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Correspondence

SUICIDE IN PRISON: A COMMENTARY

DEAR SIR,

I was pleased to read the article on prisoner suicides by Dr Topp (*Journal*, January 1979, **134**, 24–27). My reasons for commenting on this article are as follows: first, to remark upon the congruency between Dr Topp's findings and results of a similar study undertaken at the Centre of Criminology, University of Toronto, by Richard Ericson and myself; and second, to suggest directions for future research on this subject.

Our study, sponsored by the Canadian Ministry of the Solicitor-General, was largely based on an official document analysis of 96 inmates who committed suicide between 1959 and 1975 in four maximum-security institutions—Saint Vincent de Paul Penitentiary, Kingston Penitentiary, Prince Albert Penitentiary, and the British Columbia Penitentiary – in Canada. A comparison sample of 1,383 non-suicidal inmates and a critical literature review served as reference points of our analysis. The annual rate of suicide in these maximum-security institutions averaged 272 suicides per 100,000 inmates, a rate considerably higher than the corresponding suicide rate in the institutions studied by Dr Topp. Most suicides (88.5 per cent) involved ligature strangulation; and, while suicides occurred at all hours and most often during the early stage of incarceration, seasonal variations in incidence were slight. Unmarried inmates, those serving short sentences (between two and three years), and 'lifers' were over-represented in the suicidal sample. In keeping with Dr Topp's findings, the variable of previous psychiatric history, including past suicide attempts, was correlated with eventual suicide in our study. There was no significant difference in suicide rates of persons convicted of violent crimes and those convicted of property offences. We hope to publish our findings as a monograph under the auspices of the Toronto Centre of Criminology.

With respect to directions for future research on prisoner suicides, I suggest that clinical data on suicidal inmates could be usefully augmented by greater emphasis upon official responses to distressed inmates. Indeed, the available literature suggests that official responsiveness to suicidal ideation, threats and attempts may be critical in reducing the incidence of inmate suicide. Our understanding of suicide in penal settings will be furthered by incorporating the valuable clinical perspectives of Dr Topp and others with greater detail on the effectiveness of prison clinical services.

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PSYCHIATRIC EXAMPLES OF SIMPSON'S PARADOX

DEAR SIR,

Controversy over the application of certain statistical techniques in psychiatric research continues, see for example Maxwell (1975), Tennant and Bebbington (1978), Garside and Roth (1978). Although much of the confusion arises from misunderstanding of the limitations of complex statistical models coupled with the difficulties of visualizing multivariate relationships it is important to recognise that even simple statistical techniques, such as cross-tabulations, can lead to results which appear to defy intuition.

A recent set of data which illustrates one such problem can be found in Table I of Early and Nicholas (*Journal*, February 1977, **130**, 117). The authors were investigating the change in the population structure of a mental hospital over time. From their figures the probability of a patient being male in 1970 is 343/739, and in 1975 it is 238/515. Since 343/739 > 238/515 one might justifiably conclude that the proportion of males had *declined* between 1970 and 1975.

Now consider the under 65 and the 65 and over age groups separately in an effort to discover whether this decrease is primarily due to one or the other or both groups. First, for the under 65's the 1970 proportion of males is 255/429 and the 1975 proportion is 156/258. Since 255/429 < 156/258 the proportion of individuals aged under 65 who are male has *increased* between 1970 and 1975. For the 65 and over age group the 1970 proportion is 88/310 and the 1975 proportion is 82/257. Again we find that the proportion of males has *increased* between 1970 and 1975.

There is thus an apparent contradiction: for each of the age groups separately the proportion of males has *increased* from 1970 to 1975, but for the combined age groups the proportion has *decreased* over this time period. Surely both cannot be correct?

Another example of this phenomenon can be found in Table I of Glover and McCue (*Journal*, March 1977, **130**, 282) where the authors are investigating the effect of electrical aversion therapy on alcoholics.

For neither of these examples are the differences significant, but this need not always be the case. If, for example, the numbers referred to thousands of patients, rather than to single patients, then the comparisons would be highly significant.

The apparent paradox (Simpson, 1951) arises because we intuitively expect the probabilities over all ages to be the average of the probabilities in the under 65 and 65 and over age groups. In fact, this intuitive idea is only half the truth. The probabilities in the total *are* averages of the sub-table probabilities but they are *weighted* averages and the weights are not the same. To make this clear let x = male, y = under 65, and z = 1970, with x', y', z' being the complementary categories. Then we have, from elementary probability theory:

and $P(x \mid z) = P(y \mid z)\, P(x \mid y, z) + P(y' \mid z)\, P(x \mid y', z)$

with $P(x \mid z') = P(y \mid z') + P(x \mid y, z') + P(y' \mid z')\, P(x \mid y' z')$

and $P(y \mid z) = 429/739 \neq 258/515 = P(y \mid z')$
$P(y' \mid z) = 310/739 \neq 257/515 = P(y' \mid z')$.

So, although in the example $P(x \mid y, z) < P(x \mid y, z')$ and $P(x \mid y', z) < P(x \mid y', z')$, the different sets of weights mean that the weighted average of $P(x \mid y, z)$ and $P(x \mid y', z)$ is greater than the weighted average of $P(x \mid y, z')$ and $P(x \mid y' z')$.

If y and z were independent $P(y \mid z)$ would be equal to $P(y \mid z')$ and similarly $P(y' \mid z)$ would be equal to $P(y' \mid z')$ so in this case the paradox would not occur.

Simpson's paradox is one of the simplest illustrations of probabilistic phenomena which at first appear to contradict intuition. It demonstrates that intuition can be unreliable as a tool for comprehending statistical theory. If problems of interpretation can arise with something as simple as a $2 \times 2 \times 2$ cross-tabulation, then clearly very great care must be taken with the more complex analyses typical of psychiatric research.

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OUTCOME OF SCHIZOPHRENIC ILLNESSES

Dear Sir,

Johnstone *et al* (*Journal*, January 1979, **134**, 28–33) draw what may be unreasonable conclusions from their data concerning the prediction of outcome in schizophrenic illnesses. They state that there "was no significant difference in outcome between Feighner-positive and Feighner-negative cases . . .", but their Table III indicates that 15 of 20 Feighner-positive cases had a poor outcome (75 per cent) compared to 6 of 16 Feighner-negative cases (37.5 per cent). In other words, the positive cases were twice as likely as the negative ones to do poorly. The small sample size apparently prevented this difference from achieving statistical significance. In their discussion, however, the authors ignore the high risk of incorrectly accepting the null hypothesis, a not uncommon problem (*New Eng. J. Med.*, **299**, 690–4, 1978).

In addition, the authors do not provide information about the correlations between social isolation, the variable they identify as important in prediction, and the other predictors, including the Feighner criteria. One might at least suspect a good correlation between social isolation and being Feighner-positive.

Finally, it is a bit puzzling that the authors decided to exclude two patients "who scored only 4 on the social functioning assessment", indicating a "good outcome in social terms", because they "had been readmitted to in-patient care with a recurrence of psychosis . . . In this respect these patients differed from the rest of the good outcome group, and it did not seem appropriate to include them". These cases raise questions about the validity of the outcome