

Attitudes and Self-reported Alcohol Consumption in New Zealand, 1978-1979¹

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A national sample of 10,000 New Zealand residents was interviewed about alcohol, drinking, and a number of related matters. Within the interviews were a series of items dealing with attitudes and alcohol consumption. A principal components analysis of the attitude items yielded five components. Individual consumption of alcohol was estimated utilising a psychophysical approach. The relation between attitude component scores and consumption was explored for males and females separately, and for the total sample with particular reference to the 8313 male and female drinkers. Regression analyses that involved using attitude components as predictors of alcohol consumption were utilised. Relationships between attitudes and consumption were found to be present, to be psychologically weak though not insignificant. Clear sex differences emerged. Attitude-consumption relationships are complex and not homogeneous over the population.

In late 1978 and early 1979 a wide range of data were collected, by interview, from a national stratified random sample of New Zealand inhabitants between the ages of 14 and 65 years (Gregson & Hurst, 1981). The sample represents about 1 in 300 of the total population, and was made up of 5000 men and 5000 women. The interview schedule was designed by a research sub-committee, under the chairmanship of the first author, of the Alcoholic Liquor Advisory Council (ALAC). The field work was carried out by the National Research Bureau (Auckland). Within the interviews were a series of items dealing with attitudes and self-reported consumption of alcohol, as well as questions dealing with each informant's age, education, occupational status, race, religion, driving, and personal medical history.

After an introduction to the survey, the interviews opened with a series of 21 7-category (strongly agree through to strongly disagree) items. The data obtained from

these items subsequently formed the basis of a principal components analysis of the attitudes displayed by sample members which yielded five orthogonal components of interest. This principal components analysis, the attitudinal interpretation of the components obtained, and the potential use of component scores as predictors has been presented in Gregson and Stacey (1980a). We repeat for convenience a few of the main details below.

The next section of the interview was concerned with the informant's recall of the amount and situation of very recent drinking activities. From the details gathered a quantitative estimate of the mean alcohol intake (in mls) at a recent drinking session was made, and the average inter-session interval between drinking was calculated, for each informant. The results can be taken as the sample members' estimates of mean drinking rate in mls/day, which collectively can be closely reconciled with known national aggregate sales figures for alcoholic beverages. Our approach to data collection and analysis resulted in a sample of self-reported estimates, which when extrapolated to the total population, would account for more than 95 per cent of the

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Table 1

Percentage Distribution of Responses from 10,000 Sample Members to 21 Attitude Items

	a+	a	a-	o	d-	d	d+
a. People in N.Z. consume more alcoholic drink nowadays than they used to.	22.8	47.8	8.6	14.1	2.4	3.8	0.5
b. If people drink more in N.Z. then it is just part of the change that is going on in other countries.	3.6	40.5	15.0	21.1	5.3	13.6	1.1
c. We would have been better off if we had prohibition in N.Z. 50 years ago.	4.1	9.9	6.0	11.8	6.3	42.0	19.9
d. Nowadays liquor is quite cheap in N.Z.	2.0	13.3	7.2	16.5	9.5	40.0	11.5
e. The increasing violent crime rate in N.Z. is due to liquor being so easy to get.	13.8	32.6	21.6	5.4	9.0	15.2	2.5
f. Advertising campaigns have helped to reduce the amount of drinking and driving on our roads.	7.1	35.8	22.6	7.2	6.5	17.9	2.9
g. Sensible families teach their children to try drinking in moderation from an age earlier than 18.	13.9	51.4	12.0	6.9	3.2	9.9	2.8
h. People drink in N.Z. because there is nothing else to do with their time.	4.1	15.7	16.3	4.2	8.9	37.6	13.3
i. There would be fewer crimes involving alcohol if unemployment went down.	6.9	31.4	17.0	11.8	7.2	22.8	2.9
j. Alcoholics cannot help being alcoholics. It's not their fault.	6.2	24.4	12.4	10.0	10.5	27.4	9.1
k. It is sportsmen who set a bad example by drinking too much.	4.1	15.2	14.1	7.5	10.9	40.0	8.2
l. We would have fewer problems with heavy drinkers if we had more sensible laws about drinking.	9.9	35.3	14.0	10.3	7.7	20.7	2.0
m. New Zealanders have a reputation overseas for being heavy drinkers.	5.3	30.4	10.5	36.7	4.4	11.3	1.6
n. We should stop bothering about the amount of drinking in N.Z.	1.9	8.6	6.3	4.5	10.9	47.9	20.0
o. Most young people under 18 are already drinking more than is good for them.	14.7	46.3	14.7	9.8	5.8	7.8	0.9
p. Alcohol is a source of conflict in most families with teenage children.	6.1	30.2	19.5	20.2	8.7	14.2	1.1
q. Despite the odd exception most young New Zealanders drink alcohol in a fairly sensible way.	2.0	37.7	21.3	10.8	11.6	15.0	1.6
r. Alcohol is probably the single most important cause of breakdown in N.Z. marriages today.	10.6	27.3	18.6	16.4	7.9	16.5	2.6
s. The only people who listen to warnings about alcohol and driving are those who don't drink and drive anyway.	4.9	26.1	15.6	7.0	13.4	30.0	3.0
t. The normal healthy person likes to drink a little, but often.	2.5	38.8	17.6	11.6	9.9	18.1	1.6
u. At present we worry too much about alcohol in comparison to the other serious problems facing the country.	5.6	23.1	15.6	7.1	12.9	30.6	5.1

national sale of alcohol (Gregson & Stacey, 1980b).

In this paper we are solely concerned with the issue of how, and to what extent, attitude measures may be used as predictors of self-reported consumption rates in the specific context of alcoholic beverages. There are known to be linkages between a range of demographic variables (such as age, sex, occupational status, religion, and race) and drinking behaviour in New Zealand. Any of these variables may serve as mediators linking attitudes to consumption, indeed it may possibly be psychologically unrealistic to postulate any simple, direct links between attitudes and alcohol consumption when consumption usually takes place in a social milieu with accepted sex, age and status roles. However, as a necessary stage in what will be a complex series of analyses on over a million and a quarter data points, the direct statistical links between attitude component scores and consumption estimates are identified; the opportunity is also taken to comment on methodological problems.

Relationships between attitudes to alcohol, drinking, alcoholism, etc. and other variables including self-reported consumption have been explored in a number of studies, usually based on small accidental, purposive or clinical samples (e.g. Ferneau & Gertler, 1971; Kilty, 1978a, 1978b; Knupfer & Room, 1967; Orford, Waller & Peto, 1974; Schlegel, Crawford & Sanborn, 1977; Soverow, Rosenberg & Ferneau, 1972; Veevers, 1971). The results of these studies have been inconsistent, and attempts to establish a causal dependency, either of consumption upon attitudes or attitudes upon consumption, have either failed or yielded an outcome not readily generalisable to a national population. However, they suggest attitudes and drinking behaviour show some mutual compatibility and, on occasion at least, strong positive relationships (i.e. highly positive attitudes to alcohol and drinking being related to strong personal normative expectations about drinking, a high likelihood of drinking on any given day and high levels of drinking). They also suggest that the relationships between attitudes and drinking behaviour are not homogeneous through all sections

of the population. At the same time the deliberate modification of beliefs and attitudes is a recurrent objective of alcohol education programmes. If the attempt to modify public attitudes has any justification then it has to involve the consequent change and diminution of high drinking levels.

In the context of these general qualifications we have explored quantitatively the regression of consumption estimates on the principal components of our 21 attitude items, for both sexes separately and for the total sample. Previous data on a sample of this size and representativeness of a national population do not exist. Here comparative analyses of stable estimators within the survey data, which discriminate subgroups, are viable.

Attitude Measures

The raw frequency distribution of responses for the 10,000 informants on the 21 attitude items are shown in Table 1. A principal components analysis with varimax rotation of these items yielded five components which were interpreted or seemed worth exploratory retention (Gregson & Stacey, 1980a). For comparison with Table 1, where the items are coded *a* through *u*, the loadings on these five components of absolute size .40 or greater are given for items *a* through *u* in

Table 2
Item Loadings on Attitude Components × 100

Com- ponent	Item	Load- ing	Com- ponent	Item	Load- ing
I	a	43	II	n	69
	e	51		q	40
	m	41		t	59
	o	68	u	72	
	p	70	IV	c	-58
	r	64		g	64
s	46	j		53	
III	f	-77	VI	a	-52
				b	-83

Table 2. Correlation and principal components analyses indicated the total set of items is weakly structured, suggesting there is no single simple "alcohol attitude"

(Gregson & Stacey, 1980a). An additional cluster analysis on the correlational matrix confirmed this conclusion (Dixon, 1975). In the calculation of component scores, on the five components we are using here, all loadings of the 21 items are used.

Consumption

Individual consumption was estimated from the formula given by Gregson and Stacey (1980b) and involved the amount reported as drunk at the last session recalled by the informant, the time of this last session, and the time of the previous session. Only these three data were used from a single person. A psychophysical transformation was then used to rescale the quantity report: if p is the amount consumed (converted to mls ethanol equivalents from reported volumes and identity of the beverages involved) then

$$q = (a^{-1}p)^{1/b} / (t_2 - t_1),$$

where a and b are scaling constants

It has been shown that $a = 1$, $b = .928$ gives a very close agreement between reported average quantities consumed and the national average of 12 litres/year which was obtained about the time of the survey (Gregson & Stacey, 1980b). The variable q is expressed in mls/day, t_2 and t_1 are in days elapsed since the drinking of the second to last and last occasions before the interview, p is in mls and is what was recalled as drunk at t_1 . For a detailed consideration of the theoretical and measurement problems involved see Gregson and Stacey (1980b). The method here has partly been anticipated by Cartwright, Shaw and Spratley (1978), but without the inbuilt psychophysical transformation in terms of the constants a and b . The raw or untransformed data indicate, quite predictably, that there is a marked tendency for informants to underestimate alcohol consumption in self-report; which is proportionate to the amount consumed. The actual amount consumed q is never directly observable. It is the actual quantity in mls/day which a number of investigators have stated to be distributed log-normally (de Lint, 1978) and which has become the conventional wisdom about the distribution of alcohol consumption. This log-normal

conjecture, we have suggested, is not plausible given the results of this survey (Gregson & Stacey, 1980b), but it is not greatly different from the actual distribution of consumption in New Zealand. A log transformation of our data, using $\log(q)$ as the consumption measure, could be interpreted as approximately normally distributed: with a range of 0 to 3; and a mean of 0.47, a standard deviation of 0.80 for women; and a mean of 1.03 and standard deviation of 0.85 for men, considering only the drinkers in our sample. The upper tails of the drinking distributions for either sex are sparse, whether q or $\log(q)$ is used.

Relations between Attitude Component Scores and Consumption

In the survey, out of 5000 males 4432 were self-reported drinkers, and out of 5000 females 3881 were drinkers. The relation between component scores and consumption was explored for the total sample, and for the men and women separately because there are differences in the drinking distributions for the two sexes which cast some doubt upon the legitimacy of relying solely on pooled data over the two sub-samples. Unless one resorts to some device to locate the non-drinker away from zero consumption, it is only practicable to regress attitude components onto \log consumption measures. So in Tables 3, 4, 5 and 6 we have chosen to present the regression parameters for 5000 men in terms of consumption, similarly for 5000 women; and for 4432 drinking men in terms of \log consumption, and similarly for 3881 drinking women. It will be seen that taking \log consumption greatly improves the fit of a linear regression model, because the marginal distributions of all the variables involved are then approximately normal.

Given the orthogonality of the attitude components and their relationships with the dependent consumption variable, the regressions of most value are those from Tables 4 and 6 which present the data obtained from male and female drinkers: For 4432 male drinkers

$$\log(\text{alc/day}) = 0.99 + .08xI - .14xII \\ + .05xIII - .16xIV - .08xV$$

Table 3

Regression of Five Attitude Components and Consumption for 5000 men

p.c.(f)	E(f)	σ (f)	a(intercept)	b(slope)	F(linear, d.f. = 1,4998)
I	0.90	5.20	48.40	3.88	14.18
II	-0.34	2.55	47.28	-13.60	86.49
III	-0.28	1.00	52.50	2.19	0.86
IV	-0.04	1.35	51.47	-10.01	24.45
V	-0.17	1.19	51.43	-2.65	1.50

p.c. = principal component E = mean of component scores
 σ = standard deviation of component scores
 a and b are parameters of linear regression predicting consumption from attitude

The F ratio is for linear trends of the regression line.

Table 4

Regression of Five Attitude Components and Log Consumption for 4432 Male Drinkers, a Subset of Table 3

p.c.(f)	E(f)	σ (f)	a(intercept)	b(slope)	F(linear, d.f. = 1,4430)
I	1.06	4.90	0.94	0.08	187.56
II	-0.45	2.39	0.97	-0.14	253.22
III	-0.24	0.98	1.05	0.05	12.57
IV	-0.16	1.22	1.01	-0.16	173.01
V	-0.18	1.19	1.02	-0.08	38.95

Table 5

Regression of Five Attitude Components and Consumption for 5000 women

p.c.(f)	E(f)	σ (f)	a(intercept)	b(slope)	F(linear, d.f. = 1,4998)
I	0.12	5.14	13.46	1.81	30.12
II	0.19	2.38	14.18	-2.71	31.32
III	-0.37	0.88	14.33	1.76	4.86
IV	0.18	1.33	14.48	-4.57	49.74
V	0.06	1.09	13.74	-1.13	2.47

Table 6

Regression of Five Attitude Components and Log Consumption for 3881 Women Drinkers, a Subset of Table 5

p.c.(f)	E(f)	σ (f)	a(intercept)	b(slope)	F(linear, d.f. = 1,3879)
I	0.32	5.07	0.49	0.08	169.87
II	0.08	2.29	0.48	-0.09	101.43
III	-0.31	0.85	0.50	0.08	24.22
IV	0.02	1.20	0.48	-0.21	263.50
V	0.03	1.12	0.48	-0.05	14.22

where components II, I and IV dominate the rest. The total amount of consumption variance predicted is about 14.4 per cent, component II alone accounting for 5.4 per cent, I alone for 4.1 per cent and IV alone for 3.8 per cent. It is not fruitful to write of statistical "significance" in assessing the value of a regression predictor in such a large sample, as the actual predictive power may be very small even when the F value is highly significant statistically. The predictive value of regression weights in modelling is discussed by Laughlin (1979). For 3881 female drinkers

$$\log(\text{alc/day}) = 0.48 + .08xI - .02xII + .08xIII - .21xIV + .05xV$$

where components IV, I and II dominate the rest. The total amount of consumption variance accounted for is almost the same as for men, some 14.1 per cent, but the principal predictor is component IV with 6.4 per cent; I alone takes up 4.2 per cent and II has 2.6 per cent.

So, for drinking males, attitude component II, a concern with alcohol-related problems, is the principal attitudinal predictor in this male sample. Whereas for drinking females attitude component IV, which Gregson and Stacey (1980a) interpreted as reflecting the temperance-prohibition tradition in New Zealand

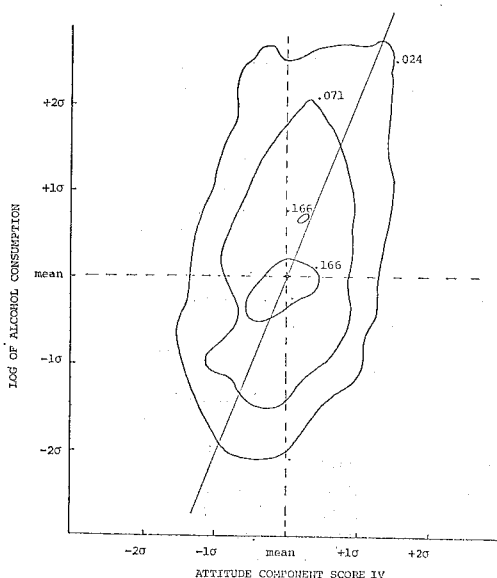


Figure 1. Probability density contours of the relationship between attitude component IV and alcohol consumption for drinking women.

society, predominates. Regression equations such as the above provide the best possible prediction with the given sets of data. This does not imply that, say, II is the most important attitudinal component for every male and IV for every female. Greatly fluctuating scores on the components within the sample results in the relative weights of the regression coefficients acting on widely differing scores at the individual level.

Figure 1 shows, as an example, the probability density contours for the bivariate plot of attitude component IV against log consumption for female drinkers. These contours were obtained by interpolation in a discrete computer generated density plot. This is one of the stronger relationships to emerge in the analyses. Both variates are scaled in standard deviation units. The contour densities correspond to probabilities of

$$.024 / \sigma_x \sigma_y$$

$$.071 / \sigma_x \sigma_y$$

$$.166 / \sigma_x \sigma_y$$

where $\sigma_x \sigma_y$ is the area of a rectangle whose sides are the standard deviations of the two variables of the plot. If the regression surface were an ideal case generated by a bivariate gaussian distribution, as is implicit in the calculation of correlation coefficients, then the contours would be a nested set of ellipses with their major axis tilted Northeast-Southwest. Our plot shows that what is one of the two strongest regression relations established between attitude components and consumption is in actuality only a small departure from what would obtain by chance, namely a set of ellipses with the major axis running North-South.

Whilst we have reviewed the linear relationship between alcohol consumption and component scores keeping the data for male and female informants separate, the comparable pooled data on all 10,000 informants, and on the total of 8313 who drink, is given here for reference. The regression equations based on these pooled data can, in our view, be misleading because they are based on the combination of discrete samples of data with different internal relationships holding between the parameters. Nonetheless, the pooled equations will show those particular relationships

which are sufficiently well defined and hold in the same manner for both of the two sexes. Table 7 gives the total sample data for regression of attitude components on consumption; Table 8 gives the data for all drinkers for regression of components on log consumption.

The log transformation of consumption makes a considerable difference (Table 8). The linear prediction for the consumption of drinkers accounts for about 18.5 per cent of the consumption variance, with three components of comparable relevance: I, II and IV. If it is desired to predict

Table 7
Regression of Five Attitude Components and Consumption for the Total Sample of 10,000

p.c.(f)	E(f)	$\sigma(f)$	a(intercept)	b(slope)	F(linear, d.f. = 1,9998)
I	0.51	5.32	30.67	4.17	59.46
II	-0.08	2.53	32.02	-10.09	167.93
III	-0.33	0.94	33.74	2.89	5.04
IV	0.07	1.35	33.38	-8.79	67.03
V	-0.06	1.15	32.57	-3.81	10.74

$$\text{alc/day} = 32.48 + 4.17xI - 10.09xII + 2.89xIII - 8.79xIV - 3.81xV$$

Table 8
Regression of Five Attitude Components and Log Consumption for 8313 drinkers

p.c.(f)	E(f)	$\sigma(f)$	a(intercept)	b(slope)	F(linear, d.f. = 1,8311)
I	0.72	5.11	0.70	0.10	505.08
II	-0.20	2.42	0.74	-0.15	500.54
III	0.27	0.92	0.79	0.07	44.67
IV	-0.07	1.22	0.76	-0.20	479.66
V	-0.08	1.17	0.77	-0.09	90.23

$$\log(\text{alc/day}) = 0.74 + .10xI - .15xII + .07xIII - .20xIV - .09xV$$

Table 9
Correlations Relating Attitude Components to Log Consumption for Drinkers

Attitude component	Drinking males	Drinking females	All drinkers
I	.20	.20	.24
II	-.23	-.16	-.24
III	.05	.08	.07
IV	-.19	-.25	-.23
V	-.09	-.06	-.10

Table 7 shows that the relation of attitudes to consumption without regard to sex, is a weak one with the second component being most prominent (the same applies to the total sample of drinkers).

drinking from attitudes then a multivariate regression is obviously essential, using all components suitably weighted.

The sign of the regression coefficients in Table 8 is compatible with their sense as

attitude quantifiers, having regard to the original items which are most heavily loaded on the components. The total variance accounted for increases from just over 14 per cent for each of the two sexes taken separately, to about 18.5 per cent. This increase is due to the larger data base on shared components I and II; on component IV the effect diminishes slightly. All the $F(1, 8311 \text{ d.f.})$ values will have a $p < .001$ but this is of little interest. It merely exemplifies the irrelevance of traditional "significance" testing for inference from very large samples. In Table 9 simple correlations relating each of the attitude components to log consumption are presented. The same three components are again prominent, though all five are statistically significant.

Conclusions

The attention that has been given to attitudes relating to alcohol, its use and abuse, suggests many specialists of various professional backgrounds believe attitudes have an important bearing on drinking behaviour. But in past empirical studies of attitudes and drinking behaviour, positive relationships of a weak to quite moderate kind have most frequently been reported. Stronger positive relationships have only been obtained from studies based upon small homogeneous samples in specific circumstances, e.g. teenage males attending a Catholic boys school, female students at a university, prison inmates. In addition, studies of attitudes as predictors of behaviour throughout the social sciences have shown strong relationships are the occasional exception. Simple correlations between attitudes and behaviour usually do not rise above .30. It appears that attitudes account for less than 10 per cent of the variance of related overt behaviour, other than in exceptional groups and/or circumstances.

The results of the present study, which stands alone both in being derived from a national sample and in the nature of the analysis, are reasonably well in accord with those of past alcohol studies. In addition, the data in the present study are less limited than data in previous studies in as

much as we developed an effective estimate of alcohol consumption and used it in our multivariate analyses, transforming the consumption data where appropriate.

We found attitudes and self-reported alcohol consumption to be positively, but not strongly, related. The relationships between attitude components and consumption are statistically weak but by no means insignificant. The proportion of the consumption variance attitudes account for, in a study of this kind, is surprisingly high. The attitudes that emerged in this study are meaningful within New Zealand society and cannot be ignored. However, attitude-consumption relationships are complex and not homogeneous over the population. Sex differences in the relationships have been demonstrated. The simple correlations between attitude components and alcohol consumption are of the same order as those typically found in studies of attitudes as predictors of behaviour in the social sciences.

As already mentioned, attempts to control alcohol use (and excessive drinking) very often assume attitudes are directly relevant to drinking behaviour. Our results, in a general way, support the assumption while indicating attitudes are not strongly reflected in drinking behaviour. There is no evidence about the causal direction of relationships between attitudes and drinking, nor about the potential manipulability of the relevant attitudes. It may well be that some modification of attitudes on a national scale would have a negligible impact on consumption and no impact on the minority with an excessive intake of alcohol. Finally, there is no evidence for the desirability of focusing on attitude change rather than, say, economic incentives to control alcohol use.

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