An investigation into the oral health status of male prisoners in the UK

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Abstract

Aim: The aim of this study was to investigate the oral health status and behaviours of a group of remand and convicted prisoners, and to report on factors that may affect their general and oral health.

Method: A convenience sample of 122 prisoners participated in a structured interview followed by an oral examination. The structured interview investigated perceived oral health, past dental attendance and dental treatment, oral health behaviours, general health and socio-demographics factors. The oral health examination determined the oral health status and normative treatment need.

Results: General health appeared to be poorer than in the general population with higher levels of mental illness and infectious diseases. A large proportion of prisoners reported tobacco (80%) and alcohol use (83%), drug dependency (84%) and high sugar diets (57%). Overall the oral health of prisoners was poor. There were no statistically significant differences between the remand and convicted groups. Compared with the general population, prisoners had higher levels of decay and lower levels of both missing and filled teeth. They also reported higher levels of dental anxiety and more frequent use of emergency dental services.

Conclusion: Prisoners have poorer general and oral health than the non-prison population. Remand prisoners reported a higher level of dental anxiety and were more likely to value their teeth, visit the dentist and opt for restoration of an anterior tooth than convicted prisoners. Convicted prisoners expressed more perceived need than their fellow remand prisoners, even though convicted prisoners normative need tended to be lower.

Key words: Prisoners, general health, oral health, substance abuse

Introduction

The 1998 Adult Dental Health Survey demonstrated a continuing overall improvement in adult dental health and decline in the prevalence and severity of dental disease, particularly in young adults (Kelly et al., 2000). Despite improvements in oral health, inequalities still exist and are greatest in deprived groups, particularly prisoners (Jones et al., 2005).

Remand (short stay) prisoners have both poorer general health (Singleton et al., 1998) and poorer oral health (Jones et al., 2005) than convicted prisoners.

Whilst the UK Department of Health document ‘The Strategy for Modernising Dental Services for Prisoners in England’ highlighted the high oral health needs and level of untreated dental disease of prisoners (Department of Health, 2003), there has been little research, in the UK, related to the oral health of convicted and remand prisoners.

The aim of this study was to investigate oral health status and behaviours, and the dental treatment requirements of a group of remand and convicted prisoners, and to report on factors that might affect their general and oral health.

Method

The study took place in Her Majesty’s Prison (HMP) Brixton, London, following ethical approval from the
Northern and Yorkshire Multi-Centre Research Ethics Committee (MREC). HMP Brixton houses a mix of remand and convicted prisoners and can maintain a population of 805 inmates. Remand prisoners comprise 50% of the prison population. There is a high turnover with approximately 13-18 new receptions per day and a short average length of stay (circa 35 days).

It was planned to undertake a cross-sectional study of prisoners. In the event, this was not possible as prisoners were only prepared to participate if offered dental treatment. Consequently, the recruitment process was modified and a convenience sample was accepted, despite the bias that this may have introduced. Once this method of recruitment was used, everyone who was approached agreed to take part. All prisoners attending the prison dental services for the first time between October 2004 and March 2005 were invited verbally to participate. Participants in the study were provided with appropriate, necessary dental treatment that was in accordance with the 2003 Department of Health guidelines for the provision of prison dental treatment for emergency and urgent care (Department of Health, 2003).

Written consent was obtained in accordance with ethical approval guidance. The details of the nature and purpose of the study were described verbally, and in writing, via the consent form. Participants completed a structured interview before undergoing an oral examination.

A questionnaire covering the areas of perceived oral health, general health status, past dental attendance and treatment, oral and general health behaviours, and sociodemographic information was developed. The structured interview format overcame any literacy and dyslexia issues which have a high, reported prevalence amongst prisoners (Duckworth, 2005). It was piloted with seven prisoners, who were excluded from the main study, to assess comprehension and ease of use.

The oral examination was used to establish the normative treatment need of prisoners and was undertaken immediately following the interview. It investigated oral mucosal pathology, number of decayed (D), missing (M), and filled (F) teeth and periodontal status. The criteria used for assessment of DMFT and periodontal status were as for the 1998 Adult Dental Health Survey [with the exception of the inclusion of the third molars] (Kelly et al., 2000). Any respondents whose medical history indicated that they required antibiotic cover for invasive dental treatment, did not undergo periodontal examination unless they were in need of other dental treatment that required antibiotic cover. In which case, the periodontal examination was deferred until the treatment visit. Radiographic examination was not undertaken.

A subjective assessment of dry mouth was made by asking the participant’s perceived view, and an objective assessment was made by the examiner and recorded as positive if the oral mucosa was obviously dry and adhered to instruments or gloves, or if the saliva appeared thick and ropy. The criteria used for diagnosing pathology of the oral mucosa were adopted from Cawson and Odell (2002) and was based on clinical diagnostic experience.

Both the interview and oral examination were carried out in the prison dental surgery by the researcher (EH) with examination data recorded by a senior dental nurse.

**Data analysis**

Data analysis took place using standard statistical tools (STAT 8, STATA Co, TX, USA). All statistical analyses were performed using non-parametric tests. The Mann-Whitney-U test (p> 0.05) was used to establish if differences between variables and groups were statistically significant.

To assess intra-examiner reliability, one participant in ten was re–examined at least one week after, and within one month, of the original examination. The results were compared with the original examination data set for the same subjects and analysed to provide a Kappa score to indicate intra-examiner reliability. All data collection was anonymous and strictly confidential.

**Results**

**Intra-examiner reliability**

The Kappa score for this study was 0.71, indicating good intra-examiner reliability.

**Demography**

One hundred and twenty two prisoners took part. All of them completed the structured interview and all but one remand prisoner underwent the oral examination.

**Age**

The mean age of the sample was 36.4 years (SD ±9.7). The mean ages of the remand and convicted prisoners were 35.7 (SD ±9.6) and 37.8 (SD ±9.9) years, respectively.

**Prison status**

Of the study population, 64% (n = 78) were remand prisoners and 36% (n = 44) convicted prisoners. The accumulated mean time in prison was 6.4 years (SD ±7.7). This ranged from a minimum of two months to a maximum of 30 years, with a median of 3.3 years (IQR 1-10). The median length of stay at the time of the study was 6 years (IQR 2-10) and 7.5 years (IQR 1-14) for remand and convicted prisoners respectively.

**Ethnicity**

Forty three percent of the prison population described themselves as white, and 37% as black. The remainder comprised people of South Asian, Chinese and mixed race origin.
Employment
Sixty two percent (n = 76) of subjects were unemployed prior to arrest and less than half of them (43%) received state benefits for either temporary or long-term sickness or disability. This was higher in the remand prisoners (58%) than convicted prisoners (12%). Although, there were high proportions of unemployed people in the study, the majority of them (53%) stated a ‘usual’ occupation, particularly amongst the convicted prisoners (84%). The most common previous employments were builder, painter, decorator, or in catering.

Education
Sixty percent (n =73) of respondents claimed to have educational, professional, vocational or other work-related qualifications. Convicted prisoners received more education than remand prisoners (77% and 50%, respectively). Fifty eight percent (n = 42) of these qualifications were professional certificates in building, plastering, bricklaying or catering and were mainly obtained whilst in prison. 42% (n = 31) of the prisoners had GCSEs, A levels and/or NVQs.

General health
The majority (84%) were registered with a general medical practitioner (GMP) and relatively few (16%) reported difficulties registering with a GMP. Forty percent (n = 49) of the participants had previously received treatment from a hospital specialist. Seventy eight per cent of participants perceived their general health as being good or OK, with little difference between remand and convicted prisoners.

The medical reasons given by prisoners for assessing their health as poor are set out in Table 1.

Health-related behaviour
Alcohol
The majority of people (83%) consumed alcohol prior to imprisonment (85% remand and 80% convicted prisoners). Fifty percent of people (n = 51) who drank consumed more than the maximum male recommended 28 units per week and 75% drank heavily (>50 units per week). The mean number of years of alcohol consumption was 12 (SD ±6.8) with a median of 10 years (IQR 4-10). Almost a third of prisoners drank large quantities of alcohol that could be termed ‘hazardous’ (38% (n=25) remand and 37% (n=13) convicted prisoners).

Tobacco smoking
Eighty percent (n = 98) of the study population reported smoking tobacco regularly. Of the remainder, 14% (n = 17) were non-smokers and 6% (n = 7) past smokers. A higher proportion of convicted than remand prisoners smoked (84% and 78%, respectively). Of these, 71% (n = 88) smoked 10 cigarettes or more a day.

Recreational drugs
Illicit drug use was admitted to by 84% (n = 103). Cannabis was smoked by 51% (n = 62), and the main recreational drug of choice was cocaine, 69% (n = 84). Other drugs used included heroin 36% (n = 44), methadone 12% (n = 14) and crack cocaine 11% (n = 13). The proportions of remand (83%) and convicted prisoners (86%) using illicit drugs were similar.

<table>
<thead>
<tr>
<th>Condition</th>
<th>% (number) of total prison population (n=122)</th>
<th>% (number) of total remand prisoners (n=78)</th>
<th>% (number) of total convicted prisoners (n=44)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes</td>
<td>4 (5)</td>
<td>6 (5)</td>
<td>0</td>
</tr>
<tr>
<td>Cardiac problems</td>
<td>5 (6)</td>
<td>4 (3)</td>
<td>7 (3)</td>
</tr>
<tr>
<td>Infectious conditions of which:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TB</td>
<td>2 (2)</td>
<td>3 (2)</td>
<td>0</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>2 (2)</td>
<td>3 (2)</td>
<td>0</td>
</tr>
<tr>
<td>Hepatitis C</td>
<td>8 (10)</td>
<td>8 (6)</td>
<td>9 (4)</td>
</tr>
<tr>
<td>HIV</td>
<td>2 (2)</td>
<td>1 (1)</td>
<td>2 (1)</td>
</tr>
</tbody>
</table>
**Diet**
The study group had a mean of 9.8 sugar intakes per day (SD ± 8.3; median 8, IQR 5-12) in the form of snack and sugary drinks. A significant proportion of prisoners stated that they sought pleasure (42%) and comfort (6%) from sugar-containing products.

**Oral health attitudes**
The majority of the study group (98%) said that they valued their teeth highly. The main reason was for mastication/function (39%). The importance of teeth both from a social (smiling, talking and working) and aesthetic perspective, was mentioned by some (16% and 15%, respectively).

**Treatment preference**
Asked if they would prefer an aching back tooth restored or extracted, 45% of the sample would opt for restoration and 32% extraction, with the remaining 21% uncertain. When it came to an aching front tooth, the number preferring restoration rose to 70%. Those opting for extraction of a front tooth fell to 11% and those who were uncertain, to 19%. There was a trend for the 19- to 34- years-old group to be more likely than the 35 years and over age group, to prefer restoration rather than extraction. However, this was not statistically significant (p < 0.05). Additionally, there was a tendency for remand prisoners to be more likely than convicted prisoners to opt for restoration of an anterior tooth (68% and 12%, respectively). However, the numbers concerned were too small for statistical significance. The prison population treatment preferences are detailed in Table 2.

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**Table 2. Dental treatment preferences**

<table>
<thead>
<tr>
<th>Treatment preference</th>
<th>Whole prison population</th>
<th>Remand prisoners</th>
<th>Convicted prisoners</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>% (n) preferring this option for an aching back tooth</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extraction</td>
<td>33 (39)</td>
<td>29 (22)</td>
<td>41 (17)</td>
</tr>
<tr>
<td>Filling</td>
<td>46 (54)</td>
<td>47 (35)</td>
<td>41 (17)</td>
</tr>
<tr>
<td>Uncertain</td>
<td>21 (25)</td>
<td>24 (18)</td>
<td>17 (7)</td>
</tr>
</tbody>
</table>

| **% (n) preferring this option for an aching front tooth** | | | |
| Extraction           | 11 (17)                 | 15 (12)          | 74 (31)             |
| Filling              | 70 (86)                 | 68 (53)          | 12 (5)              |
| Uncertain            | 19 (19)                 | 17 (13)          | 14 (6)              |
Oral health-related behaviours

Twenty-four percent of prisoners (n = 29) reported never having visited the dentist. Whilst this was higher in the younger age group of 19- to 34-year-olds than in the 35 years and over group (29% and 19%, respectively), the numbers were too small to indicate any significant difference. However, the majority of prisoners (69%), claimed to have visited the dentist during the last year. Remand prisoners were more likely than convicted prisoners to have done so (72% and 64%, respectively). This was a significant finding with p <0.05 using the Mann-Whitney-U test.

Seventy percent (n = 90) of the prison population reported brushing their teeth twice daily even though the opinion of the prison standard issue toothbrush and toothpaste was poor.

Types of dental services used

Participants’ most recent dental visits were predominantly to the prison dental service (61%). NHS dental services (29%), private dental care (4%), hospital clinics (4%) and overseas services (2%) had also been used. The sample were generally happy with the services they had received with 57% considering both past and current services to be very good and 16% good. However, they were generally critical of the difficulties accessing services and the long waiting time.

Fifty-two percent of prisoners (n = 44) used dental services solely for pain, swelling, infection or trauma. This trend was more common in remand prisoners. The majority (87%) accepted treatment under local anaesthesia. Table 3 shows the most recent dental visit.

Anxiety

Overall, 47% of the study population reported a degree of dental anxiety as the prime reason for not visiting the dentist. If specific anxieties related to injections (7%) and drills (5%) are added to general anxiety, 86 people (59%) avoided dental treatment because of anxiety. A further 30% (n= 36) gave factors, such as apathy, laziness or lack of time for not using dental services. Figure 1 illustrates the perceived degree of dental anxiety for the whole, remand and convicted study populations and for the two age cohorts. There is little difference between the groups other than the tendency for the older cohort to be less anxious.

Table 3. Reasons for most recent dental visit

<table>
<thead>
<tr>
<th>Type of dental treatment</th>
<th>% (number) of total prison population (84)</th>
<th>% (number) of total remand prisoners (56)</th>
<th>% (number) of total convicted prisoners (28)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency</td>
<td>52 (44)</td>
<td>68 (38)</td>
<td>21 (6)</td>
</tr>
<tr>
<td>Routine Care</td>
<td>35 (29)</td>
<td>16 (9)</td>
<td>71 (20)</td>
</tr>
</tbody>
</table>

Figure 1: Perceived dental anxiety
Seventy one percent of prisoners (n = 86) perceived their oral health as poor and felt that they were in need of treatment, while 18% (n = 22) felt that they had a healthy mouth and 11% (n = 14) were uncertain of their oral health status. Table 4 shows the level of perceived need.

**Normative need - mucosal health**

Sixteen percent (n = 20) of the sample presented with the mucosal signs of diffuse swelling or presence of a sinus related to chronic apical periodontitis. Twelve percent (n= 15) demonstrated other types of oral pathology and five lesions on hard palates were diagnosed as smoker’s keratosis. Three people presented with white lesions for which a clinical diagnosis of leukoplakia was made. Two of these lesions were on buccal mucosa and one on the lateral border of the tongue. All three prisoners were referred to the King’s College Hospital, Department of Oral Medicine.

Herpes labialis lesions were observed in three of the remand prisoners. A diagnosis of denture-induced stomatitis was made in three cases. Additionally, one dentate participant with ‘persistent’ angular chelitis was referred to the prison general medical practitioner for a saliva swab and a full blood count to identify the causative organism and any additional underlying cause.

Dry mouth was reported by 32% (n= 39) of the sample and the researcher judged 10% (n = 13) of the population to have xerostomia.

**Table 4. Prisoner perceived oral health needs**

<table>
<thead>
<tr>
<th>Perceived needs</th>
<th>Whole prison population %</th>
<th>Remand prisoners %</th>
<th>Convicted prisoners %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Total=122)</td>
<td>(Total=77)</td>
<td>(Total=44)</td>
</tr>
<tr>
<td>*Poor oral health</td>
<td>71 (86)</td>
<td>71 (55)</td>
<td>70 (31)</td>
</tr>
<tr>
<td>Healthy oral condition</td>
<td>18 (22)</td>
<td>19 (15)</td>
<td>16 (7)</td>
</tr>
<tr>
<td>Uncertain</td>
<td>11 (13)</td>
<td>9 (7)</td>
<td>14 (6)</td>
</tr>
</tbody>
</table>

*63 (54%) of prisoners who perceived themselves to have poor oral health did so because they had toothache or a broken tooth

**Note that the percentage may not add up to, or may exceed, 100 as figures have been rounded up or down

**Oral health**

**Perceived need**

Seventy one percent of prisoners (n = 86) perceived their oral health as poor and felt that they were in need of treatment, while 18% (n = 22) felt that they had a healthy mouth and 11% (n = 14) were uncertain of their oral health status. Table 4 shows the level of perceived need.

**Normative need - periodontal status**

Despite reporting good oral hygiene procedures, plaque and periodontal disease levels were high. The mean number of recording sites that showed visible plaque was 43 (± 27) and the mean number that bled on probing was 3.4 (± 1.2). Eighty two percent of sites demonstrated pocketing between 4 and 6mms. Table 5 details the mean pocket depth for the different sub-groups of prisoners. Whilst there were no statistically significant findings between the population sub-groups, the greatest pocket depth scores were in the older prisoner cohort.

**Dental status**

Overall, treatment need was high with a mean DMFT of 13.8 (± 7.3). The mean DMFT was 14.2 and 13.2 for remand and convicted prisoners, respectively, with remand prisoners having higher numbers of missing and lower numbers of filled teeth. Table 6 details the D, M, and F components for the remand, convicted and total prison populations.
### Table 5. Periodontal status

<table>
<thead>
<tr>
<th></th>
<th>Whole prison population</th>
<th>Remand prisoners</th>
<th>Convicted prisoners</th>
<th>Age 19 to 34</th>
<th>Age 35 +</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean Probing depth, mm (± SD)</strong></td>
<td>3.4 (± 1.2)</td>
<td>3.4 (± 1.3)</td>
<td>3.3 (± 1.0)</td>
<td>3.1 (± 1.3)</td>
<td>3.6 (± 1.1)</td>
</tr>
<tr>
<td><strong>Mean No of sites with pocket depths 4 mm +</strong></td>
<td>44.7 (± 34.8)</td>
<td>47.4 (± 36.3)</td>
<td>38.78 (± 31.2)</td>
<td>42.1 (± 35.8)</td>
<td>46.8 (± 34.2)</td>
</tr>
<tr>
<td><strong>Mean No of sites with pocket depths 6 mm +</strong></td>
<td>6.1 (± 15.3)</td>
<td>7.5 (± 18.0)</td>
<td>3.3 (± 7.7)</td>
<td>4.4 (± 14.2)</td>
<td>7.4 (± 16.0)</td>
</tr>
</tbody>
</table>

### Table 6. DMFT status

<table>
<thead>
<tr>
<th>Dental status</th>
<th>Whole prison population</th>
<th>Remand prisoners</th>
<th>Convicted prisoners</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Mean (±SD)</strong></td>
<td><strong>Median (IQR)</strong></td>
<td><strong>Mean (±SD)</strong></td>
</tr>
<tr>
<td>Sound</td>
<td>14.2 (7.3)</td>
<td>15 (9-20)</td>
<td>13.8 (7.5)</td>
</tr>
<tr>
<td></td>
<td>17.8 if 3rd molar included</td>
<td></td>
<td>18.8 if 3rd molar included</td>
</tr>
<tr>
<td>Decayed</td>
<td>3.6 (2.7)</td>
<td>3 (2-5)</td>
<td>3.5 (2.7)</td>
</tr>
<tr>
<td>Missing</td>
<td>5.7 (7.0)</td>
<td>2 (1-8)</td>
<td>6.2 (7.6)</td>
</tr>
<tr>
<td>Filled</td>
<td>4.6 (4.1)</td>
<td>3 (1-7)</td>
<td>4.5 (7.5)</td>
</tr>
<tr>
<td>DMFT</td>
<td>13.8 (7.3)</td>
<td>13 (8-19)</td>
<td>14.2 (7.5)</td>
</tr>
</tbody>
</table>
Discussion

Bias
The sampling method, the structured interview, and the fact that the researcher was the prison dentist, are all factors that could have introduced bias to the study. The use of a ‘convenience’ sample of the prison population introduced a bias by including only those prisoners who showed an interest in the study in order to gain access to dental treatment. However, this was the only way it was possible to recruit to the study.

As a result, caution must be taken in extrapolating the results of this study to the prison population as a whole. Despite this, the current results were comparable with other studies of prisoners (Jones et al., 2005; Lunn et al., 2003). Williams et al. (2001) reported higher perceived needs amongst their prison population than were reported in the current study.

Use of a structured interview was considered more appropriate than that of a questionnaire because of the potential for high rates of illiteracy and dyslexia amongst prisoners. Whilst the majority of prisoners said they found this method helpful there was a possibility that disclosure of sensitive information (such as dependency on recreational drugs) would be withheld. However, this was not perceived to be the case, since the author’s personal experience as a prison dentist is that prisoners tend to boast about drug use. The researcher has formed the view over a number of years of providing prison dentistry that prisoners are very open with information that they think might shock the recipient.

The researcher as the main health care provider, provided potential for interviewees to give the responses they believed she wished to hear. However, check questions indicated the true feelings and intent of prisoners. For example, whilst the majority of prisoners stated that they valued their teeth, a large number preferred extraction to restoration of an aching back tooth. This was in line with Kelly, et al.’s (2000) findings amongst adults from lower social classes. The explanation is more likely to be linked to a complex value system (known as health short-termism) and dental anxiety than a need to please the interviewer (Locker, 1989).

General health
Despite over half of the prisoners in this study stating they had experienced depression or mental illness, their self-reported health status was generally good or fairly good (78%). Meltzer et al. (1999) have previously reported prisoners’ general health as compromised related to the non-prison population and poorer than that of males from the most deprived areas of England and Wales. This was especially the case for mental health (Department of Health, 1999).

There was a high prevalence of Hepatitis B (2%) and Hepatitis C (8%) virus infections in the HMP Brixton study population. This may be linked to the higher than average rate of intravenous drug use, in the pre-prison population (Department of Health, 2002) and in the London Borough of Lambeth from where 45% of the HMP Brixton population originate (Scott and Brown, 2004).

Health related behaviour
The scope of this study does not allow for detailed analysis of the possible interactions between health related behaviours and oral health. However, hazardous drinking, high levels of drug use and high levels of mental illness were all reported and are factors likely to impact on oral health. Hazardous drinking in the current study population is four times higher than national rates and three times greater than men from London’s deprived areas (Lambeth PCT Public annual report, 2003). The high use of alcohol (83%) and tobacco (80%) amongst the study population, at a relatively early age, make this group vulnerable to oral cancer.

Robinson et al. (2005) reported that risk factors such as tobacco smoking, and alcohol and recreational drug use in combination with disorganised lifestyles contribute to compromised general health. Whilst Freudenberg et al. (2005) suggested that prisoners’ characteristics of low education and poor economic status result in lifestyle choices, including poor diet, that have a negative impact on health. In the current study, despite the availability of healthy dietary choices in HMP Brixton, the majority of prisoners opted for the unhealthy and sugar rich options. Whilst most of the group acknowledged the tooth damaging effect of frequent and high levels of sugar intake, the average number of sugar episodes taken per day, between meals, was ten, indicating that information did not necessarily influence behaviour.

A high proportion of prisoners in the study (84%) reported illicit drug dependency. According to Sheridan et al. (2001) and Robinson et al. (2005) chronic drug use can contribute to both general and oral neglect through factors such as appetite suppression, altered taste perception, sugar cravings, and a tendency to snack rather than having meals.

Overall, the trend in remand prisoners in this study was for them to have poorer general health in comparison to the convicted prisoners, although the former practised the same unhealthy behaviours as the convicted prisoners.

Oral health
Both remand and convicted prisoners in this study expressed high perceived needs for dental treatment in accordance with their high normative need. Their perceived need was greater than that of the general population and was consistent with the findings of the only other UK prison study to explore perceived needs (Williams et al., 2001).
Many factors contribute to poor oral health. The demographic features of the prison population in this, and other, studies are all associated with poor general health, i.e. young, male, low education, unemployed, and from the lower social classes (Acheson, 1998; Locker, 1989). It is generally recognised that people from lower social classes have a low use of preventive dental services (Gibson et al., 2005; Nutall et al., 2001; Sheridan et al., 2001). Additionally, a high proportion of the study population reported dependency on illicit drugs, and this may impact on oral health as a result of the high levels of dental anxiety, low dental attendance, and avoidance of dental treatment reported amongst drug users (Robinson et al., 2003). Although the cited studies were not conducted with prisoners, the high levels of dependency on illicit drug use and the high levels of dental anxiety reported by the study population are potential contributing factors to the irregular dental attendance patterns and poor oral health of the study prison population.

Despite the fact that the majority of participants (70%) reported brushing their teeth more frequently than both the general male population and the male lower social classes IV and V group (Kelly et al., 2000), they presented with higher plaque and poorer gingival conditions. The high prevalence of periodontal disease contradicted the reported oral hygiene practices by the prisoners and leads to the assumption the prisoners may have been reporting what they felt the researcher wanted to hear.

Participants in the current study and other UK prison studies (Jones et al., 2005; Lunn et al., 2003) have greater levels of untreated decay, more missing teeth, and fewer filled teeth than in the general population. USA prison studies (Mixon et al., 1990; Salive et al., 1989) report higher numbers of missing teeth, reflecting previous dental trauma and use of emergency, rather than routine, dental services. According to Jones et al. (2005), DMFT varies with time spent in prison and, generally, longer-stay convicted prisoners have better oral health than the shorter-stay remand prisoners. This has been explained by convicted prisoners’ regular use of prison dental services (Jones et al., 2005; Lunn et al., 2003). This pattern was not mirrored in the HMP Brixton population and could be due to the small numbers in each prison sub-group and the lower proportion of convicted prisoners in HMP Brixton. Sample sizes in other prison studies have also been relatively small, ranging from 96 to 191 (Cunningham et al., 1985; Jones et al., 2004; Lunn et al., 2003; Mixon et al., 1990; Salive et al., 1989). A multi-centre study could provide a sufficiently large sample size to afford robust data analysis to support statistical findings.

**Dental service use**

Whereas Cunningham et al. (2005) found that convicted prisoners were more likely than remand prisoners to use dental services, this study found the converse. This was particularly so for emergency dental services. Longer-term convicted prisoners have the opportunity to adapt to, and take fuller advantage of, healthy lifestyles available in prisons such as detoxification programmes, smoking cessation, healthy food options, routine dental and health care and more organised life styles. This is not the case for people with shorter custodial sentences, which is the predominant situation in HMP Brixton. A higher proportion of remand prisoners than convicted prisoners, in this study reported visiting emergency dental services, 68% and 21%, respectively. Whereas NHS, private and hospital dental services had all been used to a limited degree, over half of the remand prisoners last dental visit was during their previous prison conviction.

The main barriers to the receipt of general dental services are well recognised as cost, anxiety and access (Fiske et al., 1990). In a prison setting, the barriers to dental care are long waiting lists, part-time services, and large volumes of emergency treatment need taking priority over preventive and routine dental services. Lunn et al. (2003) felt that prisoners encounter fewer barriers in accessing dental care than they did prior to imprisonment. Although prisoners in the current study found waiting times long and considered access to the prison dental service difficult, the majority (73%) thought the service was of high quality.

For remand prisoners the completion of long-term dental treatment is difficult as they are either transferred or released, before this is possible. However, treatment is in line with the Department of Health’s recommendation (2003) for prison dental services of simple treatment for pain relief in the form of extractions and simple conservative treatments, and provision of oral health information. Jones et al. (2004) suggest that some of the barriers could be overcome by integrating oral screening into the health assessment of all new prisoners, to identify those most in need of dental treatment. As long ago as 1989, Salive et al. recommended longitudinal assessment of prisoners’ oral health, from intake into the prison system, to enable an assessment of the effectiveness of dental treatment and preventive services provided to the prison population. This is only feasible for convicted long-term prisoners and is unlikely to provide useful information for remand prisoners.

**Conclusion**

The oral health of the prison population in the current study was compromised compared with the equivalent social classes in the general population. The prison population had a higher prevalence of decay and lower levels of both missing and filled teeth than do the general population, indicating less treatment experience.
Acknowledgements
The authors express their gratitude to the participants, Dr. Ron Wilson for his statistical advice, and the staff of the HMP Brixton Prison, in particular Mr Andy Ransome (the Head of Health Care). Dr. E Heidari would also like to express her appreciation to Dr. Liana Zoiopoulos (Head of Departmet of Community Special Care Dentistry at Kings College London Dental Institute) and her staff for the support that allowed this study to be undertaken whilst she was working for the department as a senior dental officer.

References
Duckworth S. At the Health Council meeting ‘Innovation in Education on Disability’. Royal College of Physicians. 03.10.2005

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