

because they contain added iron and vitamin D and have limited saturated fat and sodium contents, without limiting energy content.

Regarding cost we can quibble over figures, but let's accept an extra cost of £1.43 a week of using a follow on milk (or infant formula) instead of cows' milk. This is the equivalent each day of one to two disposable nappies, or a newspaper, or two cigarettes, or 28 ml beer. Nevertheless, for some families even this extra cost may be the proverbial straw—but the answer to this is to change other aspects of public policy, not to continue to recommend substandard child feeding customs that are being abandoned by many other countries in the developed world.

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## Sexual expression in paraplegia

SIR,—Dr J M Kellett emphasises the potential for people with paraplegia to have satisfying sexual relationships despite difficulties with potency, sexual responsiveness, and immobility. But for patients with neuropathic bladder sexual expression may be marred by incontinence or voiding on intercourse. Learning how to self catheterise may solve these problems.

Provided that patients are motivated and have a bladder that can retain an adequate volume of urine they can become dry with self catheterisation.<sup>2</sup> Regular bladder drainage also protects the upper tracts.<sup>3</sup> Disability is not necessarily a bar to self catheterisation. Patients can learn the technique despite paraplegia, poor manual dexterity, and lack of perineal sensation.<sup>4</sup>

By enabling patients to regain bladder control and freeing them from bulky external appliances, self catheterisation does much to enhance their self esteem and sexuality.<sup>5</sup> Complications are few and long term results excellent.<sup>3</sup> Dr Kellett recommends practical advice about sexual technique and aids. When appropriate this might include discussion of the benefits of clean intermittent self catheterisation.

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- 5 Hill V, Davies W. A swing to intermittent clean self catheterisation as a preferred mode of management of the neuropathic bladder for the dextrous spinal cord patient *Paraplegia* 1988; 26:405-12.

## The mean predicts the number of deviants

SIR,—Professor Geoffrey Rose and Mr Simon Day have shown that in a population the proportion of deviant values of such characteristics as obesity and blood pressure is strongly related to the mean value and conclude that we should attend to the population as a whole and not just its deviants.<sup>1</sup>

For reasons related to natural biological variability a person may be unusually small and heavy, have a high blood pressure, be of low birth weight, and so on, and there is no reason to expect that excess risk of disease should attach to such people as even if we are all absolutely "normal" someone will still be the smallest, heaviest, most hypertensive, and so on. Such people are neither abnormal nor deviant of course.

On the other hand, some people may have unusual values because they have a disease and thereby are at risk of other disease. The reasons for their differences from the mean may be pathological rather than biological. Thus the distribution of values in a population may be made up of a distribution of values in normal people reflecting natural biological variation and an overlapping distribution of values in a few diseased people. This is widely thought to be the case, for example, for birth weight,<sup>2,3</sup> for which it is supposed that no excess risk of postnatal mortality or morbidity attaches to low birth weight babies who were expected to be small for biological reasons such as having a small mother. The risk may, however, be great in babies who are small for pathological reasons, such as disease brought about by poor prenatal nutrition or antenatal smoking. Altering the mean in ways that only shift the distribution of "normal" values will have no effect on the prevalence of disease related deviance and hence of disease, even though the deviant tail will alter as your authors have shown.

In some cases the main biological determinants of the characteristic may be known, and an "expected" value can then be devised, and deviance from this expected value may allow individual values that are due to disease to be identified. This is, for example, the case for forced expiratory volume, which is usually expressed as a percentage of the predicted value based on age, height, and sex. For most characteristics, however, it is not possible to distinguish between values that were determined, in part, by disease and other identical values that were the result of natural biological variation. In these cases, as the tail of a distribution will contain a larger proportion of people whose values are deviant for pathological rather than biological reasons and who may need and benefit from treatment, it is surely correct to pay attention to the tail of the distribution.

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- 1 Rose G, Day S. The population mean predicts the number of deviant individuals. *BMJ* 1990;301:1031-4. (3 November.)
- 2 Wilcox AJ, Russell IT. Birthweight and perinatal mortality. I. On the frequency distribution of birthweight. *Int J Epidemiol* 1983;12:314-8.
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SIR,—Professor Geoffrey Rose and Mr Simon Day may favour arguments for managing "sick populations" rather than "deviant individuals" but they rest their case for debate on a specious appeal to statistics.<sup>1</sup>

If a social or biological characteristic is distributed in anything remotely like a bell shape then the proportion or number of individuals that exceed any arbitrary absolute position (systolic blood pressure  $\geq 140$  mm Hg, body mass index  $\geq 30$  kg/m<sup>2</sup>, alcohol intake  $\geq 300$  ml/week, sodium intake  $\geq 250$  mmol/day) will of course be predicted by the position of the whole curve (that is, its mean). But deviance from the mean in statistical terms is described by such relative measures as centiles or standard deviation and not by absolute cut off points. We cannot say whether skewing or sliding is at work in the 52 study populations, but the graphs (A-D) look, unsurprisingly, like the normal cumulative probability curve rather than like straight lines.

We need to discuss the issue of norms, deviance, and absolutes, not as metaphysic but according to reason and causality. In what sense are moderate drinkers collectively responsible for the heavy drinkers? Before we focus our attention on deviants we need to be sure not only that they are in some sense at risk but that we have an effective treatment. Thus we do not direct medical effort against high intelligence, but we do direct drugs against high

blood pressure. Until we have evidence that intervention in normotensive patients is helpful we should leave well alone. And what of the great cholesterol debate? Whether to shift the population's behaviour or just the top centile, will depend on evidence from controlled trials. Sometimes, of course, the "sick population" approach is unarguable—for example, when a whole Third World region is trapped in famine we should attack the causes, but the approach would not preclude us from feeding a starving person.

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AUTHOR'S REPLY,—Mr Jon Nicholl and Dr L S Lewis are, of course, right to point out that intervention against a risk factor is not warranted unless it is believed that the relation is causal and at least partially reversible. These conditions are met in the examples we studied (hypertension, obesity, heavy drinking, and high sodium intake), but any other examples must each be judged individually, including the question of heterogeneity in the make up of the population.

The laboratory custom of reporting a "range of normal" in purely statistical terms ( $\pm 2$  standard deviations) often causes confusion, being quite different from clinical or biological significance. A particular value may be uncommon yet benign, or common and yet sinister. Statistical measures of deviance have no biological meaning: they only identify what is unusual. Clinical action must be guided by absolute measures.

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SIR,—The premises on which Professor Geoffrey Rose and Mr Simon Day build their argument that the normal majority must change is fallacious, their reasoning faulty, and their evidence irrelevant.<sup>1</sup> The only common denominator of their data seems to be the trivial observation that shifting population means also shifts the tails of distribution. As these observations are based on interpopulation comparisons of surrogate measures for health, no conclusion can be drawn as to the health of individual populations. There is no evidence that lowering populations means for weight, blood pressure, alcohol consumption, or 24 hour urinary sodium excretion makes people live longer or happier lives.

The people who differ from arbitrarily assigned values are called "deviant individuals" or simply "deviants." In this way the standard deviations of individuals become reified as moral lapses of statistics. Yet, in the case of alcohol intake, teetotalers, who are equally "deviant" statistically do not earn this label. It is a short step from labelling people as deviants to moral exhortation and the language of blame: "The population thus carries a collective responsibility for its own health and wellbeing, including that of its deviants" and "it is no longer possible to regard normal (majority) behaviour as of no wider consequence." Note the imperceptible shift by which weight, blood pressure, or urinary sodium excretion become behaviour and responsibility.

Professor Rose and Mr Day would have us believe that studying the determinants of "average blood pressure and weight, alcohol intake, average population 'mood,' intellectual performance, aggression, etc" could tell us something about "the causes of hypertension, obesity, alcoholism, depression, violence, and so on." This is analogous to claiming that the causes of poverty can be discovered by analysing the determinants of average income, or that the causes of gigantism or