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Previous studies have attributed low rates of alcoholism and alcohol consumption among Chinese and Japanese to genetic or to cultural factors. The present study examined the responses of 47 Asian and 77 Caucasian American students who completed questionnaires concerning their drinking patterns, their own and their parents' attitudes toward drinking, and the cues they used to control alcohol consumption. Asian students were also administered assimilation measures. Results indicated that (a) Asians reported more moderate drinking, (b) degree of assimilation was positively related to drinking, (c) attitudes toward drinking were related to reported drinking and were more negative in the case of Asians and their parents, and (d) Caucasians reported more extensive use of cues in the regulation of their drinking. The results suggest the importance of cultural factors in drinking patterns.

ALCOHOL DRINKING PATTERNS AMONG ASIAN AND CAUCASIAN AMERICANS

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Considerable evidence suggests that certain Asian-American groups have extremely low rates of alcoholism. Hospital admission rates for alcoholism have been found to be many times lower for Chinese than for other patient groups in Hawaii, New York, and San Francisco (Barnett, 1955; Chu, 1972; Rosenthal, 1970; Wedge and Abe, 1949). Although it has been argued that admission rates are a poor indicator of the true incidence rates for mental disorders among Asian-Americans (Sue et al., 1975), a survey by Chu (1972) in San Francisco confirmed the higher frequency and quantity of alcohol consumption among Caucasians than Chinese-Americans. Simi-

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larly, DeVos (1978) has noted that the incidence of alcoholism is extremely low for Japanese-Americans.

Two explanations have been proposed to account for the findings: (a) genetic-racial differences in alcohol sensitivity and aversion and (b) ethnic-cultural differences in attitudes and values toward the use of alcohol. In support of the genetic hypothesis, Wolff (1972) compared the reactivity to alcohol consumption of Caucasian and Asian men and women living in the United States, Japan, Taiwan, and Korea. In order to control for cultural differences in diet and other postnatal environmental influences, healthy Caucasian, Japanese, and Chinese infants were also tested. On the basis of optical densitometry of the earlobe and visual inspection of the face, Asian adults and infants were far more likely to exhibit face flushing than Caucasians were, after the consumption of alcohol. Furthermore, reports of dizziness, muscle weakness, and the like were more frequent among Asian than Caucasian adults, even though the latter group drank more alcohol per unit of body weight. Wolff speculates that because of heredity, Asians have a greater autonomic nervous system responsivity to alcohol.

Ewing et al. (1974) also suggest that low rates of alcohol abuse have genetic/physiological rather than cultural origins. In their study, responses to alcohol ingestion were examined in Caucasian and in Chinese, Japanese, Korean, and South Vietnamese students in the United States, all presumably having the same American diets. Asian students exhibited significantly greater face flushing and heart rate than Caucasians. There was also a strong but nonsignificant tendency for Asian subjects to show higher blood acetaldehyde levels. Ewing and his colleagues raise the possibility that Asians respond with more aversion to alcohol, in a manner similar to an alcohol-disulfam (Antabuse) reaction whereby acetaldehyde accumulates in the blood. They further suggest that cultural explanations are insufficient to explain the drinking patterns of Asians.

The genetic explanation, if valid, could have profound implications in the understanding and treatment of alcoholism. If racial differences in alcohol reactivity have a genetic basis, then it is possible that within-group differences (e.g., among Caucasians or among Asians) in alcoholism and drinking patterns also have a genetic basis. Susceptibility to alcoholism would then best be viewed in a medical or disease model.

The cultural hypothesis for the low rates of alcohol consumption among Chinese and Japanese has many strong proponents. The classic study of Barnett (1955) in New York's Chinatown revealed that drinking, particularly at social functions, was quite permissive, but excessive drinking behavior was discouraged and tightly regulated by family and community attitudes and values. As with Jews, many Chinese consumed alcohol, but in moderation. In the survey by Chu (1972), attitudes toward drinking were assessed. Chinese more than Caucasians disapproved of drunkenness, although no ethnic differences in attitude were found with respect to drinking in moderation. Chu suggests that cultural attitudes and values do influence alcohol consumption. Chafetz (1964) noted that alcoholism among Taiwan Chinese and Japanese in Japan traditionally has been low. However, the increasing western influence in Japan corresponds with a dramatic increase in alcoholism, which implies that drinking patterns vary according to cultural values or to the erosion of values. Hsu (1972) argues that Chinese have low rates of alcoholism since their culture is situation or social centered rather than individual centered, which is more characteristic of Americans. While data on the rates of drinking among Japanese-Americans are virtually nonexistent, DeVos (1978) believes the rates are low because of values emphasizing moderate drinking habits. Strong family roles and cultural values emphasizing achievements have helped Japanese-Americans to adjust and adapt (DeVos, 1978; Kitano, 1976).

If cultural factors are important in influencing drinking behaviors, then the medical model approach to alcoholism would

be weakened. Differentiating between the cultural and the genetic models is extremely difficult for several reasons. First, hereditary differences may exist between races. Cultural values may be adopted in response to these differences. That is, cultural and even moral values against excessive drinking may have evolved because of one group's adverse physiological reaction. Second, genetic racial differences, such as flushing, may exist but may not influence drinking patterns. Third, cultural prescriptions against excessive alcohol consumption may form the basis for observed or self-reported physiological reactions. Self-reports of dizziness, nausea, and the like, may be culturally learned responses to alcohol. Finally, both genetic and cultural factors may influence drinking patterns. In any event, these two factors are almost inextricably confounded.

The present study was exploratory to assess potential ethnic and cultural influences on drinking behavior. Information was obtained on self-reported drinking patterns, demographic backgrounds, body weight, degree of assimilation (among Asians), self and parental attitudes toward drinking, and reasons (social, physiological, behavioral, and emotional) why they regulated or controlled drinking. It was hypothesized that alcohol consumption is greater among Caucasians than Asians. Consistent with a cultural interpretation, Asian-Americans were hypothesized to (a) show a direct relationship between alcohol consumption and degree of assimilation in the United States, (b) have stronger values against excessive alcohol use compared to Caucasians, and (c) have stronger beliefs in their parents' values against drinking than Caucasians have. With respect to the kinds of cues (social, physiological, etc.) used to regulate drinking, no specific hypotheses were made. It was hoped that possible ethnic differences in the cues used to control drinking might shed additional light on attitudes and values toward drinking. The study was not designed to be a definitive test of the genetic versus the cultural explanations. Nevertheless, the importance of culture in influencing

alcohol consumption would be supported if drinking patterns vary according to degree of assimilation and according to attitudes and values of one's parents and oneself.

METHOD

SUBJECTS

The subjects were 23 Chinese (9 males, 14 females), 24 Japanese (13 males, 11 females), and 77 Caucasian-American (38 males, 39 females) students at the University of Washington. Most of the Asian-American students were recruited from an introductory Asian-American studies course, while Caucasian students came from introductory psychology courses. Asians of mixed racial ancestry or non-Chinese and non-Japanese Asians were not included in the study. Since hypotheses concerning the genetic versus the cultural interpretations were made for Chinese and Japanese, these two groups were combined and compared with the Caucasian group for all analyses. Asians ($\bar{x} = 19.8$) did not differ statistically from Caucasians ($\bar{x} = 19.7$) in age, $t(117) = .41$. No sex differences were found between Asians (22 males and 25 females) and Caucasians (38 males and 39 females), $X^2(1) = .01$. However, Asian students ($\bar{x} = 2.2$) were more advanced in educational grade level (i.e., a little above a sophomore level) than were Caucasians ($\bar{x} = 1.7$), $t(122) = 2.55$, $p < .05$. Their mothers ($\bar{x} = 4.2$) and fathers ($\bar{x} = 4.6$) were lower in educational attainment than the mothers ($\bar{x} = 5.3$) and fathers ($\bar{x} = 5.8$) of Caucasians, as measured by a seven-point scale ranging from less than seven years of school to a college degree, $t(119) = 4.72$, $p < .01$ and $t(119) = 4.26$, $p < .01$, respectively. Asians ($\bar{x} = 57.41$ kg) weighed less than Caucasians ($\bar{x} = 64.81$ kg), $t(122) = 3.84$, $p < .01$. Since many of the students were under the legal drinking age of 21, such students were asked their degree of agreement or disagreement on a seven-point scale with statements that they would drink more when they became 21 and that they

do not drink more because of concern with the legality of drinking. Asians (\bar{x} = 4.2 and 3.2) did not differ from Caucasians (\bar{x} = 3.7 and 2.6) on either item, $+ (90) = 1.17$ and $+ (90) = 1.41$, respectively.

MEASURES

Subjects received a booklet which contained a 13-item drinking habits questionnaire, developed by Cahalan et al. (1969), which measures the frequency and quantity of alcohol consumption over a wide variety of alcoholic beverages (wine, beer, liquor, etc.). When scored, the questionnaire yields five categories of drinking patterns ranging from abstinence (or infrequent) to very heavy drinking. The booklet also requested demographic information concerning age, sex, educational level, mother's and father's education, weight (without clothes and shoes), and ethnicity. For Asian students, three assimilation measures were administered. The Socializing measure asked students to indicate on a seven-point scale what proportion of friends were non-Asian (ranging from all friends are Asian to all friends are non-Asian). The Speaking measure ascertained on a five-point scale how well subjects could speak an Asian (Chinese or Japanese) language (ranging from not at all to excellent). Generation in the United States was measured by asking subjects if they, or their parents or grandparents, were born in the United States. Students were thus classified into four categories: (1) Self and others born elsewhere; (2) others but not self born elsewhere; (3) self and one or both parents born in the United States; (4) self, both parents, and one or both grandparents born in the United States. The higher the number, the greater the assimilation. Previous studies of assimilation have utilized measures of this kind (Fong, 1965; Kitano, 1976).

All students were then asked to rate on a seven-point scale their extent of agreement or disagreement with (a) attitudes

toward drinking and (b) reasons for regulating or controlling drinking. The attitude questionnaire contained five items, asking subjects to rate their mothers, fathers, and themselves concerning attitudes toward approval of drunkenness, morality of drinking, physical harmfulness of alcohol, and use of alcohol as a crutch to relieve tensions and feel confident. Several items on this and the last questionnaire were phrased in a negative direction. The final questionnaire sought to assess the cues used in situations to control or regulate drinking (e.g., "I regulate or control my drinking because I might develop headaches" or "I regulate or control my drinking because I start feeling guilty about drinking"). As indicated in Table 4, the 23-item questionnaire included physical (items 1, 4, 6, 11, and 17), behavioral (items 2, 12, 16, 21, 22, and 23), social (items 3, 8, 9, 13, and 20), emotional (items 5, 7, 14, 15, 18, and 19) and cognitive (item 10) factors.

PROCEDURE

The booklet was administered to Asian-American students during a regularly scheduled class meeting. Caucasian students participated as part of their introductory psychology course requirement. The self-explanatory booklet indicated that the questionnaires were to be completed anonymously and that students were free to decline participation. Completion of the questionnaires usually required about 40 minutes.

RESULTS

REPORTED DRINKING PATTERNS

As shown in Table 1, Chinese, Japanese, and Caucasians had different patterns of drinking. The Asian sample ($\bar{x} = 2.94$) averaged less drinking than the Caucasian group ($\bar{x} = 3.79$), $t(122) = 3.62$, $p < .001$. In the analysis of covariance controlling

TABLE 1
Drinking Patterns by Ethnicity

Group	(n)	Drinking Categories (%)				
		Abstainers or Light	Mild	Moderate	Heavy	Very Heavy
Asian	(47)	15	28	23	17	17
Caucasian	(77)	9	5	20	30	36

NOTE: Responses were scaled from 1 (Abstainers or Light) to 5 (Very Heavy). The Asian mean response was 2.94, the Caucasian, 3.79.

for body weight, a significant racial difference in drinking persisted, $F(1,121) = 9.13$, $p < .01$. Thus, Asian-American students reported consuming less alcohol than their Caucasian counterparts.

ASSIMILATION AND DRINKING

Table 2 shows the correlation matrix between the assimilation measures and amount of drinking. Chinese and Japanese who did not speak their ethnic languages very well drank more alcohol than those who did. The more generations that Asians had been in the United States, the greater the consumption of alcohol. Interestingly, while the relationship between the proportion of Caucasian friends and drinking was in the predicted direction, it failed to reach significance. The Socializing variable also was not significantly related to generation. A stepwise multiple regression analysis indicated that the combination of the Generation and Speaking measures optimally correlated with self-reported drinking ($R = .38$, $p < .01$). Inclusion of the Socializing measure with the other two assimilation measures resulted in a nonsignificant multiple correlation ($R = .39$). Thus, there is some support for the relationship between assimilation and drinking, particularly in the Generation and Speaking measures.

TABLE 2
Pearson Correlation Matrix Between Assimilation Measures
and Reported Drinking Patterns

	Socializing	Speaking	Generation	Quantity
Socializing		-.32*	.09	.14
Speaking			-.56***	-.31*
Generation				.36**

* $p < .05$

** $p < .01$

*** $p < .001$

ATTITUDES AND DRINKING

If cultural values influence the lower reported drinking habits of Asian-American students, then these students should have, and perceive their parents to have, more negative attitudes toward drinking. A multivariate analysis of variance (MANOVA) tested for an overall ethnic difference in the set of attitudes (i.e., 15-item questionnaire) toward drinking.¹ A significant effect for ethnicity was found on the MANOVA, $F(15, 98) = 2.73, p < .005$. In order to interpret the attitudinal difference, a discriminant function analysis of the two groups was performed. The power of the discriminating information accounted for by the discriminant function was statistically significant, $X^2(15) = 36.49, p < .005$. The function can be interpreted by examining the relative contribution of each attitudinal variable in terms of its standardized discriminant function coefficient. Table 3 shows these coefficients, along with the corresponding group means and significant t-tests for each attitudinal measure. Consideration of the five largest coefficients indicates that Asian-American and Caucasian students basically differ in attitudes toward drunkenness and the morality of drinking. Asian-American students reported that they and their parents more strongly disapproved of drunkenness; they less strongly felt that drinking is morally wrong. These findings also were supported generally by the

TABLE 3
Attitudes Toward Alcohol Consumption as Reported by Asian
and Caucasian Students and Their Standardized
Discriminant Function Coefficients (SDFC)

Attitude	Mean level of Agreement			
	Asian	Caucasian	Significant	SDFC
	\bar{x}	\bar{x}	ts	
Mother				
Approves of drinking	3.70	4.64	2.61**	-.27
Disapproves of drunkenness	6.42	5.56	3.18**	-.48
Drinking morally wrong	3.83	2.33	4.68***	-.82
Alcohol no harm body	2.40	2.48		-.19
Alcohol used as crutch	4.15	4.14		.20
Father				
Approves of drinking	4.30	5.32	2.89**	.55
Disapproves of drunkenness	5.24	5.24		.59
Drinking morally wrong	3.20	2.35	2.82**	.14
Alcohol no harm body	3.00	2.39	2.20*	-.20
Alcohol used as crutch	4.02	4.09		-.09
Self				
Approves of drinking	4.79	5.39	2.04*	.11
Disapproves of drunkenness	5.19	4.14	2.70**	-.51
Drinking morally wrong	2.54	2.09		.39
Alcohol no harm body	2.42	1.87	2.23*	-.05
Alcohol used as crutch	4.51	4.56		.01

* $p < .05$ ** $p < .01$ *** $p < .001$

univariate analyses (i.e., the t-tests). Moreover, the relationship between reported drinking and the attitudinal difference as represented by the discriminant function was significant ($r = .38$, $p < .005$). Not surprisingly, the multiple R between the 15 attitude items and reported drinking behavior was quite

strong, $R = .78$, $p < .006$ for Asians and $R = .76$, $p < .001$ for Caucasians. One particularly noteworthy finding was that the attitude variable concerning the belief that alcohol harms the body contributed little to the discriminant function. In fact, Asians held less negative attitudes than Caucasians toward the physiological destructiveness of alcohol, which is interesting since the genetic hypothesis might predict the opposite relationship. The overall findings with respect to attitudes indicate that Asian-Americans have, and perceive their parents to have, more negative attitudes than Caucasians toward drinking, and that these attitudinal differences are significantly related to reported drinking patterns.

CUES REGULATING DRINKING

Only six of the 23 items concerning why subjects controlled or regulated drinking yielded ethnic differences (see Table 4). Asian-American students were more likely than Caucasians to agree they controlled their drinking because their faces flushed. On the five other significant items, "muscle weakness," "lose inhibitions," "body uncoordinated," "lose control of self," and "can't do what I want to," Caucasians exceeded Asians. Thus, Caucasians exceed Asians in reporting more extensive use of cues to control their drinking. Furthermore, most of the cues cited were behavioral (e.g., lose inhibitions and become uncoordinated) rather than physiological (e.g., headaches and nauseated feelings) or emotional (e.g., anxiety or depression). In the case of the Asian students, they were no more likely than Caucasians to regulate drinking because of physiological cues, as might be expected in a genetic hypothesis.

The multivariate results generally reflected the univariate findings. A MANOVA on the 23-item questionnaire revealed a significant ethnic effect, $F(23, 93) = 1.76$, $p < .05$. The standardized coefficients of the significant discriminant function, where $X^2(23) = 37.37$, $p < .05$, appear in Table 4 along with the respective group means and significant t-tests for each

item. Inspection of Table 4 indicates that the five greatest coefficients correspond to items concerning social visibility ("face flushing," "others notice," and "others think negatively") and behavioral ("muscles uncoordinated" and "can't do what I want to") cues. Although the ethnic difference in cue utilization was significantly correlated with reported drinking, $r = -.26$, $p < .005$, the relationship was weaker than that reported for attitudes.

DISCUSSION

The purpose of this study was to assess the drinking patterns of Asian- and Caucasian-Americans students. Consistent with other studies, Chinese and Japanese reported less alcohol consumption than did Caucasians. The interesting issue concerns the explanation for the differential drinking patterns. If the genetic hypothesis, which assumes racial physiological differences in alcohol reactions was on target, then Asians, regardless of age, social class, student versus nonstudent status, or cultural orientation, would tend to drink less. If, however, drinking patterns vary as a result of social or cultural factors, then the importance of the cultural hypothesis would be supported. Two of the three assimilation measures were significantly correlated to drinking patterns among Asian-Americans. The Socializing measure was not significantly related to reported drinking or to Generation, although the correlation was in the predicted direction. It may be that proportion of non-Asian friends is a poor measure of assimilation on a university campus where the vast majority of students are Caucasian, or that assimilation proceeds differently depending on the measures used.

Further evidence supports the cultural explanation. First, Asians were more likely than Caucasians to agree that they and their parents have negative attitudes toward drinking or alcohol. More importantly, these attitudinal differences be-

TABLE 4
Reasons for Controlling Drinking as Reported by Asian
and Caucasian Students and Their Standardized
Discriminant Function Coefficients (SDFC)

Item	Mean		Significant ts (p < .05)	SDFC
	Asian	Caucasian		
1. develop headaches	3.42	3.35		-.15
2. talk too loudly	2.89	3.08		.22
3. others notice	2.71	3.14		-.49
4. face flushes	3.20	2.42	2.28	.92
5. become anxious	2.67	2.69		-.10
6. unpleasant taste	3.87	3.13		.39
7. feel guilty	2.69	2.83		-.19
8. others don't drink	3.00	2.93		-.22
9. attract attention	3.20	3.66		-.32
10. can't think well	3.71	4.34		.44
11. muscle weakness	2.53	3.12	2.02	-.21
12. lose inhibition	3.16	3.91	2.22	-.12
13. do things I don't want	2.80	2.99		-.19
14. become hostile	2.56	2.46		.42
15. become withdrawn	2.36	2.20		.06
16. muscles uncoordinated	3.00	3.97	2.98	-.47
17. become sick	4.18	4.67		.22
18. feel depressed	2.58	2.96		-.24
19. shouldn't to feel happy	4.69	4.92		.09
20. others think negatively	3.91	3.96		.50
21. can't drive properly	5.16	5.72		-.08
22. lose control of self	3.48	4.49	2.76	-.01
23. can't do what want to	4.28	5.16	2.55	-.58

tween Asians and Caucasians were related to reported drinking. Second, Asian-Americans did not feel as strongly as did

Caucasians that alcohol harms the body. If they are particularly reactive to alcohol in an aversive manner, one might expect Asians to believe more strongly that alcohol harms the body. Third, as suggested earlier, physiological factors may determine cultural values. If Asians have an adverse physical reaction to alcohol, then perhaps cultural values develop in order to control drinking. In such a situation, the relationship between cultural values and drinking can actually be traced to a third variable—namely, genetic/physiological factors. However, this argument seems weak. If genetic/physiological factors are the basis for the low drinking rate, then greater acculturation should not increase consumption, since the underlying genetic factor remains the same. The present investigation suggests that acculturation is related to increased drinking behavior. Finally, Asians indicated that they controlled their drinking because of face flushing. However, the relationship between face flushing and reported drinking patterns for these subjects failed to reach significance ($r = -.17$). It may be that, while face flushing is a physiological response, the social consequences in terms of increased visibility are more important. There were no ethnic differences in the use of other physiological cues to control drinking.

Obviously we have not shown, by using a questionnaire, that genetic or physiological factors are unimportant. Rather, the results indicate that culture appears to influence drinking. Both heredity and culture may be important. There are, of course, limitations to this study. This investigation focused on self-reports rather than actual drinking behaviors. It may be wise to have Asians and Caucasians engage in actual drinking experiments such as the design used by Marlatt et al. (1973). If, as suggested by studies previously cited, Asians do report more feelings of dysphoria and physical symptoms, assimilation and expectancy should be examined as moderator variables. Finally, the data concerned drinking patterns and did not directly deal with alcoholism, a problem of growing concern among Asian-Americans. Indeed, increasing loss of

ethnic culture may mean increased rates of drinking and alcoholism for Chinese- and Japanese-Americans. There is an urgent need for more alcoholism studies among Asians, especially in the area of cross-national research where the physiological, generational, and assimilation variables are more or less naturally partitioned for analysis.

NOTE

1. The MANOVA and discriminant function analysis of the data were used, since they have advantages over a series of univariate comparisons. When utilizing a series of univariate comparisons, intercorrelations among dependent variables may magnify group differences. The MANOVA is a conservative method which maintains a significance level which is not increased by the addition of more dependent variables. It can also detect important differences to which univariate methods remain insensitive (Kaplan and Litrownick, 1977).

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