"differences". In Results they refer to their figure showing the "association between body height and age" but they do not say whether these differences were tested. In the Disscusion, however, they state that "The numbers are small and the differences are not statistically significant but they are concordant with the trend in the figure and with the mean values in table 3" (p. 336). In this sense they are referring to my study concerning urban children mainly born in 1955.[1] If I understand this correctly their sample of persons born in 1955 would at the time of the interview have been about 25 years of age. In their figure the difference between the mean height of 25-year-old women from senior salaried occupations and unskilled workers seems to be nil. For the 25-year-old men there seems however to be a difference between these extreme groups of about 3·9 cm. Now, if I am interpreting their figure and their tables correctly, they have actually tested two groups consisting of eight persons from senior salaried employees' homes and 35 persons from unskilled workers' homes. If so I can understand why the authors did not report the sample sizes and why they found no significant differences. Thus I question some of their conclusions.

The authors' conclusions—I do not agree with the statement that adult height in Sweden *today* is associated with socioeconomic status in childhood (it could however, be a working hypothesis for a new study). Of course there is also the matter of the definition of an *adult*. So far as the sample born in 1955 is concerned, I think it was about that time the differences levelled out.

There is also another study confirming this. In 1976 Otto,[2] studying a total annual population of conscripts born in 1953, reported a correlation coefficient of r = 0·044 between height for 18·5-year-old conscripts and social group (so the Nyströms-Peck and Vågerö study is not the first study on adult height and socioeconomic group). This coefficient was significant because of the large number of conscripts (n = 51 897). However, it is not *relevant* since if you multiply r with itself you get 1·9 per thousand, in other words 0·2 per cent of the variance is common to height and social group, which is practically nothing. However, I am glad that they agree with my suggestion that "the height differences between social groups diminish with time due to a greater height gain in the lower classes" (p. 337).

What is interesting in this whole area of research, however, is that bad conditions in society or in subgroups within society affect stature as well as the tempo of physical growth. Tanner[3] coined the phrase "Growth as a mirror of conditions in society"; stature can generally be used as a proxy for health and living conditions in the society. In developed countries, however, socioeconomic groupings may not be so relevant today—not only because of the difficulties in defining meaningful groupings, but also because there are probably other factors in the environment that affect people more (pollution, stress, and so on). In these respects all socioeconomic groups are in the same boat. For example in a Swedish nationwide sample of schoolchildren born in 1967 (where the only socioeconomic differences found were in weight) we found that the birthweight for children in the city of Malmö was significantly (100g) lower than in the rest of the country.[4] The area around Malmö is highly polluted, so it is tempting to infer that living in a polluted area is more of a danger today than being born in the home of an unskilled worker. I do not think that babies are any more resistant than fish and seals in this respect.

References

[1] Lindgren G. Height, weight and menarche in Swedish urban schoolchildren in relation to socio-economic and regional factors. *Ann Hum Biol* 1976; **3**; 501-28.

[2] Otto U. Male youths. A Socio-psychiatric study of a total annual population of Swedish adolescent boys. *Acta Psychiatr Scand* 1976; **Suppl 264.**

[3] Tanner J M. Growth as a mirror of the conditions of society: Secular trends and class distinctions. In: A Demirjian, M Brault Dubux eds *Human growth: A multidisciplinary review*. London & Philadelphia: Taylor & Francis, 1986

[4] Lindgren G W-, Strandell A. Fysisk utveckling och hälsa. En analys av hälsokorsuppgifter för grundskoleelever födda 1967. (Physical development and health. An analysis of health chart data for schoolchildren born in 1967). Report no 4/1986. Department of Educational Research, 1986. Institute of Education. (In Swedish with English summary.)

GUINILLA W-LINDGREN
Department of Educational Research,
Stockholm Institute of Education,
Box 34 103,
S-10026 Stockholm,
Sweden

The authors reply as follows:

SIR—Gunilla Lindgren has commented on our previous article in your journal.[1] There we concluded that differences in body height by childhood socioeconomic group existed in the adult Swedish population of today, and, at the same time, that these differences were diminishing.

Lindgren has three objections to our study, namely: (1) our method of establishing body height is not valid; (2) the differences between socioeconomic groups are not statistically significant when analysing 1 year age groups; and (3) our interpretation of results is questioned.

The method of measuring height—Lindgren refers to the method used by us (personal interview) as one of the "cheapest and dirtiest methods to estimate a person's height". The expression "cheapest and dirtiest" is put within quotation marks, but we are not told who is quoted. We choose to believe that Lindgren means that it is an inexpensive method to ask people about their height rather than measuring it. In our view this a clear advantage, especially when it comes to a nationwide sample, in this case with more than 12 000 individuals. "Dirty", we assume, means that this method gives rise to confounding in analysing results. The confounding caused by the method used by us was discussed in our paper, but we are happy to elaborate on that further.

If one is interested in the differences between individuals, or how one individual's height changes over time, we agree that the method may be unsatisfactory. However, to conclude that this method is not valid for group comparisons is, we believe, totally wrong. Palta, Prineas *et al* estimated the size of error in survey studies using interview methods to establish body height. They estimated the average error to be an overestimation of about 1%.[2] Others have come to similar conclusions.[3] Lindgren is also worried about changes over time which may influence the size of this error. Since this is a cross sectional study, changes over time should not affect the results.

In survey studies, questions about body height are, in fact, to a very small degree burdened by measurement error. Other questions, for instance self rated health, smoking habits, or prevalence of specified symptoms, are usually less reliable. Futhermore, Palta et al[2] and Stewart[3] found that short people and people of low educational level had the strongest tendency to overstate their body height at the interview. If this is true for Sweden also, which we have no reason to doubt, we will be underestimating the true class differences in body height in our study. In conclusion, any methodological problems in using survey data will make it more difficult for us to demonstrate group differences in average body height.

There are real differences—Are there differences in body height by childhood socioeconomic group in the adult Swedish population today? Yes, there are. Sons and daughters of senior salaried employees are significantly taller than those of unskilled workers, for instance. Among men this difference is almost 3 cm, and among women it is more than 1 cm (see[1], tables 3, 4, p 336). This is based on age standardised mean heights for the entire material.

The purpose of this study was not to analyse each 1 year group separately. Our comments on the 1954–55 birth cohort were made only as a comparison to the previously published study by Lindgren.[4] When analysis is applied to 1 year age groups, the number of persons will be very small and we could not exclude differences being due to random variation. The curve in fig 1 (p 335) is based on the mean height in 3 year classes, calculated stepwise by adding and subtracting each 1 year cohort at a time, to smooth the curve. Thus the numbers are, in fact, larger than the ones Lindgren quotes.

It is extremely unlikely that the observed differences, which systematically appear in almost every age group, should be the result of random variation or measurement error.

We regret not quoting Otto's work on conscripts born in 1953 in our article. He demonstrates that the number of tall conscripts from social class 1 is larger than expected.[5] It seems therefore that Otto's study could not be used to support the hypothesis that there are no height differences by childhood social class. The size of these differences was, however, not published by Otto. The fact that the square of the correlation coefficient (Cramer's V) is low does not say anything about whether these differences are large, small or non-existent in the 1953 birth cohort.

Conclusions—In summary we believe that our main conclusion is justified. Body height differences by childhood socioeconomic group do exist in the adult population in Sweden today.

The controversial issue seems to be to what extent these differences are present among those born after 1950 and, secondly, whether we should continue the research in this area.

Lindgren argues that other factors, for example pollution, might today be of greater importance than the socioeconomic childhood environment. We do not want to ignore the importance of pollution and environmental hazards. This is, however, a slightly different problem, which our present study did not address. It is probable, though, that persons who grow up in economically and socially underprivileged families today will be those persons also who are most exposed to and most affected by the pollution of urbanised areas. Thus, pollution and other environmental problems may well contribute to class differences in body height or health.

References

1 Nyström Peck M, Vågerö D. Adult body height and childhood socioeconomic group in the Swedish population. *J Epidemiol Community Health* 1987; **41**: 333-7.

2 Palta M, Prineas R J, Berman R, Hannan P. Comparison of self-reported and measured height and weight. *Am J Epidemiol* 1982; **115**: 223-30.

3 Stewart A L. The reliability and validity of self-reported weight and height. *J Chron Dis* 1982; **33**: 295-309.

4 Lindgren G. Height, weight and menarche in Swedish urban school children in relation to socio-economic and regional factors. *Ann Hum Biol* 1976; **3**: 501-28.

[5] Otto U. Male youths. A socio-psychiatric study of a total annual population of Swedish adolescent boys. *Acta Psychiatr Scand* 1976; **Suppl 264**.

M NYSTRÖM PECK AND D VÅGERÖ
Department of Community Medicine
Köpmangatan 36 B
951 32 Luleå
Sweden

Screening for cancer of the cervix

SIR—In view of the Journal's international readership it might have been useful if Professor Day had made clear in his otherwise excellent review article (June 1989) that when referring (page 105) to "this country's Health Service", the country to which he refers is England, not the United Kingdom. The success of cervical screening in parts of Scotland is partly due to the integration of general practitioner services with Health Boards, and the consequent opportunity to have a Community Health Index with one patient identification number used for all hospital and community purposes, including cervical screening.[1] We routinely produce from our cervical computing system, OCCURS, the indicators recommended by Professor Day. The table shows our population statistics as of 31st March 1989.

We have identified some problems with these statistics. Firstly, an appreciable number of women—12% in the age range 50–59 years—have had hysterectomies, and do not need to be screened. At present such women appear mainly in the "over 5 years" column; a separate column for "screening not required" is necessary. Secondly, some women positively decline screening, and perhaps a "refusers" column is also necessary, especially if the Government's proposals on payment of GPs for cervical screening being related to achieving percentage targets is implemented. We have not yet produced anything resembling Professor Day's proposed screening index but the concept is attractive.

Table *Area summary as at 31.3.89; values are percentages screened by age group and interval*

Age group (years)	*Interval since last screening*			
	Within 3 years	*3–5 years*	*Over 5 years*	*Never screened*
15–19	9	—	—	91
20–24	47	7	1	45
25–29	58	13	4	25
30–34	60	15	7	19
35–39	57	17	9	17
40–44	53	19	12	15
45–49	49	20	15	16
50–54	46	19	17	19
55–59	41	17	18	24
60 and over	10	6	21	63

In this Area, the greatest problem is the proportion of women who do not respond to several invitations to attend for screening, either by their own General Practitioner, or at a Well Woman Clinic.[2]

References

[1] The OCCURS Group. Computerisation of screening for cervical cancer. *Health Bull (Edin)* 1988; **46:** 146–62.
[2] Robertson AJ, Reid GS, Stoker CA *et al.* Evaluation of a cervical cytology call screening programme in women aged 50–60 years. *Br Med J* 1989; **299:** 163–5.

N R WAUGH
A J ROBERTSON
Departments of Community Medicine and Pathology
Tayside Health Board
Vernonholme
Riverside Drive
Dundee DD1 9NL