seychelles is a group of 115 islands lying in the Indian Ocean approximately 1800 km north to Mauritius. The large majority of the population is of African descent. Approximately, 90% of the population lives on the main island (Mahé), and most of the remaining people live on the two largest other islands. Creole is typically spoken at home, while English is the main language used at school. The gross domestic product per capita increased from US\$600 in 1976 to US\$8492 in 2003.

The GYTS includes grades in which students aged 13 to 15 years are found. In the Republic of Seychelles, this includes the 4 secondary grades S1-S4 (school is compulsory through the S4 level). In Seychelles, there are 12 schools (10 public, 2 private) on the three main islands that teach grades S1-S4. The total enrollment of grades S1-S4 for these 12 schools was 6161. The GYTS sample size estimation showed that 1224 completed interviews were needed from an enrollment of 6161 for a  $\pm 5\%$  margin of error. The actual number of students targeted for the survey was increased by 20% to adjust for student nonparticipation ( $1224/0.80 = 1530$ ). All 12 schools were included in the study, and classes were selected proportionally to the total S1-S4 enrollment in each school. When every school is selected (ie, a census of schools) the probability of selecting a class must be the same in every school; thus, the number of classes selected in each school was proportional to the school enrollment size (ie, enrollment in S1-S4). In total, all 12 schools agreed to participate (100% school response rate), and 1321 students completed the survey (90.9% student response rate).

The survey took place at the same time (Tuesday, 8 am to 9 am) in all selected 52 classes. Teachers were not present during the survey, and survey officers (most often a nurse student) informed the students about the survey and invited them to participate. After the survey was completed, each survey officer asked the teacher the names of students absent on that day ("absent students"). Subsequently, the absent students were contacted within the

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next 4 weeks by approaching them at school (in collaboration with their teacher) or at home for students not attending school for a long period. Whenever located, absent students were informed about the survey and invited to complete the questionnaire at their school or, in some instances, at home.

The same questionnaire (in English) was used for both present and absent students, and it was anonymous and self-administered. The questionnaire included 56 core questions on tobacco and other variables (eg, age, sex) that are used in all GYTS worldwide. We included 15 additional questions in order to address alcohol drinking and use of illegal drugs. Most students could complete the questionnaire within 35-45 minutes.

The survey was approved by the research committee of the Ministry of Health, as the questionnaire was considered nonsensitive in nature, there were no invasive investigations or physical measurements, students were allowed to decline participation, and the information was collected anonymously ensuring confidentiality of all answers by all students.

Consistent with the GYTS methodology, "smoking" was defined as smoking on 1 or more days per month. ("During the past 30 days, on how many days did you smoke cigarettes?") Drinking was defined as any alcohol consumption on 1 or more days during the past 30 days. ("During the past 30 days, on how many days did you drink alcohol?") Marijuana use was defined as having smoked marijuana at least once during the past 12 months. ("During the past 12 months, how many times did you take a joint, marijuana, or hashish?")

Since the purpose of this study was to compare behaviors in present and absent students, the analysis was limited to using unweighted data. Cutoff values for categories of age (11-13, 14, and 15-17 years) were selected to balance the number of students in each category. Chi-square test was used to test for significant differences in prevalence estimates by presence status. Logistic regression adjusted for age and sex was used to assess the effect of nonparticipation on the considered risk behaviors. Analyses were conducted with Stata 8.2 StataCorp, College Station Tex. The p values less than 0.05 were considered significant.

## RESULTS

Of the sample of 1453 eligible students, 11 refused to answer to all questions and 121 were not present at

school, hence 1321 completed all or part of the questionnaire (90.9% participation). Of the 121 students not present on the day of the survey, we could trace 105 students (87%) (referred as "absent students"). All absent students agreed to complete the questionnaire. Absent students were not asked about their reason for nonattendance on the day of the initial survey.

Answers not completed in the questionnaire were coded as missing values and their proportions varied between 1% and 8.7% depending on the question. Overall, 125 students did not answer the question about smoking during the past month (8.7%), 66 on ever smoking (4.6%), 16 about drinking during the past month (1.1%), 25 about ever drunkenness (1.8%), and 34 about marijuana during the past year (2.4%). The proportions of missing values were similar in present and absent students.

Age reported by students ranged from 11 to 17 years. Table 1 shows that the distribution of present and absent students was similar across age categories ( $p > 0.05$ ). Percentages tended to differ for girls at ages 13 and 16, but these differences are not important enough to affect direct comparisons of the present and absent students.

Table 2 shows the prevalence of the selected behaviors by presence status, sex, and age. The prevalence of smoking and drinking increased across age categories in boys and girls. The prevalence of smoking was higher in absent than present students of both genders. There was a difference in all age categories although it reached statistical significance only in a few categories. A similar pattern was found for alcohol consumption and history of drunkenness, although in girls, the difference between absent and present students was only significant for monthly alcohol consumption at age 14. Marijuana use tended to be higher in absent than present students in the younger age categories but not in the oldest age category. However, none of the differences reached statistical significance.

Overall, the prevalence of all considered risk behaviors was higher in absent than present students although the difference failed to reach statistical significance for marijuana use (Table 3). Accounting for the findings in the absent students resulted in substantial relative increase in the prevalence of the considered risk behaviors in the base population: 3.9% for ever smoking (47.5% to 49.3%), 8.4% for smoking in the past month (25.2% to 27.3), 4.2% for ever drunkenness (44.7% to 46.6%), and 2.7% for drinking in the past month (48.5% to 49.8%).

Table 1  
Number and Percent Distribution Comparison (in Parentheses) of Present and Absent Students by Age and Sex

Age category	11	12	13	14	15	16	17	Total
Boys								
Present students	37 (6.0%)	96 (15.5%)	124 (20.0%)	160 (25.8%)	146 (23.5%)	47 (7.6%)	10 (1.6%)	620 (100%)
Absent students	7 (10.3%)	7 (10.3%)	11 (16.2%)	18 (26.4%)	17 (25%)	8 (11.8%)	0 (0.0%)	68 (100%)
Girls								
Present students	21 (3.2%)	106 (16.2%)	147 (22.5%)	193 (29.5%)	151 (23.1%)	32 (4.9%)	4 (0.6%)	654 (100%)
Absent students	1 (2.7%)	6 (16.2%)	4 (10.8%)	11 (29.7%)	10 (27.0%)	5 (13.6%)	0 (0.0%)	37 (100%)

Table 4 shows adjusted odds ratios for the selected behaviors associated with absence on the day of the survey. Compared to present students, absent students had higher odds to report smoking and drinking. Boys and students aged 15 to 17 years were also associated with these behaviors. The odds ratio for participation status associated with marijuana use was not statistically significant.

### DISCUSSION

This study shows a significantly higher prevalence of risk behaviors in students who were absent than present on the day of a school-based survey. Absent students were more likely to smoke, drink, and consume marijuana

than present students. Despite the high participation rate to the survey (91%), inclusion of data from absent students increased the point estimates of the prevalence of the considered risk behaviors by up to 8% in the study population.

The study has several limitations, some of them being inherent to the issue addressed by the study (ie, comparison of results in students present or absent on the day of a survey). First, the number of absent students was small (a consequence of the high participation to the survey), which limits the statistical power of the analyses. Second, behaviors apply to absent students who constitute the largest part of all nonparticipants. However, results are unknown in the few students present at school but who

Table 2  
Prevalence (%) of Risk Behaviors in Students Absent (A) or Present (P) on the Day of a Survey, by Sex and Age

Age category (years)	Boys								Girls							
	11-13		14		15-17		Total		11-13		14		15-17		Total	
	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A
Tobacco																
Ever smoking	46	52	53	83	67	76	54	70	30	46	44	64	56	80	41	65
Smoking in past month	27	48	24	39	38	64	30	52	15	18	23	64	28	47	21	43
Alcohol																
Ever drunkenness	27	48														
Drinking in past month	40	64	44	78	59	76	47	72	35	36	44	55	52	64	43	53
Marijuana																
Ever marijuana	45	56	40	67	63	76	50	66	41	36	47	81	58	53	47	57
Marijuana in past year	15	28	12	17	26	24	20	24	6	9	15	9	29	7	9	8
	14	28	10	28	23	12	17	22	6	9	5	18	12	7	8	11

\*  $p < 0.05$ .

Table 3  
Prevalence (and 95% Confidence Intervals) of Risk Behaviors by Participation Status and Impact on Prevalence in the Base Population

Risk Behavior	Present Students (P)		Absent Students (A)		Total (T)		Absolute Increase (P vs T)	Relative Increase (P vs T)
	%	95% CI	%	95% CI	%	95% CI	%	%
Tobacco								
Ever smoked	47.5	44.7-50.2	68.0	58.8-77.1	49.3	46.4-51.7	1.8	3.9
Smoking in past month	25.2	22.7-27.6	48.6	38.8-58.3	27.3	24.6-29.5	2.1	8.4
Alcohol								
Ever drunkenness	44.7	41.9-47.4	65.4	56.1-74.7	46.6	43.6-48.8	1.9	4.2
Drinking in past month	48.5	45.8-51.2	62.9	53.5-72.3	49.8	47.0-52.2	1.3	2.7
Marijuana								
Ever marijuana	14.5	12.5-16.4	18.3	10.7-25.8	14.7	12.9-16.6	0.2	1.4
Marijuana in past year	12.5	10.7-14.3	18.1	10.6-25.6	12.9	11.2-14.7	0.4	3.2

Table 4  
**Odds Ratios (OR) With 95% Confidence Intervals (CI) for Risk Behaviors by Participation Status, Sex, and Age**

	Smoking in Past Month			Ever Smoking			Drinking in Past Month			Ever Drunkenness			Marijuana in Past Year		
	OR	CI	P	OR	CI	P	OR	CI	P	OR	CI	P	OR	CI	P
Present students	1			1			1			1			1		
Absent students	2.55	1.69-3.86	0.001	2.06	1.33-3.21	0.001	1.71	1.12-2.59	0.012	2.19	1.44-3.36	0.001	1.33	0.77-2.27	ns*
Girls	1			1			1			1			1		
Boys	1.54	1.19-1.99	0.001	1.67	1.34-2.09	0.001	1.09	0.88-1.36	ns*	1.22	0.98-1.53	0.066	2.49	1.76-3.52	0.001
Age 11-13	1			1			1			1			1		
Age 14	1.25	0.90-1.72	ns*	1.62	1.24-2.12	0.001	1.12	0.86-1.46	ns*	1.33	1.02-1.74	0.034	0.85	0.55-1.33	ns*
Age 15-17	1.91	1.42-2.56	0.001	2.68	2.05-3.51	0.001	2.01	1.55-2.60	0.001	2.05	1.58-2.65	0.001	1.82	1.26-2.63	0.001

\* ns, not significant.

refused to answer to all questions (n = 11) and in those not present at school but who could not be traced (n = 16). Third, the anonymous and self-administered nature of the questionnaire could not prevent some participants refusing to answer some questions. The proportion of such missing data was, however, fairly low (generally <5%) and similar in present and absent students. Fourth, present and absent students may have voluntarily or involuntarily misreported their behaviors. Fifth, absent students may have perceived less confidentiality when completing their questionnaire on an individual basis as compared to present students for whom the questionnaire was administered collectively. This may lead to some underestimation in absent students in the prevalence of the behaviors, which are not socially encouraged. On the other hand, strong points of the study include the population-based design and the high proportion of absent students who were successfully traced.

Absent students were more likely to be male than female (65% of all absent students were boys). Although some studies have reported a higher proportion of males among nonparticipants,<sup>3,19</sup> gender specificity of nonparticipants has not been found consistently.<sup>6</sup> The prevalence of several behaviors under study (eg, smoking and drinking) did not largely differ between boys and girls. This suggests that the difference in the prevalence of behaviors among present and absent students was not confounded by this sex difference in present and absent students.

The prevalence of smoking habits was significantly higher in absent than in present students with twice as many smokers in the former than the latter. A similar difference between nonparticipants and participants has been found in previous studies among adolescents<sup>13,14</sup> and among adults.<sup>1,4-10</sup> In our study, absent students drank more often than present students, irrespective of sex. The impact of nonresponse on alcohol consumption in previous studies has been inconsistent. Compared to participants, in studies in adults, nonparticipants indulged in hazardous drinking less often,<sup>20</sup> more often,<sup>11,12</sup> or equally often.<sup>3,21</sup> Similarly to smoking and drinking, the prevalence of marijuana use tended to be higher in absent than in present students. This finding is consistent with two studies in teenagers.<sup>13,14</sup>

While drinking, and to a lesser extent smoking, are tolerated among adults in Seychelles,<sup>22-24</sup> smoking, drinking, and marijuana use are not tolerated among youth. A higher prevalence of these behaviors in absent than present students may reflect the fact that absent students include adolescents who may have marginalized themselves and/or are more defiant toward social norms. We had indication that a substantial proportion of absent students (perhaps up to half of them) had been attending school poorly or not at all (particularly at S4 level) and/or were suspended for disciplinary reasons (ie, major misbehaviors). This underlies the multifactorial nature of school absence, including health and behavioral components.<sup>25,26</sup>

Despite the high participation rate in the survey (91%), inclusion of data from students who were not present at school on the day of the survey had a substantial impact on the prevalence of the considered behaviors. The strongest effect was observed for tobacco use, with a relative increase in smoking prevalence of 8% (from 25.2% to 27.3%) upon inclusion of data from absent students. Nonetheless, the prevalence of the considered behaviors when

accounting for results in absent students did still fall inside the upper 95% confidence interval of the estimates based on present students only. Limited overall impact is consistent with a review of the effect of nonresponse on statistical inference, which suggests that nonresponse bias is unlikely when the response rate is above 90%.<sup>27</sup> It should be noted, however, that a significant difference in estimates based on present students only vs all students could have been found if our survey had included a larger sample size. More generally, it has been reported that there is no ceiling for participation rates above which nonresponse bias cannot exist.<sup>28</sup>

This study shows that the prevalence of risk behaviors tends to be higher in students absent of school as compared to students present on a day of a survey. Accounting for data in absent students can increase the prevalence estimates in the base population. Further studies should examine how bias due to nonresponse relates to participation rates to surveys.

## Key Points

- The prevalence of smoking, drinking, and marijuana use was higher in students absent than present on the day of a school-based survey.
- Despite a participation rate of above 90%, point estimates of the prevalence of these behaviors increased by several percents upon inclusion of data from absent students.

## Policy Implications

- Prevalence of risk behaviors in school-based surveys can be underestimated despite high participation in surveys.
- Validation studies among nonparticipants are useful to determine the direction and magnitude of potential biases arising from nonparticipation.
- Further studies should examine how bias due to nonresponse relates to participation rates to surveys. ■

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