RESEARCH NOTES

MARIJUANA USE AMONG HIGH-SCHOOL STUDENTS IN GUAM

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This study aimed to provide an estimate of the prevalence of marijuana use among Guam's high-school youth and to explore the potential protective and risk factors associated with its use. Using a probability sample (n = 589), our findings revealed that 51 percent of respondents said that they had used marijuana at least once during their life. Males reported using marijuana more frequently than did female respondents. Higher grades and being female were each associated with significantly lower levels of marijuana use. Contrary to predictions, students that discussed their problems and worries with adults, and students that participated in high-school extracurricular activities, were more likely to have used marijuana. However, students who were members of intact families that discussed their worries and problems with adults were significantly less likely than others to say they used marijuana.

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THIS BRIEF STUDY extends earlier research focusing on the use of marijuana in Guam (Pinhey 1997a, 1997b). Previous analyses suggest that between 8 and 12 percent of Guam's adult population (i.e., persons 18 years of age and older) have used marijuana and that younger persons are more likely than older individuals are to have ever used the substance (Pinhey 1997a:117). Indeed, Pinhey estimated that the percentage of persons in Guam who had ever used marijuana was about 29 percent for those between the ages of 18 and 25 years, about 13 percent for persons between the ages of 26 and 35 years, and only about 5 percent for persons over age 35 (ibid.). An evaluation of the literature on substance use indicates that estimates of marijuana use among Guam's youth are virtually nonexistent (see ibid.: 117–118 for a review). Thus, the goals of the present study were to (1) estimate the prevalence of marijuana use among Guam's youth and (2) explore the potential risk and protective factors that may be associated with marijuana use among Guam's youth. The study begins with a brief review of the literature, followed by a description of our sampling techniques, measures, and analytical strategy, and continues with a description of our findings. Finally, we discuss the results of the study as they may pertain to future research and theory.[1]

Previous Research

Marijuana is the world's most extensively used illegal substance, and about one in four Americans report that they have tried it (National Institute on Drug Abuse 1990; U.S. Bureau of the Census 1988). Marijuana use is most frequent among individuals between 18 and 25 years of age, and more prevalent among males than among females (National Institute on Drug Abuse 1990; Robbins 1989; U.S. Bureau of the Census 1988). Recent studies of Guam's adult population suggest that the use of marijuana is positively associated with higher levels of psychological distress (see Pinhey 1997a) and with religious beliefs associated with "sinful behavior" (see Pinhey 1997b).

Some researchers argue that Peace Corps volunteers introduced marijuana to the western Pacific (Lindstrom 1987). Others note that substance abuse in Micronesia grew as transportation networks improved, tourism increased, and more islanders traveled to other countries, thus gaining exposure to different lifestyles and substances (for example, Marshall, Sexton, and Insko 1994:23). Following a decade-long decline (Bachman et al. 1988), rates of adolescent marijuana use in the mainland United States have risen sharply. Indeed, more than 41 percent of high-school seniors recently reported having tried marijuana or hashish, the highest rate since 1989 (Leland 1996).

There is general agreement that the effects of marijuana are not partic-

ularly dramatic: an increase in heart rate, a reddening of the eyes, a dryness in the mouth, and a disruption of short-term memory. Although the health hazards of marijuana use continue to be the subject of an emotional debate, marijuana is clearly less dangerous than alcohol, tobacco, cocaine, and most other widely used recreational drugs (Ray 1983). However, recent studies suggest that marijuana use among adolescents may contribute to subsequent psychological impairments (Hansell and White 1991), especially among those individuals characterized as being "highly introspective" (see Zablocki et al. 1991). Finally, research conducted in the mainland United States indicates that Asian- and Pacific Islander–Americans are significantly less likely than other ethnic subpopulations to abuse pharmacologically active substances (Zane and Kim 1994). Research describing marijuana use among Guam's extensive Asian-Pacific high-school student population, however, is nonexistent.

Research Methods

This study's data derive from a survey of high-school students conducted in Guam during the months of April and May 1999. We used random sampling techniques to select nine high schools, which included five public and four private schools. For the total number of sampled schools we calculated the proportionate percentage of students at each grade level and then randomly selected clusters of classes within each individual school at each grade level in proportion to the total. We completed 589 usable interviews. The sampled high schools enrolled 9,208 students, which is 86 percent of the total number of students currently attending high schools in Guam. Preliminary analyses indicated that the sample approximates the distribution of students in Guam's high schools by grade level and gender.

We assessed marijuana use with a single item asking students to estimate the number of times during their life that they had ever used marijuana. Codes and response categories for this item were (0) never, (1) 1 or 2 times, (2) 3 to 9 times, (3) 10 to 19 times, (4) 20 to 39 times, (5) 40 to 99 times, and (6) 100 or more times. This measure was then recoded into two separate items, reflecting (1) the midpoints of each category described above (never used marijuana = 0; 100 or more times = 100)[2] and (2) as a binary item reflecting those students that had *ever* used marijuana (coded 1) and those students that had *never* used marijuana (coded 0).

We hypothesized that students who were members of intact families and who frequently discussed their problems with adults would be less likely than other students to say that they had ever used marijuana. Indeed, previous research indicates that Guam's high-school students meeting those

criteria are less likely to consume alcohol (Pinhey et al. 1999). The literature also reveals that students who participate in extracurricular activities are less likely to participate in health-compromising behaviors such as physical fights (Pinhey, Workman, and Perez 2000). Involvement in extracurricular activities obligates students to participate in team practices, band rehearsals, or student-government meetings, thus placing various constraints on their behavior. These constraints include the threat of dismissal from school or the denial of participation in favored extracurricular activities because of taking part in behaviors such as smoking or using alcohol or marijuana. As well, participation in extracurricular activities is likely to place students in direct contact with positive adult role models (coaches, teachers, club sponsors). Thus, our analyses control for the effects of family intactness, frequency of discussion of "problems or worries" with adults, and participation in high-school extracurricular activities.

Our measure of family intactness draws from a single item asking respondents whom they lived with most or all of the time (see Fitzpatrick 1997 for review of this measure). Response categories included (1) both parents, (2) one parent only, (3) a biological parent and a stepparent, (4) grandparents, (5) other extended family members, (6) unrelated persons, and (7) others. The variable was recoded into four categories that included does not live with parents (coded 0), lives with one parent only (coded 1), lives with one biological parent and a stepparent (coded 2), and lives with both biological parents (coded 3). Seven percent of respondents indicated that they did not live with their parents, 20 percent said they lived with one parent, 8.8 percent said they lived with a biological parent and a stepparent, and 64.1 percent indicated that they lived with both of their biological parents.

Our measure of frequency of discussing problems and worries with adults was a single item that asked respondents, "How frequently do you talk about your problems or worries with an adult, such as a parent, relative, teacher, or coach?" Response codes and categories included: (0) never, (1) discuss problems and worries only with other kids, (2) discuss problems and worries with adults rarely, (3) discuss problems and worries with adults sometimes, (4) discuss problems with adults almost always. Fully 22.8 percent of students said they never talked with adults about their worries or problems, and 15.6 percent of students said they always discussed problems and worries with adults.

We measured participation in extracurricular activities using six binary items (participation = 1, nonparticipation = 0) that form a summated scale. The scale items replicate those used in the High School and Beyond study (for a review of this measure, see National Center for Educational Statistics 1983; Glanville 1999; McNeal 1999). Students were asked if they had ever participated in any of the following activities during the year previous to the

survey: (1) worked on the school newspaper or yearbook, (2) participated in student government, (3) were members of the school band or orchestra, (4) were members of school athletic teams, (5) were members of school clubs, and (6) participated in theater or drama productions. The scale ranges from 0 to 6 and has a mean of 1.61 with a standard deviation of 1.40 activities. High values on this scale indicate greater participation in extracurricular activities.

Our ordinary least squares (OLS) and logistic multiple regression models also control for the effects of student grades (see Fitzpatrick 1997 for review of this measure), which is a self-reported single item asking respondents, "What grades do you typically earn?" Response codes and categories were: (1) D's and F's, (2) C's and D's, (3) C's, (4) B's and C's, (5) B's, (6) A's and B's, (7) A's. The modal category of this item was A's and B's (27.8 percent). Fully 22.3 percent of respondents said they typically received B and C grades, 14.9 percent of students indicated they received C's and D's, and 4 percent said they received D's and F's.

Ethnicity is self-reported. Binary ethnic categories include Chamorro, Filipino, Asian (Chinese, Japanese, Korean), Micronesian (Chuukese, Yapese, Kosraean, Pohnpeian, Palauan) and Caucasian respondents (the excluded comparison category in the regression models that follow). Additional variables used in the analysis include a binary measure of students' gender (female = 1, male = 0), and age (actual years). We begin the analysis with a discussion of our estimates of the prevalence of marijuana use among Guam's youth and then assess the effects of various risk and protective factors for self-reported lifetime use of marijuana.

Findings

As may be seen in Table 1, 51 percent of the total sample said that they had used marijuana at least once in their lifetime, and the mean average for lifetime marijuana use is 15.37 occasions for all respondents. We also replicate a common finding in the literature (National Institute on Drug Abuse 1990; Pinhey 1997a; Robbins 1989; U.S. Bureau of the Census 1988), which indicates that males are more likely than females to report ever using marijuana (58 percent and 44 percent respectively). Female students reported that they had used marijuana on 10.25 occasions during their lifetime whereas males indicated that they had used marijuana on 21.29 occasions throughout their life.

As previously noted, 51 percent of respondents reported ever having used marijuana. A 95 percent confidence interval (CI) was calculated to estimate the prevalence of marijuana use among Guam's youth (95% CI = 51 ± 4).

From these figures, one can roughly estimate that between 47 and 55 percent of Guam's high-school student population has used marijuana. In contrast to these findings for Guam, approximately 41 percent of mainland U.S. high-school seniors reported having tried marijuana or hashish (Leland 1996).

What are the risk and protective factors associated with marijuana use among Guam's youth? We use OLS multiple regression to explore the potential factors that may influence the use of marijuana among Guam's high-

TABLE 1. **Percentage Lifetime Marijuana Use and Mean Marijuana Use for Total Sample and by Gender for High-School Students in Guam**

	Total Sample	Female	Male
Percentage	51	44	58
Mean times used	15.37 (29.54)	10.25 (23.22)	21.29 (34.55)
N of cases	584	311	272

Note: Standard deviations in parentheses.

TABLE 2. **Unstandardized OLS Regression Coefficients and Standard Errors for the Regression of Lifetime Marijuana Use on Ethnicity, Gender, Age, Family Structure, Discussion with Adults, Participation in Extracurricular Activities, Self-Assessed Grades, and Interaction Effects (*N* = 556)**

	Additive Model		Interaction Model	
Variables	*B*	*SE*	*B*	*SE*
Chamorro	−1.500	4.962	−1.516	4.958
Filipino	−12.174°	5.128	−12.125°	5.123
Asian	−12.695°	6.991	−12.010°	7.002
Micronesian	−20.460°°	6.992	−20.256°°	6.988
Female	−7.522°°	2.392	−7.524°°	2.390
Age	2.028°	.879	2.053°°	.878
Family	−.637	1.156	1.253	1.787
Discussion	1.170+	.854	3.593°	1.946
Extracurricular	1.750°	.838	1.805°	.838
Grades	−4.480°°°	.695	−4.528°°°	.695
Family × discussion	–	–	−1.061+	.766
Constant	10.735	–	6.149	–
R^2	.174	–	.177	–

+$p < .10$; °$p < .05$; °°$p < .01$; °°°$p < .001$ (one-tailed tests)

school students. As may be seen in Table 2 (equation 1, additive model), when contrasted with Caucasian respondents (the excluded comparison category), Filipino students (–12.174, $p < .05$), Asian students (–12.695, $p < .05$), and Micronesian students (–20.460, $p < .01$) were all significantly less likely to indicate that they used marijuana. Chamorro students were not statistically different in their use of marijuana when compared to Caucasian students ($B = -1.500$, not significant). Female students indicated that they used marijuana less frequently than males did ($B = -7.522$, $p < .01$), and students that reported earning higher grades were significantly less likely than others to indicate that they had used marijuana ($B = -4.480$, $p < .001$). Contrary to our predictions, students that said they frequently discussed their problems with adults ($B = 1.170$, $p < .10$) and students indicating that they participated in high-school extracurricular activities ($B = 1.750$, $p < .05$) were more likely to say that they had used marijuana. Older students ($B = 1.922$, $p < .05$) were also more likely than younger students were to be at risk for marijuana use.

Finally, we tested the hypothesis that students who are members of intact families and who discussed their problems with adults would be less likely than others to use marijuana by estimating the interaction effects of family

TABLE 3. **Logistic Regression Coefficients and Standard Errors for the Regression of Lifetime Marijuana Use on Ethnicity, Gender, Age, Family Structure, Discussion with Adults, Participation in Extracurricular Activities, Self-Assessed Grades, and Interaction Effects ($N = 556$)**

	Additive Model		Interaction Model	
Variables	*B*	*SE*	*B*	*SE*
Chamorro	.549+	.399	.551+	.401
Filipino	–.966°	.415	–.981°	.418
Asian	–.412	.557	–.299	.563
Micronesian	–1.372°	.594	–1.402°	.603
Female	–.436°	.201	–.431°	.202
Age	.103+	.075	.109+	.075
Family	.025	.097	.350°	.153
Discussion	.001	.072	.405°	.166
Extracurricular	.183°	.073	.201°°	.074
Grades	–.294°°°	.060	–.309°°°	.061
Family × discussion	–	–	–.179°°	.066
Constant	–.224	–	–1.015	–
R^2 (Cox and Snell)	.186	–	.197	–

+$p < .10$; °$p < .05$; °°$p < .01$; °°°$p < .001$ (one-tailed tests)

structure and the problem-discussion variable on marijuana use. As may be seen (Table 2: equation 2, interaction model), students who were members of intact families and who talked with adults about their problems and worries were significantly less likely than other students were to indicate that they used marijuana ($B = -1.061$, $p < .10$).

We next considered the possibility that our OLS regression analysis was flawed because the dependent variable was coded-at-midpoint (see Berry 1993). Thus, using a dependent binary variable reflecting those students that had *ever* used marijuana during their life (coded 1) and those that had *never* used marijuana during their life (coded 0), we replicated the analysis using logistic regression. The results of the logistic regression indicate negligible differences from the OLS regression analysis (see Table 3). In sum, it appears that older male students who participate in extracurricular activities are at greater risk for marijuana use than are other students. Chamorro and Caucasian students may also be at greater risk. Higher grades, however, appear to shield students from greater marijuana use.

Discussion and Conclusions

This brief investigation makes a modest contribution to the emerging literature on substance abuse in Guam by employing data from a sample of high-school students to estimate the prevalence of marijuana use among Guam's youth. We also explored the potential risk and protective factors that may be associated with marijuana use for this little-studied population. Our findings suggest that as many as 47 to 55 percent of Guam's high-school youth have used marijuana and that males are at greater risk than females to use marijuana. Contrary to our predictions, our findings revealed that students who said they talked about their problems and worries with adults and who participated in extracurricular activities were *more likely* than others were to say that they had frequently used marijuana. However, students that receive higher grades appear less likely than other students to indicate that they smoke marijuana. Our findings also suggest that there may be ethnic differences in marijuana use among Guam's high-school youth.

What are the implications of these findings for theory and future research? First, peer pressure may account for the positive relationship between participation in extracurricular activities and marijuana use (Aseltine 1995). For example, students that are organized around participation in various high-school extracurricular activities may have a greater influence on their peers than do their parents or other adults. Thus, peer pressure may also account for the positive relationship between discussing problems and worries with adults and marijuana use. However, students that belong to intact families

and who discuss their problems and worries with adults are less likely to use marijuana. This suggests that students that are integrated into intact families where discussions of problems and worries are encouraged may be less likely than others to be subject to the pressures of their peers. One implication of these findings is the potential reduction of illicit substance use among Guam's youth resulting from open family discussion of the dangers involved with using marijuana and other illicit substances.

The association of higher grades to significantly lower levels of marijuana use among Guam's high-school youth suggests that strong social integration into the school environment may shield students from violating various school norms, which would include using marijuana. However, higher levels of participation in extracurricular activities should also indicate greater integration into the school environment, but our findings suggest that integration into school systems through involvement in extracurricular activities actually increase marijuana use.

Why would Guam's high-school youth report greater marijuana use than other similarly aged populations? Our findings reveal that 47 to 55 percent of Guam's high school youth reported using marijuana at least once during their lives compared to 41 percent of U.S. mainland high-school students (Leland 1996). One possible explanation for this finding may be that marijuana use in Guam is relatively common. Indeed, earlier research drawing from anecdotal accounts and direct observation support the hypothesis that marijuana use in Guam is common (Pinhey 1997a:113). However, research describing the assessments of the attitudes and meanings that may be associated with the use of marijuana in Guam appear to be nonexistent.

Although our findings speak to important debates in the literature on adolescent substance abuse, our study has some limitations. First, since our measure of marijuana use is a recoded-to-midpoint scale that is essentially ordinal in nature, the results of our OLS regression analysis are vulnerable to ceiling effects due to top coding. As well, some of our independent variables are also ordinal measures. Marijuana use may be more effectively estimated if the metric of the dependent and independent variables are truly ratio in nature (see Elliot and Ageton 1980). Thus, while we believe our data generally reflect accurate statistical associations, readers may wish to treat our findings with some caution. Second, although our findings are broadly congruent with our expectations, some patterns did not reach statistical significance at conventional levels. The most obvious reason for this is the relatively small sample size. A larger sample of Guam's high-school students might yield more striking and robust results.

To date, the social patterning that contributes to the use of marijuana among Guam's youth has essentially been undocumented. One important

implication from our findings suggests, however, that parents should talk with their children about substance use, thus possibly reducing their consumption of marijuana and other illicit substances. Moreover, further explorations of the influence of variations in family and student organizational structure on the use of marijuana and other illicit substances by Guam's youth should be a priority for future research. Indeed, future researchers may wish to examine more thoroughly the acceptability and meaning of marijuana use in Guam.

NOTES

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1. See Pinhey for a review and background on marijuana use among adults in Guam and the U.S. mainland (1997a, 1997b). See also Zane and Kim for an extensive and excellent review of substance abuse among Asian-Pacific Americans (1994). Marshall, Sexton, and Insko describe patterns of substance use among youths in Chuuk, including marijuana (1994).

2. Although coded-at-midpoint, our dependent variable is actually an ordinal measure. However, following Berry (1993), we argue that a common approach is to use ordinal dependents when the number of response categories are in the range of 5–7 and when responses are not highly concentrated in a small number of categories. Berry argues similarly for the use of ordinal independent variables (ibid.:47), noting that 5-point Likert scales (Likert 1932) in regression analyses are extremely common in the literature.

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