A recent report\(^1\) identified back pain and early retirement due to back pain as growing problems in Sweden. This report raised the question: Is the problem of back pain equal for the sexes or does it differ by gender?

A survey of the official health statistics in Sweden\(^2\)–\(^4\) (with questions to a panel of 12,684 people) estimated the prevalence of back pain from 1975 to 1989. Women in general reported an increasing prevalence of back pain over the years. The statistical report showed a prevalence for women of all ages (16–84 years) of 6.1% in 1975 and 8.1% in 1989. Back pain in very young women (16–24 years) was found to have increased from 2.4% to 3.5%, in women aged 25–34 years from 3.1% to 4.4%, and in women aged 35–44 years from 5.9% to 7.6%. Only in women aged 45–54 years was the prevalence almost unchanged, 10.1% and 10.2%, respectively.

A corresponding increase was not observed in men. The figures were 7.6% for 1975 and 7.1% for 1989 in men aged 16–84 years.

Thus, women in Sweden have reported increased disability related to back pain during the past two decades. What can be the cause? Earlier studies found the following factors to be of pathogenic importance: heavy physical work, smoking and multiparity.\(^5\)

Since the early 1960s, oral contraceptives (OC) have represented a pharmaceutical agent administered to large groups of healthy fertile women throughout the world. Other authors have suggested a relationship between increased use of OC and back pain, but without supporting data.\(^6\) The aim of this study, then, was to determine whether a causal relationship existed between back pain and use of the ‘pill’.

There is complete information about the consumption of OC in Sweden on the individual level for two separate districts (the county of Jämtland and the municipality of Tierp), where the use of pharmaceutical drugs has been registered for many years.\(^7\) This enabled us to study the incidence of back pain in a population with known consumption of OC. The questions were: Is there a higher risk for back pain in women who use or have used OC? If there is such an increased risk, does this risk increase if OC use begins at a younger age, and can pregnancy be excluded as a confounding factor?

**MATERIAL AND METHODS**

**Study Community**

The study was conducted in Tierp, Sweden, a municipality of about 20,000 inhabitants. The study district
includes both rural areas and small industrial towns. Community health services are concentrated into one primary care health centre where six general practitioners work with a paediatrician and several other part-time specialists.

About 65% of the 45 000 visits to physicians made yearly by the population are at this health centre. Most of the other visits take place at specialized outpatient clinics at the University Hospital in Uppsala or to private specialists in Uppsala. All data regarding visits to the health centre, the cause and diagnosis, as well as all drugs prescribed have been registered since 1972. However, only drugs purchased by the community population from the two pharmacies located within the municipality are registered. Prescription drugs purchased outside the study district are not included. In spite of the many visits outside Tierp, the magnitude of this attrition has been estimated to be only 5% of the total amount of prescriptions. The data are collected at the Centre for Primary Care Research at the University of Uppsala.

The Cohort (Subjects)
All women in Tierp aged 10–44 years in 1980 who had received at least one prescription of an OC drug, i.e. group 13 B in the pharmaceutical classification used in Sweden at the time, were identified. Women without registered use of OC during 1975–1985 were selected as a comparison group. The latter were matched by age with the study population (Table 1). This means that the study group has been using OC for a shorter or longer period. Of the OC users 1975–1985 in Tierp 86.9% used OC for 3 years or more. In contrast to this, the control group had been non-users, as far as we could ascertain, for a 10-year period.

Because of the study restriction, the comparison groups, i.e. non-users, were in a minority in several age groups. (For instance, among those aged 19–20 years there were only 33 women who had not been using OC from 1975–1985.) When the number of OC users in an age group exceeded the number of non-users, the OC users were chosen at random. Conversely, the non-users were chosen at random when OC users were in the minority. In all, the cohort consisted of 1006 OC users and non-users. All registered visits to the primary health care centre by the cohort were followed for 5 years.

Methods
We decided not to differentiate between diagnoses of back pain determined by different doctors. Thus, we used the following diagnoses for back pain (diagnostic codes 713.1; 717.0; 725; and 728.8), according to the Swedish translation of the Nomescod code list for primary care diagnoses based on the International Classification of Diseases (ICD 8). In the following, these diagnoses are abbreviated as LBP (low back pain).

The women selected as exposed or unexposed to OC in the study were followed for registered visits to the doctor from 1981 to 1985. Then the incidence of LBP for each year was registered for each group. Pregnanacies (counted as parturitions) were also registered, to enable us to determine whether pregnancy was a confounding factor.

Approximately half of the women in the study material before exclusion of cases without matching control were ≤22 years of age, the rest were 23–44 years old during the index year. These age groups were selected because they were similar in size.

Statistics
Because of the matched design, both unconditional methods and conditional methods of analysis, i.e. Mantel-Haenszel, were used. The analyses were carried out using the SAS statistical program.
RESULTS
In this study population aged 10–44 years, about 20% of women used OC in 1980. The use of these drugs was most frequent in the 17–20 year age group, where about two thirds were OC users. There were no OC users in the 10–13 year age group. In all, 503 women exposed to OC were included in the study. Table 1 illustrates exposure to OC in the population.

The number of younger women with low back pain was found to be quite small especially among controls (non-users). Therefore the statistical analysis was carried out only for the whole age range from 14 to 44 years. LBP occurred more frequently every single year during the follow-up period among OC users compared to non-users, and a statistically significant difference between OC users and non-users was registered for the first \( P < 0.01 \) and the fourth year \( P < 0.05 \) (Table 2).

As the number of younger women with LBP was quite small, the statistical analysis did not enable us to determine the importance of early exposure.

When collating the LBP data over the period 1981–1985, the difference between the groups was also found to be significant (once a woman had been registered as having sought care for LBP, she was considered to have LBP from that year on).

We also studied pregnancy as a possible confounding factor. Pregnancy influenced the frequency of LBP, but when all pregnant women were excluded, the difference between the groups was the same, with an association between OC use and LBP.

DISCUSSION
Our results suggest an increased risk for low back pain associated with current or prior OC use, although it is possible that the association is unrelated to OC use and may stem from some other factor. The relationship with prior OC use might be due to a late adverse effect. The possible mechanisms for this are not explained by our study, but will be discussed further.

Although low back pain is a common health problem, it is mostly caused by degenerative disease, which would be uncommon in younger women. Therefore causes other than degenerative need to be sought. Many studies have found that female LBP begins during pregnancy and persists afterwards.\(^{11}\) This, of course, can have multiple causes. The most common type of back pain during pregnancy—posterior pelvic pain—has been related to the hormone relaxin.\(^{12}\) Relaxin was earlier thought to be a hormone of pregnancy only, but the recent development of more sensitive methods enables us to measure relaxin outside pregnancy.\(^{13-16}\)

Relaxin has been detected in the peripheral circulation during the normal menstrual cycle\(^{16}\) and has also been found in sera in higher concentrations in healthy women during the OC use cycle than during the normal menstrual cycle.\(^{16}\) Relaxin might provide the missing key for understanding the possible causal relationship between OC and LBP.\(^{6,17}\)

The variable of outcome—the LBP diagnosis determined at a visit to the public health service—was used without attempting to subdivide sufferers into causal groups, because it is considered impossible to establish the cause of back pain in most acute episodes\(^{18}\) and in up to 50% of chronic cases.\(^{19}\) As no separate diagnostic codes exist for posterior pelvic pain without inflammatory disease, LBP could possibly also include these disorders and is considered to do so here.

The LBP diagnosis does not cover all subjects with the disorder, but only those who actually seek care. The set up of the Tierp register also does not allow us to study lifestyle factors such as heavy physical work, smoking or high body mass index (BMI), all known risk factors for LBP among women. Conceivably, these could occur more often among OC users than non-users, influencing our results.

### Table 2

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OC users</td>
<td>Non-users</td>
<td>OC users</td>
<td>Non-users</td>
<td>OC users</td>
<td>Non-users</td>
</tr>
<tr>
<td>14–22</td>
<td>2.47</td>
<td>1.85</td>
<td>4.61</td>
<td>0.66</td>
<td>1.45</td>
<td>0.00</td>
</tr>
<tr>
<td>23–44</td>
<td>3.23</td>
<td>2.05</td>
<td>4.80</td>
<td>1.49</td>
<td>3.34</td>
<td>1.50</td>
</tr>
<tr>
<td>Total</td>
<td>2.98</td>
<td>1.99</td>
<td>4.74**</td>
<td>1.23</td>
<td>2.78</td>
<td>1.07</td>
</tr>
</tbody>
</table>

\*\( P < 0.05 \); **\( P < 0.01 \).
It is also possible, but unlikely, that the results were ‘confounded by disease’, i.e. women who already have a tendency to back pain are more likely to use OC to prevent pregnancy. There is also the chance of coincidence between two common factors, i.e. back pain and OC use. Another problem when interpreting the association is that OC users have more contact with the health care system and consequently may have a higher risk for a diagnosis of back pain. During the study period both low and high oestrogen-containing OC were in use. It is possible that the various OC differ in their adverse effects, but this would require further study.

The study design does not allow us any definite proof that OC use is an aetiologic factor for LBP, but we can stress the intriguing association. Despite the fact that OC have been in use for more than 30 years, late adverse effects outside the reproductive field are not adequately known. We conclude that further studies to elucidate the possible adverse effects of OC use are needed and should concentrate on the questions outlined above.

ACKNOWLEDGEMENTS
We wish to thank Ms Helen Dahlin, for help with the statistical data analysis.

REFERENCES

(Revised version received July 1996)