



The Impact of London 2012 Olympic and Paralympic Games on Alcohol-Related Illness and Injury

Final Report: July 2013

1. Executive summary

1.1. Introduction

It was anticipated that hosting the 2012 Olympic and Paralympic Games would bring London great benefits, including the potential for health improvement if the Games could be used to motivate and inspire the local (and national) population to adopt healthier behaviours. However, alcohol-related attendances at Emergency Departments (EDs) can increase during national celebrations and holidays and also during major sporting events. To mitigate the potential harms, the NHS London 2012 Programme aimed to implement interventions to reduce alcohol-related harm and minimise the impact on the health system. These programmes, combined with a Games context where advertising for alcohol and other products was at a minimum and pricing was elevated above normal levels, provided a unique opportunity to minimise alcohol-related harm. This evaluation aims to assess any change in alcohol-related illness and injury in London during the 2012 Games, as well as to explore any factors and interventions that could mitigate alcohol-related illness and injury. The outcomes will inform future major event planning in London, the UK and elsewhere. The evaluation was commissioned by NHS London but since NHS London was abolished on 3 March 2013, Public Health England took on the responsibility for this work from 1 April 2013.

1.2. Methodology

This evaluation used a range of different approaches in order to maximise understanding around the health outcomes (both alcohol-related and more generally) of the London 2012 Olympic and Paralympic Games. The main parts of the evaluation include: a literature review to identify and understand the published research already in existence around such health outcomes; stakeholder interviews with health services and local authorities to understand organisational experiences of the Games; data analyses of hospital episodes, ambulance callouts and ED presentations to determine if any changes in health service use have occurred; and analyses of recorded crime data to understand the impact on crime.

1.3. Headline findings

1.3.1. Literature review

A systematic review of 54 studies from 1987 to 2008 found no conclusive evidence that major sporting events (including the Olympic Games) affected health or socioeconomics. However, 85% of studies were of poor methodological quality, largely due to their lack of a control group. Evidence collated here shows a mixed impact of sporting events such as the Olympic Games. For example:

- One analysis investigated the impact of sporting events (including the 2008 Beijing Olympics) on night-time (6.01pm to 6.00am) ED assault presentations in England. Here, the 2008 Olympics were associated with a small decrease in night-time assault presentations ($P < 0.05$).
- For the 2010 Vancouver Winter Olympic Games, the mean daily number of ED presentations rose from 278 in the previous seven days to 423 during the Games. The number of assaults rose from 45 presentations in the week preceding the Games to 70 in both weeks one and two of the Games. No analysis was performed to identify whether these changes were statistically significant.
- In relation to the 2010 Vancouver Winter Olympic ice hockey final, ED presentations in Ontario on the Sunday of the final were compared with ED presentations on the six preceding and the six following Sundays. During the final, the mean hourly rate of presentations was significantly lower than during the control periods (647 compared with 783; $P < 0.001$). No significant difference was identified in the hours surrounding the game.

However, the literature identified is not directly comparable with the London 2012 Games, as it does not reflect the impact of the Games on health service use in London. For example, to date Olympics-related data are from studies based on health service use from different countries, limiting their applicability for the London Games. Further, whilst some studies had examined health service use in England, they investigated the impact of sporting events that had occurred abroad. Other limitations of the literature were also apparent. Typically, monitoring of the involvement of alcohol and/or other substances has involved extracting data from hospital records based on substance-specific diagnoses (such as alcohol dependence syndrome or drug psychoses) and ICD codes but both alcohol and drugs have a much wider impact than these data indicate, for example, assault, suicide, and motor vehicle accidents. Some of the literature focuses just on the Olympic Games and does not consider the Paralympic Games; it is not known to what extent these studies would reflect the experience of an Olympic and Paralympic Games being held in England.

1.3.2. Stakeholder interviews

Semi-structured telephone interviews were conducted with representatives from public services that were directly affected by the Games (including the Metropolitan Police, NHS London, Trading Standards, local hospitals and the Ambulance Service). Eleven interviews were carried out pre-Games and 15 were performed post-Games (eight were interviewed both before and after). Key findings include:

- Stakeholder interviews showed the high level of planning and preparation that occurred in the build-up to the Games. As part of these preparations, stakeholders worked in partnership with a wide range of different agencies.
- Typically, based on previous experiences, stakeholders involved in the pre-Olympic interviews had expected an increase in demand for health services. To meet this demand, organisations established a range of services and interventions including the Olympic Polyclinic (for the Olympic and Paralympic familyⁱ), London Organising Committee of the Olympic and Paralympic Games (LOCOG) first aiders providing medical services for spectators in Olympic and Paralympic venues and the Alternative Response Vehicle to divert intoxicated people and those with more minor ailments from EDs. In reality, only two stakeholders reported an increase in service use, one of whom noted:

“The apocalyptic vision of mass public drunkenness, it just didn't happen really.” (Senior Manager, Local Authority, Post-Games)

- Participants were asked whether they thought a Games legacy would result from their Games time planning and preparations. Five themes emerged: partnership working; improving local health and wellbeing and promoting healthy lifestyles (through the new sports facilities); improving existing information systems (for example, the newly developed London Events Co-ordinating Calendar provides stakeholders with an overview of London events); strengthening staff skills (in relation to working across different information management systems and knowledge gained in planning for and service delivery during major events); and contributing to the weak evidence base surrounding health service planning for mass gatherings, especially in relation to public health and health promotion.

1.3.3. Health service use

Data from Hospital Episode Statistics (HES), the London Ambulance Service, six EDs in London and nine outside London were analysed for inclusion in this report (data relating to ED assault presentations in London are from four of the six EDs). Days were matched to equivalent days in previous years by day of the week.

Key findings for emergency hospital admissions for acute alcohol specific conditions in London:

ⁱ The Olympic family refers to the groups such as the athletes, officials and media involved in delivering the Games.

- In the 2012 London Olympic period, there were a total of 1,271 emergency hospital admissions for acute alcohol specific conditions in London and 2,430 emergency admissions for alcohol-related external causes in London (daily means: 74.8 and 142.9 admissions respectively). During the Paralympics, 923 emergency hospital admissions were made for acute alcohol specific conditions in London and 1,753 emergency hospital admissions for alcohol-related external causes in London (daily mean: 76.9 and 146.1 admissions respectively).
- The busiest day for emergency hospital admissions for acute alcohol specific conditions in London during the Games was Saturday 1st September 2012 (day four of the Paralympics; n=102) and Saturday 8th September 2012 for alcohol-related external causes (day 11 of the Paralympics; n=182).
- After correcting for confounding factorsⁱⁱ, the Paralympics were associated with a significant increase in emergency hospital admissions for acute alcohol specific conditions in London (by 12.1%). No such relationship was identified for emergency hospital admissions for acute alcohol specific conditions during the Olympics or for alcohol-related external causes in London during either the Olympics or Paralympics.

Key findings from the ambulance analysis showed:

- In the 2012 London Olympic period, 50,812 ambulance callouts were recorded by the London Ambulance Service. This equated to a mean of 2,989 ambulance callouts per day. During the Paralympics, 35,238 ambulance callouts were recorded, equating to a mean of 2,937 ambulance callouts per day. Across both 2012 Games periods, the busiest day for ambulance callouts was the first day of the Olympics (Friday 27th July 2012; n=3,529).
- In the 2012 London Olympic period, 1,947 ambulance callouts for assaults were recorded by the London Ambulance Service (4% of callouts overall). This equated to a mean of 115 ambulance callouts for assault per day. During the Paralympic period, 1,283 ambulance callouts for assault were recorded, equating to a mean of 107 callouts per day. Across both 2012 Games periods, the busiest day for ambulance callouts for assaults was Friday 10th August 2012 (day 15 of the Olympics; n=184).
- After accounting for confounding factorsⁱⁱⁱ, there was no significant difference in the mean daily number of ambulance callouts in London compared with the same days in previous years. However, the occurrence of other Games events (the London torch relay events and the Greatest Team Parade) was associated with a 4.6% increase in the mean daily number of callouts compared with the same days in the previous years. After accounting for confounding factors, both the Olympics and Paralympics showed a significant increase in the mean daily number of ambulance callouts for assaults compared with the same days in previous years (Olympics by 12%; Paralympics by 11%).

Key findings from the ED analysis showed:

- In the 2012 London Olympic period, 27,729 ED presentations were recorded by the six London EDs included in the analysis. This equated to a mean of 1,860 ED presentations per day. During the Paralympics, 22,393 ED presentations were recorded, equating to a mean of 1,866 per day. Across both 2012 Games periods, the busiest day for ED presentations was Monday 30th July 2012 (day four of the Olympics; n=2,132).
- In the 2012 London Olympic period, 178 ED presentations for assaults were recorded by the four London EDs who provided data on assaults (0.7% of the total 24,381 ED presentations to the four EDs in that period). This equated to a mean of 10.5 ED presentations for assault per day. During the

ⁱⁱ These included: day of the week, year, bank holiday, other events (music, other sport, carnival, other Games), mean air temperature, London riots and number of team GB gold medals

ⁱⁱⁱ These included: day of the week, year, bank holiday, other events (music, other sport, carnival, other Olympic), mean air temperature, London riots and number of team GB gold, for both the Olympics and the Paralympics.

Paralympics, there were a total of 124 presentations for assaults recorded (0.7% of the total 17,457 ED presentations to the four EDs in that period), equating to a mean of 10.3 per day. Across both 2012 Games periods, the busiest days for ED presentations were Friday 3rd and Friday 10th August 2012 (days eight and 15 of the Olympics respectively; both: n=19).

- After accounting for confounding factors, the Olympics were associated with a 5.2% decrease in the mean daily number of ED presentations in London. There was no significant association for the Paralympics. This was similar to the EDs outside London, where the Olympics were associated with a 4.8% decrease in the mean number of ED presentations and the Paralympics were associated with a 5.9% decrease. For assault-related ED presentations (both in and outside London), there was no significant association between the Olympics and/or Paralympics and mean daily number of assault presentations.

1.3.4. Other data

Evidence was collated from reports and online articles to investigate the potential impact of the Olympics on crime, and consumption. Key findings showed:

- There was a 5% decrease in notifiable offences^{iv} in the Olympic Tasking Period^v between 2010 and 2012. Whilst data are available for the Olympic Park specifically, it is difficult to assess change over time because whilst the 2012 data were based on the finished Olympic venue, data prior to that are based on the building site and the location. Of the London-based Olympic venues, the Olympic Park had the highest number of offences in 2012 (n=1,342). For specific areas in London, experience of crime was more variable: North Greenwich Arena and Hyde Park experienced an increase in notifiable offences from 2010 to 2012, whilst for others such as Earls Court and Lord's Cricket Ground, the level of crime remained relatively stable.
- Alcohol sales data from pubs, pub chains and the Association of Licensed Multiple Retailers depict a mixed impact of the Games, depending on timing during the Olympic period, day of the week, occurrence of an event nearby, and location of the pub. However, the sales data are based on individual pubs or groups of pubs, with each source using different parameters with which to discuss the potential impact of the Olympics.

1.4. Conclusions

Overall, as this evaluation has shown, the London 2012 Olympic and Paralympic Games had a minimal impact on alcohol-related harm. Whilst it is unclear precisely which interventions contributed to the success of the Games in preventing increases in alcohol-related harm, published literature suggests that restricted advertising, appropriate service planning, and pricing strategies that were in place for the Games would have played an important role in harm prevention. The Games have provided a legacy by demonstrating that successful delivery of an international sporting event can take place without an overarching impact on healthcare service demand above and beyond any ongoing trends. In order to deliver the Games, organisations have worked in partnership to share information and strategies, and to deliver co-ordinated services. The lessons identified will go on to inform future multi-agency practice both in future day-to-day business and in future event planning. Such lessons should include the opportunities that the Games presented through the direct and indirect interventions provided in terms of the advertising restrictions, prohibition of taking own alcohol into events, appropriate pricing strategies and the use of interventions to divert intoxicated people away from EDs where appropriate.

^{iv} Notifiable offences are defined as follows: burglary, criminal damage, drugs, fraud and forgery, other notifiable offences (undefined), robbery, sexual offences, theft and handling, and violence against the person.

^v The Olympic Tasking Period refers to the reporting period Friday 6th July 2012 to Sunday 16th September 2012. This has been matched to equivalent periods in 2011 (Friday 8th July 2011 to 18th September 2011) and 2010 (Friday 9th July 2010 to Sunday 19th September 2010).

1.4.1. Recommendations

- For any future events, to aim for planning and preparation, as well as delivery to occur in partnership with other relevant agencies, as occurred for the London 2012 Olympic and Paralympic Games.
- For any future events of this nature, to incorporate interventions which can reduce alcohol-related harm (such as appropriate pricing strategies, prohibition of taking own alcohol into events, and advertising bans) and divert people from main service providers which are expected to experience extremely high levels of demand (as the Alternative Response Vehicle [ARV] and Soho Alcohol Recovery Centre aimed to do here in relation to reducing ED presentations).
- For any future similar evaluations, to access data from other service providers already established as well as those established specifically for the Olympics (such as the Olympic Polyclinics, ARV, and Soho Alcohol Recovery Centre).
- To improve the quality of ED presentation data in relation to assaults.
- To identify ways of accessing and using alcohol consumption data (through sales and taxation) to monitor the impact of events such as these and alcohol interventions.

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2. Introduction

The London 2012 Olympic and Paralympic Games officially opened on the 27th July and ran until the 9th September 2012, with numerous associated cultural events surrounding this period (the 2012 Festival events^{vi} ran from 21st June to 9th September). Eleven million tickets were available for the Olympic and Paralympic Games,^[1] which had the potential to increase the population of London by approximately 500,000 people per day.^[2] The Olympics was held across 34 venues (20 for the Paralympics), with 22 Live Sites^[1] showing events on large television screens across Great Britain. There were also three 'Olympic Festival' sites: Hyde Park (capacity: 50,000), Victoria Park (capacity: 40,000) and Potters Bar (capacity: 4,500).^[2, 3] For the Paralympics, a live site was located at Trafalgar Square (capacity: 10,000). It was anticipated that hosting the 2012 Olympic and Paralympic Games (here, referred to as 'the Games') would bring London great benefits, including the potential for health improvement if the Games could be used to motivate and inspire the local and national population to adopt healthier behaviours.^[4] To sustain this, £135 million is being invested in sports facilities, clubs and supporting programmes, in a National Lottery funded scheme called Places, People, Play^{vii}.^[1]

Alcohol-related attendances at Emergency Departments (EDs) can increase during national celebrations and holidays (for example, New Year's Eve, Bank Holidays) and also during major sporting events.^[5] During the Games, the opportunities to purchase alcohol were increased: for example, extended trading hours on Sundays for large shops and supermarkets during the Olympics and Paralympics period provided an opportunity for extending licensing hours (although shops were required to apply to their licensing authority for changes to their licensing hours).^[6] Extended licensing hours have been associated with a rise in alcohol consumption; in Perth, Western Australia, when trading hours were extended by one hour to 1am, violence increased by 70% in premises with extended licences.^[7] The UK population is particularly at risk of alcohol-related harm because of its already high levels of alcohol consumption and associated adverse consequences.^[8] For instance, between 1970 and 2007 the rate of liver disease in the UK saw a five-fold increase, compared to a three-fold decrease in countries such as France and Italy during the same period. Hosting the Olympics can bring additional pressure on health services, including the impact of any increases in alcohol consumption. To mitigate the potential harms, the NHS London 2012 Programme^{viii} aimed to implement interventions to reduce alcohol-related harm and minimise the impact on the health system.

Evidence on the impact of previous Games and associated cultural events on alcohol-related harm is limited. This evaluation, commissioned by NHS London, aims to fill this gap in the evidence base by assessing any change in alcohol-related illness and injury in London during the 2012 Games as well as by exploring any factors and interventions that could mitigate alcohol-related illness and injury. The outcomes will be available to inform future major event planning in London, the UK and elsewhere. Since NHS London was abolished on 3 March 2013, Public Health England took on the responsibility for this work from 1 April 2013.

^{vi} The festival programme offered the UK population the opportunity to participate in events celebrating the Games. See: www.london2012.com/join-in/festival

^{vii} Launched in 2010, Places, People, Play is a lottery funded scheme delivered by Sport England that runs over five years. For further information see: www.sportengland.org/about_us/places_people_play.aspx

^{viii} The NHS London 2012 Programme focused on how the NHS would manage the health-related impacts of the Games. The programme was split over several strands, one of which was Public Health. A key objective was for generating a legacy of health improvement.

2.1. Research rationale

To fill a gap in the evidence base by publishing an evaluation of any change in alcohol-related and other public health related illness and injury in London during the London 2012 Games that can be used to inform future major event planning in London, the UK and elsewhere.

2.2. Research objectives

The objectives of this research project are to:

- Use existing quantitative data sources and conduct qualitative fieldwork to analyse the impact of hosting the Games on short term illness and injury related to alcohol;
- Quantitatively measure changes in the level of alcohol consumption among the resident population during the Games using, where possible, existing data sources, and investigate the factors associated with any increase or decrease; and
- Produce recommendations for further research, evaluation and policy development.

2.3. Report structure

This evaluation used a range of different approaches in order to maximise understanding around the health outcomes (both alcohol-related and more generally) of the London 2012 Olympic and Paralympic Games. A literature review was performed to identify and understand the published research already in existence around such health outcomes. Stakeholder interviews were conducted in order to understand their organisational experiences of the Olympics. Data analyses were performed to identify if any changes in health service use had occurred. Police recorded crime data were also interrogated to understand the impact on crime. News and social network analyses provide context for the statistical models generated, enabling the identification of days when large-scale events and parties were occurring. Finally, a brief analysis of secondary data on alcohol consumption has been included to provide available information on changes in consumption. Each section of the report discusses a different element of the evaluation, firstly providing the methodology used for that part of the evaluation and then presenting the findings. The results are then drawn together in the discussion. Ethical approval was gained from Liverpool John Moores University Research Ethics Committee to conduct this evaluation.

The rest of the report is divided into the following sections:

- Section 3: Literature Review
- Section 4: Stakeholder interviews
- Section 5: Health service use for ambulances, emergency departments and hospital admissions
- Section 6: Health service use for other health services
- Section 7: Recorded crime
- Section 8: News and social media
- Section 9: London events
- Section 10: Local authority data: licensing, noise and disturbance
- Section 11: Alcohol consumption
- Section 12: Discussion.

3. Literature review

3.1. Methodology

An in-depth literature review was conducted between June and August 2012. This identified published studies examining the relationship between sporting events and alcohol-related illness and injuries. The review used a systematic search methodology with the following key search terms: event, alcohol, Olympics, World Cup, European Football Championship, injury, illness, violence, and public health. The reference lists of articles identified in the literature review were also checked for suitable papers for inclusion in the review. Finally, NHS London supplied a number of relevant guidance documents that have been incorporated into the literature review and sources known to the researchers supplemented the review where appropriate. A second search was conducted in January 2013 to identify new publications. In total, 34 articles are discussed in the literature review.

3.2. Findings

Mass gatherings are “events attended by a sufficient number of people to strain planning and response resources of a community, state or nation”.^[9] They usually contain a collection of ‘well persons’ but generate a higher incident of injury and illness than the general population^[10] from communicable diseases, and non-communicable hazards, such as injury from crowd stampedes or terrorist attacks.^[11] Mass gathering healthcare provision aims to preserve the regular operating capacity of local services through extra help and part-time staff.^[12] A number of factors need to be considered in planning for these mass events:

- Season and temperature: There is a demonstrable seasonal trend for communicable diseases. An investigation of paediatric admissions and Emergency Department (ED) presentations in Australia^{ix} identified that Incident Rate Ratios (IRR) were significantly higher in autumn for asthma (IRR=1.29) and croup (IRR=3.88) compared with the incident rate in the summer (both asthma and croup: IRR=1.0; P<0.01).^[13] The diarrhoea IRR peaked in the spring (IRR=2.73; P<0.001). Further, an analysis of St John Ambulance^x casualty reports at the 1991 Royal Adelaide Show in South Australia (n=1,276) showed that the mean patient presentation rate increased significantly with maximum daily temperature (r=0.715; P<0.05).^[14] Research has also suggested an association between violence and season.^[15-17] However, an analysis of 19,264 ED assault presentations in Cardiff between May 1995 and April 2000 suggests that seasonal effects may be due to specific calendar events, rather than temperature.^[18]
- Attendance and crowd density: The number of people seeking or requiring medical attention may decrease with larger attendances.^[19] The literature review concludes that events with over one million spectators averaged ten patients per 10,000 spectators whereas events with less than one million people averaged 41 patients per 10,000 spectators.
- Duration: Events lasting for multiple days may result in higher medical usage rates. The Royal Adelaide Show analysis (n=1,276) showed that the mean patient presentation rate increased significantly with the number of days that the show had been operating for (r=0.615; P<0.05).^[14] The show was a nine-day event.

^{ix} Researchers analysed 737,388 admissions (1993-2004) and 484,765 ED presentations (1999-2004) to the Canberra Hospital for Australian Capital Territory residents.^[13]

^x St John Ambulance attends public gatherings to provide first aid.

- Type: Individual events have unique needs (that is if the event occurs indoors or outside, its demographic profile, or music type). For example, a jazz festival might attract middle age people whilst a rock festival might attract a younger audience. Younger people are more likely to consume excess alcohol which may result in increased numbers of alcohol-related injuries.
- Existing medical need: Individuals travelling to an event outside their local area may have existing medical issues, and may require care for these whilst at the event.
- Alcohol use: In some countries, alcohol may become more readily available during mass events through the potential for increased numbers of venues selling alcohol and longer licensing hours. In Los Angeles, a 1% rise in alcohol outlet density led to a 0.62% rise in the rate of violent offences,^[20] and in Perth, Western Australia, extending opening hours by one hour to 1am increased violence at those venues by 70%.^[7]

3.2.1. Hospital use surrounding sports events

To date, published data show mixed results as to whether large sporting events are associated with changes in rates of hospital admissions and/or ED presentations. Whilst none of these analyses specifically investigated the involvement of alcohol, or whether alcohol consumption was associated with hospital admission or presentation, their key findings are shown below:

- An analysis of 172,366 ED presentations in 14 British EDs^{xi} during the 1996 European Football Championship (held in England) showed no significant association between the number of presentations and incidence of a football match that day.^[21] This lack of a significant association was even sustained on days when the home nations, England and Scotland, were playing.
- In Northern Ireland, a retrospective analysis of 137,668 ED presentations to one ED (and subsequent admissions over 24 hours) following live and televised local, national and international sporting events was conducted^{xii [22]}. Whilst no association was found between sporting events and total ED attendances, specific events were associated with an increase in mean admission: FA Cup final (20.8 mean admissions per day; P<0.01); rugby Six Nations matches (16.0; P>0.05); and Gaelic football all Ireland semi-final (17.0; P>0.05) and quarter-final games (17.0; P<0.05) compared with no match days (13.6 admissions per day). International games involving Ireland also saw an increase in admission rates: 19.3 mean admissions per day for rugby World Cup games involving Ireland (P<0.05) and 16.3 mean admissions per day for rugby Six Nations matches involving Ireland (P<0.01). However, no such association was found for the football World Cup final, or the rugby World Cup finals (including the quarter-finals and semi-finals).
- An analysis of emergency calls made to Hampshire Ambulance Service during the 2006 World Cup showed that on the day of the first match, calls were 50% higher than on a typical Saturday (734 emergency calls compared with a mean of 367)^{xiii [23]}. Percentage increases in callouts for assaults (138%), road traffic accidents (118%) and traumatic injury (31%) compared with a typical Saturday were particularly high^{xiv}. However, it is not reported if these differences were statistically significant.

^{xi} Data were collected for a nine week period (20th May to 21st July 1996), which represented three weeks before, three weeks during and three weeks after the tournament. Seven of the EDs involved were located next to a tournament venue and seven were not.^[21]

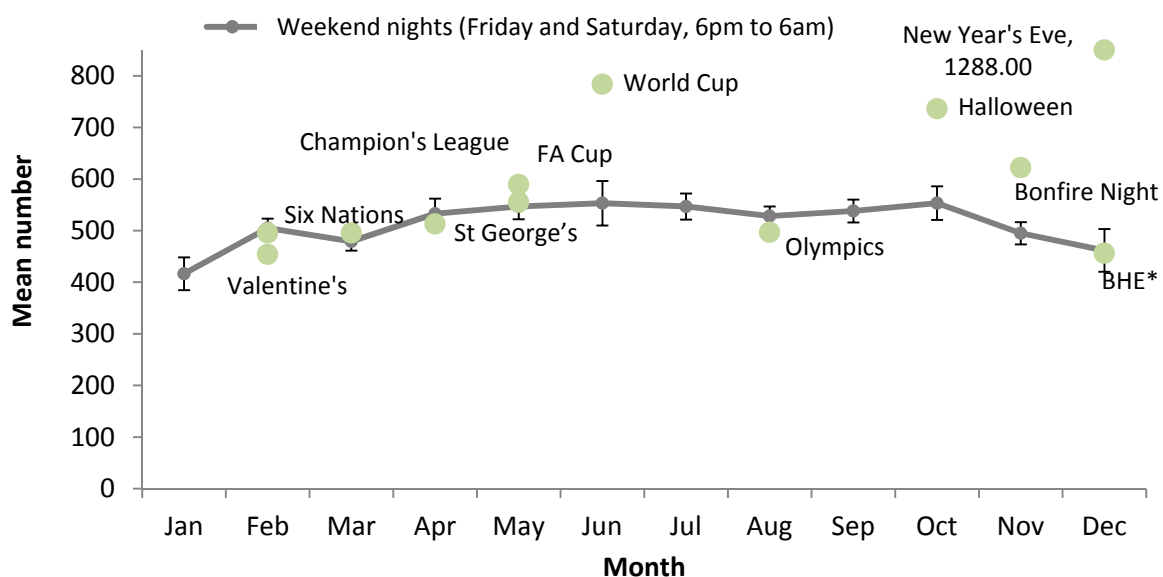
^{xii} Data were collected from April 2002 to July 2007 from one hospital in Northern Ireland.^[22] Sporting events included football (FA Cup finals, World Cup final), rugby (World Cup and Six Nations matches) and Gaelic football matches.

^{xiii} Data for the first day of the World Cup (Saturday 10th June 2006) were compared with Saturdays occurring between 1st March 2006 and 31st May 2006.^[23]

^{xiv} Researchers did not publish the numbers involved, just the percentage change.^[23]

- The Centre for Public Health, Liverpool John Moores University analysed the impact of the 2006 and 2010 football World Cups in Germany and South Africa respectively on ED assault presentations in the North West of England.^[24, 25] For the 2006 World Cup, they found that ED assault presentations increased by an average of 33% across the 17 EDs involved in the study on the days that England played compared with equivalent periods from 2006 to 2009 ($P < 0.01$)^{xv}.^[24] However, overall, there was no independent effect on assault attendance. For the 2010 World Cup, assault presentation data from 15 EDs in the North West of England were analysed^{xvi}.^[25] ED assault presentations increased by 37.5% on the days England played: from a mean of 47.6 presentations per day on days when England did not play to a mean of 65.4 per day when they did ($P < 0.05$).
- The Centre for Public Health also analysed the impact of sporting events^{xvii} on 330,172 night-time^{xviii} ED presentations in England for assaults between the financial years of 2008/09 and 2010/11.^[26] This showed that the risk of assault presentation increased almost threefold when matches occurred between Sunday and Thursday compared with Friday to Saturday (208 compared with 503 respectively; $P < 0.001$). However, there was no significant impact associated with the Football Association Cup finals, Union of European Football Association (UEFA) finals or the England matches in the Rugby Six Nations (Figure 1 and Figure 2). The 2008 Beijing Olympics were associated with a small decrease in night-time assault presentations (no numbers were provided; $P < 0.05$).

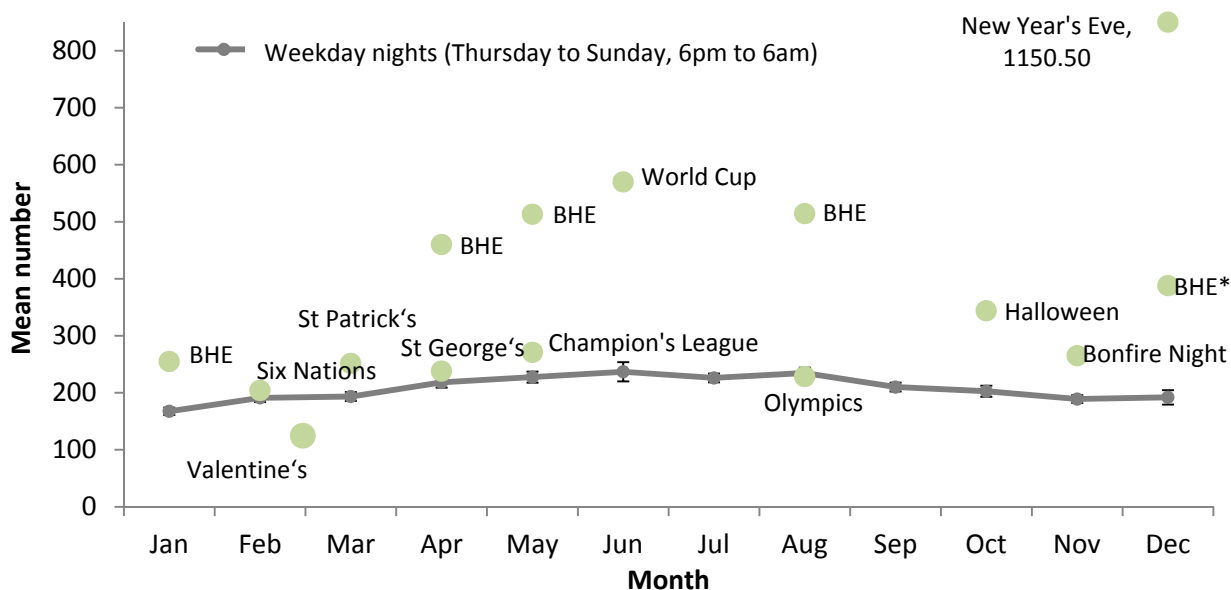
Figure 1: Mean assault presentations per night by month and event (Friday and Saturday nights only) to Emergency Departments in England between 2008/09 and 2010/11



Source: Bellis et al. (2012).^[26] Error bars represent 95% confidence intervals for monthly means. The value for New Year's Eve is provided as it is outside the scale. BHE = Bank Holiday eve.

^{xv} Researchers did not publish the numbers involved, just the percentage change.^[24]
^{xvi} The analysis investigated data before (7th May to 6th June), during (11th June to 11th July) and after (16th July to 15th August) the 2010 World Cup.^[25] Comparison years (2007–09) covered the same periods; data were matched on weekdays not dates.
^{xvii} The sporting events investigated were: Football Association Cup finals, Union of European Football Association (UEFA) Champions League finals, England matches in the football World Cup 2010, England matches in the Rugby Six Nations and the Beijing Olympic Games in 2008.^[26]
^{xviii} Night-time presentations were defined as those occurring from 6.01pm to 6.00am.^[26] So presentations occurring between 6.01pm on the 29th March 2008 and 6.00am on the 30th March 2008 were coded as a night-time presentation for 29th March 2008.

Figure 2: Mean assault presentations per night by month and event (Sundays to Thursdays only) to Emergency Departments in England between 2008/09 and 2010/11



Source: Bellis et al. (2012).^[26] Error bars represent 95% confidence intervals for monthly means. The value for New Year's Eve is provided as it is outside the scale. BHE = Bank Holiday eve.

- Finally, a study from Geelong, Australia considered the impact of alcohol and sporting events on hospital admissions.^[27] Authors analysed 6,697 presentations to the local ED from 1st July 2005 to 16th February 2010. Alcohol-related presentations were defined as those where the participant had self-reported consumption and/or clinicians had recorded signs of alcohol use in the clinical notes. They found no significant relationship between whether the local American Football Club had played and the number of alcohol-related presentations even when controlling for confounding factors; however there was a significant association between game days and assault presentation. It is not known to what extent such a study has relevance for the understanding the impact of the sporting events in the UK, and authors acknowledge that the definition used to identify alcohol-related presentations is likely to have created an under-representation of the true involvement of alcohol in ED presentations.

3.2.2. Alcohol consumption at sporting events

Alcohol consumption may be higher at sporting events than other social occasions. A survey of students and football season ticket holders (n=762) in Florida, USA, suggested that those attending college American football games drank significantly more (mean 5.60 drinks) compared with the last time they partied or socialised (4.46)^{xix}.^[28] Thus, the number of alcohol-related offences can increase on days where a sports event occurs. Again in Florida, researchers analysed data on the number of alcohol-related arrests^{xx} on ten public holidays associated with raised levels of alcohol consumption,^{xxi} ten days where American football games occurred at home, and ten control Saturdays (from March 2005 to March 2007).^[29] In total, across

^{xix} One thousand college students and 1,000 football season ticket holders (non-student) were randomly selected to take part in an anonymous online survey.^[28] Standard error for mean consumption on game day was 0.17, and for non-game day 0.15.

^{xx} Offences included unlawful possession of alcohol, drugs, or false identification; public intoxication; driving under the influence; assault and battery; resisting arrest; burglary/theft; and trespassing.^[29]

^{xxi} These holidays were decided in consultation with students and included New Year's Eve, St Patrick's Day and Labor Day.

these 30 days, 944 arrests occurred. American football game days had the highest mean number of arrests (70.3 per day) compared with control days (12.3 per day) and holidays (11.8 per day; $P < 0.001$). Increases in the mean number of arrests were particularly apparent for driving under the influence (1.8 per day versus 0.9 on control days; $P < 0.001$) and battery (2.0 per day versus 0.4 on control days; $P < 0.05$). However, it is not known how applicable these studies are to UK drinking and arrest patterns. In the UK, researchers surveyed 12 male drinkers aged 34-59 years at a cricket match.^[30] Their mean unit consumption was 14.5 units^{xxii}, but all participants had binge (drank above eight units). The author did not compare their consumption at the cricket match with consumption on other occasions. In Cardiff at the Millennium stadium, a random cross-sectional sample of male rugby fans ($n=86$) were surveyed after rugby matches^{xxiii}.^[31] Participants were divided into those whose teams had won, lost or drawn. Whilst there was no difference between the groups on their intentions to drink alcohol after the match, spectators whose teams had won and those whose teams had drawn were rated as being more aggressive after the match than those who had lost. However, the sample for both of these studies was small and so results should be interpreted with caution.

3.2.3. Public health at the Olympics

A systematic review of 54 studies from 1987 to 2008 found no conclusive evidence that major sporting events affected health, wellbeing, quality of life, health service use or transport use;^[32] however, 85% of studies were of poor methodological quality, largely due to their lack of a control group. Five of the studies assessed health impacts, and this included an examination of the data from the 2000 Sydney Olympics (see Box 1). Here, 1,740 cases of notifiable communicable diseases^{xxiv} were identified among Sydney residents.^[33] This was consistent with 1999 and 2001 (1,479 and 2,143 respectively). Twelve cases were reported for overseas visitors (compared with six cases in 1999 and seven in 2001). In addition, it identified that 55,339 ED presentations had occurred during the Olympics, approximately 5% higher than in 1999 and 2001 (51,117 and 53,173 respectively).^[33] Of these, 2.7% ($n=1,431$) presentations were by overseas visitors, which was higher than in the comparison years (1999: 1.5%; 2001: 1.9%). The number of presentations relating to illicit drug use^{xxv} was higher during the Olympic Games (193 compared with 148 in the three weeks preceding and 54 in the three weeks following). The number of presentations for injuries occurring outside the home was higher in the weeks preceding and during the Olympic Games but then decreased (3,030 in the three weeks preceding, 3,038 in the three weeks during and 572 in the three weeks following). Finally, the Olympic Village Polyclinic recorded 12,131 presentations being made by Olympic family members^{xxvi}.^[33] Of these, 36% were for musculoskeletal problems (mainly among athletes). The authors did not calculate whether the changes identified reached statistical significance. However, a second paper on the public health surveillance system did perform a more in-depth analysis,^[34] assessing the 424 presentations for adverse events due to drug use^{xxvii} in the five week surveillance period. The mean daily number of presentations for adverse events

^{xxii} One unit was defined as 10ml pure alcohol.^[30]

^{xxiii} Researchers surveyed fans at five rugby matches: 17 whose team had won, 23 whose team had lost and 46 whose team had drawn.^[31] Aggression was measured through a subscale on the Buss-Durkee Hostility Inventory, which asked participants ten questions concerning response to provocation.

^{xxiv} Medical practitioners, hospitals, laboratories, schools and childcare centres in New South Wales, Australia, must notify health departments if diagnoses are made of certain communicable diseases.^[33] The diseases were not specified in the paper.

^{xxv} The paper did not define which diagnoses were categorised as drug-related.^[33]

^{xxvi} The Olympic family refers to the groups such as the athletes, officials and media involved in delivering the Games.

^{xxvii} Drug-related ED presentations were defined as those with at least one of the following diagnoses (ICD9 code provided in brackets): drug psychoses (ICD9 code: 292); opioid dependence (304.0); amphetamine and other psychostimulant dependence (304.4); unspecified drug dependence (304.9); non-dependent cannabis, hallucinogen, sedative, hypnotic,

Box 1: Public health surveillance at the Sydney 2000 Olympic Games

A public health surveillance system was designed for the 2000 Sydney Olympic Games to monitor health impacts. It was in operation between 28th August and 4th October 2000 (starting three weeks before the opening ceremony and ending three weeks after the Games).^[33, 34] The system collected a range of intelligence including incidence of communicable diseases (collated through notifications made to the health department), medical incidents at Olympic venues and presentations to 15 sentinel EDs (this recorded symptoms of acute communicable diseases, injuries occurring outside the home and adverse events due to illicit drug use). Data for the Olympic venues relate to 3rd September to 4th October 2000, when the Olympic Village Polyclinic was in operation. Data were compared with those available for the corresponding periods of 1999 and 2001. Whether alcohol was involved was not recorded because it was deemed too difficult to ascertain in an ED.^[34]

due to illicit drug use was significantly higher during the Olympic Games than in the lead up to the Games (13.3 per day compared with 8.8; $P < 0.04$). In total, 52% of these presentations occurred at two EDs (these EDs were based in areas that were known for having higher levels of illicit drug use).

Since the systematic review was published, additional analyses have been performed on the impact of the Olympic Games. Firstly, as discussed in Section 3.2.1, the impact of sporting events (including the 2008 Beijing Olympics) on 330,172 night-time assault presentations in England between 2008/09 and 2010/11.^[26] Here, the 2008 Beijing Olympics were associated with a small decrease in night-time assault presentations (no numbers were provided; $P < 0.05$). In addition, data have been released on the impact of the 2010 Vancouver Winter Olympic Games. Overall, the number of ED visits related to substance use (including alcohol) increased during the Vancouver Games^{xxviii}.^[35] The mean daily number of visits increased from 278 in the seven days prior to the Games to 423 during the Games. The number of presentations for alcohol and substance use within the 15-24 year old age group tripled during this period (no numbers were given). The number of injuries also increased, but again no numbers were given. The number of assaults also rose from 45 presentations in the week preceding the Games to 70 in both weeks one and two of the Games ('most' of these presentations were reported in two of the nine EDs).^[37] The largest increase in ED presentations for assaults was amongst males and those who did not live in the Vancouver Coastal Health area (no numbers were given). No analysis was performed to identify whether these changes were statistically significant. However, a more in-depth analysis was performed on presentations to EDs following the Olympic ice hockey final.^[38] Here, ED presentations in Ontario on the Sunday of the final were compared with ED presentations on the six preceding and six following Sundays. In total, there were 99,447 presentations in the dataset; of these, 14.1% ($n = 13,990$) occurred on the day of the final. During the hours of the final, the mean hourly rate of presentations was significantly lower than during the control periods (647 compared with 783; $P < 0.001$). No significant difference was identified in the hours surrounding the game.

anxiolytic, opioid, cocaine, amphetamine or relating acting sympathomimetic abuse (305.2-305.7); poisoning by opiates and related narcotics (965.0); poisoning by psychodyslpetics (hallucinogens; 969.6); poisoning by psychostimulants (969.7).^[34]
^{xxviii} Substance-related ED presentations were defined as those with at least one of the following diagnoses (ICD9 code provided in brackets): alcohol psychoses (ICD9 code: 291); drug psychoses (292); alcohol dependence syndrome (303); drug dependence (304); non-dependent abuse of drugs (305); drug dependence complicating pregnancy, childbirth or the puerperium (648.3); suspected damage to the foetus of drugs affecting the mother (655.5); dermatitis due to drugs taken internally (693); exposure to narcotics, perinatal (760.72); hallucinogenic agents affecting foetus or newborn via placenta or breast milk (760.73); exposure to cocaine, perinatal (760.75); drug withdrawal syndrome in newborn (779.5); poisoning by opiates and related narcotics (965.0); poisoning by psychostimulants (969.7); poisoning by opiate antagonists (970.1); other counselling not elsewhere classified (V65.4); accidental poisoning by drugs, medicinal substances and biologicals (E850-E858).^[35, 36]

3.3. Limitations of the published literature

It should be noted that there are a number of limitations in using these analyses to assess the likely impact of the 2012 Olympic and Paralympic Games on London. Whilst one analysis did focus on the impact of the Olympics on English ED presentations, it was based on the 2008 Games which occurred in Beijing, and so, for the Olympic part of the analysis, was based on a fully televised event.^[26] Where analyses did investigate the impact of sporting events and Olympics occurring in their immediate vicinity,^[33-35, 37] it is difficult to make direct comparisons between these previous Olympic cities and London.^[39] London is more densely populated and more easily accessible both nationally and internationally. This made it difficult to estimate beforehand the number of people who would travel to the city. Health systems also vary and reasons for accessing them may differ if alcohol and other substances are used more frequently and excessively in London than elsewhere. Typically, monitoring of the involvement of alcohol and/or other substances has involved extracting data from hospital records based on substance-specific diagnoses (such as alcohol dependence syndrome or drug psychoses) and ICD codes^{xxix [34, 35]}. However, both alcohol and drugs have a much wider impact on health than this and can be involved in a wide range of conditions including assault, suicide, and motor vehicle accidents.^[40, 41] A number of the analyses focus just on the Olympic Games and do not consider the Paralympic Games.^[26, 33] Finally, because these datasets use different definitions and different methodologies, it makes comparison difficult. It is not known to what extent these studies would reflect the experience of an Olympic and Paralympic Games being held in England. Our analysis seeks to address the gaps identified.

^{xxix} International Classification of Disease (ICD) codes are used to classify diseases and other health problems on health records. For further information see: www.who.int/classifications/icd/en

4. Stakeholder interviews

4.1. Methodology

Semi-structured telephone interviews both before and after the Olympic and Paralympic Games were used to gain an understanding of organisational experiences of the Games. Participants were purposively selected members of staff from public services that were directly affected by the Games. These organisations included the Metropolitan Police, NHS London, Trading Standards, local hospitals and the Ambulance Service. Over the course of the fieldwork period, the commissioners helped to identify 18 potential interviewees from 16 organisations. In total, 26 semi-structured telephone interviews were conducted. Eleven interviews were carried out pre-Games (13th July to 26th July 2012^{xxx}). Post-Games, researchers aimed to include individuals who had been involved in the initial interviews, individuals who had declined participation in the initial interview, and new individuals identified by the commissioners; 15 interviews were carried out (10th September to 22nd November 2012^{xxxi}). Eight people were interviewed both before and after the Games. Full details of the interview schedules can be found in Appendices A and B. Interview duration ranged from 10 to 40 minutes (average: 19 minutes). All participants gave informed consent. Interviews were digitally recorded and thematically analysed. All interviewees were assured of confidentiality and that all data used in the report would remain anonymous. Interview topics for both the pre and post-Games included:

- Interviewees' and their organisation's role in alcohol harm prevention;
- Basis of learning and planning assumptions;
- Positive and negative impacts of hosting the Games on London generally and their services;
- Health risks associated with the Games;
- (Anticipated) challenges and barriers faced by them and their organisation due to the Games, and measures to overcome these; and
- The anticipated legacy from the Games.

In order to protect interviewee confidentiality, participants were grouped as local authority or health service-based. Three pre-Games participants worked for local authorities and eight worked for health services. Similarly, the post-Games group was made up of three members of staff from local authorities and twelve health managers. The interviews were digitally recorded and notes taken. The interviews were coded using directed content analysis.^[42] The coding structure mirrored the main interview topics: alcohol harm prevention; learning and planning assumptions; risks associated with the Games and actions to mitigate these risks; challenges and/or barriers of hosting the Games; positive or negative experiences of the Games in general and for individual organisations; and the legacy of the Games. The coding framework was further developed in line with interviewee responses. For example, health risks associated with the Games were sub-coded to reflect the range of different risks including communicable diseases such as sexually transmitted infections. This flexibility in coding enabled the limiting of any bias arising from using predefined evaluative questions as the coding structure. The purposive rather than random sampling strategy may have limited the potential representative nature of the interview findings but the strategy maximised recruitment at a very busy time. Whilst we had hoped to include junior managers and front line clinicians, these groups proved particularly problematic to recruit (only two clinicians were involved in the interviews).

^{xxx} Two pre-Olympic interviews took place after the Olympics had begun.

^{xxxi} Two post-Olympic interviews took place during the Paralympics

4.2. Findings

4.2.1. Anticipated health risks of the Games

In the pre-Games interviews, participants (n=11) were asked to identify any health risks that they anticipated might occur during the Games. Four themes emerged: alcohol-related injury and accidents; increased prevalence and/or incidence of communicable diseases; increased drug use; and risky sexual health practices. Eight interviewees mentioned possible increases in alcohol and drug consumption at any events associated with a 'party' atmosphere. Thus, interviewees expected that alcohol, and perhaps drug-related, attendance to EDs and health services would increase during the Games period. Six respondents felt that problems with alcohol-related injuries would be greater during sunny, warm weather, which in itself could create health problems through heat stroke and dehydration:

"Obviously you've got drug and alcohol consumption when you have any sort of large scale event like Pride or the Queen's Jubilee. Particularly if it's successful and you have outside [TV] screens, you have people potentially that will be drinking. If it's good weather you have dehydration."

Senior Manager, Health Service, Pre-Games

Three pre-Games interviewees speculated that due to increased numbers of (often overseas) visitors to London and the Games venues, the transmission of communicable diseases may be higher. Sexual health risks were highlighted by four interviewees as a potential issue; it was felt that the 'party' atmosphere may encourage individuals to partake in risky sexual behaviours, which may lead to the contraction of sexually transmitted infections. It was suggested that this might be a particular problem for visitors to London, who are not registered with local GPs and do not know how to access appropriate health services:

"The kind of transmission of disease generally, as you have got more people potentially coming in from other countries. But I think I mean sexual health is probably the number one thing that has been highlighted as sadly always goes on the increase when something like the Olympic Games moves into an area."

Senior Manager, Health Service, Pre-Games

Five respondents commented that the potential increased use of health services during the Games could put pressure on the health system, especially ambulance services and hospitals, to deliver appropriate care to high numbers of service users with diverse needs. This could directly affect turnaround. However, one respondent mentioned that London was experienced in managing large scale events and that the Games were likely to be no worse than the winter period. In comparison to the anticipated impacts of hosting the Games, seven post-Games interviewees felt that the actual impact on their services had been negligible.

4.2.2. Anticipated alcohol-related harms

Ten of the 11 pre-Games participants were concerned with alcohol-related harm. Eight suggested that alcohol-related harm could potentially increase during the event. However, they were uncertain as to what extent. One thought the increase in alcohol-related harm and associated hospital admissions would be equivalent to any other major event:

“In relation to sort of alcohol and health I don't think it is going to have a significant impact. I mean it's going to be like any major event. There's going to be an increase in drinking, probably, but probably no bigger or not as big as, for instance, the World Cup. So I mean there it is probably going to cause an increase in alcohol-related harm and other health harms but no more than other major event would.”

Senior Manager, Local Authority, Pre-Games

Individuals and their organisations reported being involved in a variety of measures aiming to prevent alcohol harm. Three interviewees and/or their organisations provided advice and/or training both within and across organisations and to the public on alcohol. For example, the Alcohol Policy Forum provided advice and leaflet-based information, whilst the Council Licensing Team provided server and licensee training and advice, and enforced licensing conditions. Specific health promotion activities involving alcohol, which were already in place, were also discussed. For example, the London Ambulance Service ran alcohol promotion pilots across several London complexes; crews were trained in using the AUDIT-C screening tool^{xxxii} in order to assess risky drinking behaviours, to deliver brief interventions to potentially harmful drinkers and signpost to other services as necessary. Guy's and St Thomas' Hospital also screened for alcohol harm. Additionally, as part of a pan-London Commissioning for Quality and Innovation (CQUIN) scheme^{xxxiii}, two projects were in operation during the Games that focussed on alcohol-related harm for 2012/13. Both of these covered the Games period as well as other peak times in the year. The first was the Soho Alcohol Recovery Centre which provided care for intoxicated individuals on Friday and Saturday nights and provided brief advice around reducing alcohol consumption (once patients are sober).^[44] The Soho Alcohol Recovery Centre had been successfully deployed during previous peak times (for example, Christmas and New Year) and was re-commissioned for the whole of 2012/13 including the Games to relieve pressure on other hospital departments, especially EDs in central London.^[45] The Soho Alcohol Recovery Centre will remain active until March 2013. The second initiative already in operation in London involved the Alternative Response Vehicle (ARV).^[44, 45] This multi patient vehicle has been used for intoxicated individuals who are in need of medical attention but do not require a full ambulance response; they can be treated appropriately, whilst avoiding the use of expensive and over-stretched ambulances. The ARV works with the Soho Alcohol Recovery Centre within an agreed alternative care pathway.

During the Olympics there were three Live Sites at Victoria Park, Hyde Park and Potters Bar, managed by a company with experience of previously large music events in these settings, whilst during the Paralympics, the Live Site was based at Trafalgar Square; these offered the public the chance to watch the Games on big

^{xxxii} The AUDIT-C is a brief alcohol screening tool (a set of three questions) used to identify individuals who are hazardous drinkers or have active alcohol use disorders (including alcohol abuse or dependence).

^{xxxiii} CQUIN is a national programme where financial incentives are provided for delivering quality and innovation on NHS contracts.^[43] A number of pan-London CQUIN schemes were also in operation, which facilitated the delivery of the ARV and Soho Alcohol Recovery Centre.

screens whilst “enjoying a range of free entertainment”^{xxxiv}. In order to mitigate the impact of alcohol-related illness or injury at the sites, a number of temporary ‘field hospitals’ were put in place:

“The Alcohol Recovery Centre is a sort of, is a bit like a field hospital set up which will allow patients who don't have any significant physical or other injuries so they are kind of safe but drunk. They will basically sober up there and be monitored by paramedics and then discharged home. And we are working in partnership with the alcohol prevention team who are giving advice. ”

Senior Manager, Health Service, Pre-Games

NHS London, the Greater London Authority and the Department of Health have developed a number of policies and recommendations to mitigate the health risks associated with the Live Sites^{xxxv} and reduce the pressure on local healthcare services (which expected increased demand whilst the Live Sites were in operation). These documents encouraged responsible drinking policies, including enforcing Challenge 21^{xxxvi}, prohibiting attendees from bringing alcohol into the events, server training, prohibiting the use of glass for drinks at outdoor events, and the closure of bars prior to the end of an event. They also provided guidance to health representatives on the Safety Advisory Groups for such events. NHS London encouraged all events to have a comprehensive alcohol policy. Nevertheless, two respondents commented on the difficulties in promoting responsible drinking at the Games due to its sponsorship by the alcohol industry. They also expected a lot of media coverage regarding the athletes’ consumption of alcohol, often in celebration following their events:

“There was a lot of media coverage in past Olympics and I'm sure there will be at this Olympics a lot of media coverage of the behaviour of athletes around drinking once they've finished their events. Frankly, there is a lot of really bad drunken behaviour.”

Senior Manager, Health Service, Pre-Games

Furthermore, one pre-Games respondent noted that, whereas the health legacy of the Games had been heavily promoted, there was no clear message surrounding alcohol consumption and health. However, the Regional Public Health Group were developing an ‘alcohol vision for London’ that intended to inform local alcohol strategies and approaches as part of the London Health Improvement Board’s priorities. The activities surrounding this priority involved mapping good practice in identification and brief advice, and improving performance around alcohol licensing.

4.2.3. Reflections on anticipated health impacts and alcohol harms during the Games

In the post-Games interviews, participants were asked to reflect on their perceptions of the impact of the Games on individual health and health services. Whilst six participants said that alcohol had not been an issue for their organisation, nine discussed how the period was notable for the absence of any major impact or incidents in relation to alcohol. Three thought that the incidence of alcohol-related harm had been less than what they had expected prior to the Games. The mood was summed up by the following participants:

^{xxxiv} Senior Manager, Health Service, Pre-Games.

^{xxxv} The health risks may include assaults and accidental injuries, increased transmission and incidence of communicable diseases, adverse events due to illicit drug/alcohol use, and negative impacts of heat or sun exposure.^[2, 34, 35]

^{xxxvi} Under the Challenge 21 scheme, alcohol servers ask all individuals who look under 21 years for proof of identification, to prove that they are over the legal purchase age of 18 years.

“It's almost like better than normal. It's a bit weird [...] There was [sic] no transport problems, no logistics, no delivery problems, no nothing [...] We did a quick review half way through so I haven't seen the figures as of the end but at the end of the Olympics we did a quick review and our emergency attendances at A&E were down, our overseas patient visitor numbers were down.... Our admissions and surgical admissions were normal, pretty consistent with normal. And our DNA [did not attend] rates were up slightly but only tiny bits.”

Senior Manager, Health Service, Post-Games

“The apocalyptic vision of mass public drunkenness it just didn't happen really[...]From a normal day to day professional point of view both in terms of alcohol and drugs the Olympics was a complete non-event anti-climax... Which was good!... It certainly seems to have been an event that was enjoyed and was enjoyed in a responsible way.”

Senior Manager, Local Authority, Post-Games

When the participant was asked for potential reasons for the lack of alcohol-related incidents they stated:

“I think it was one of those slightly ethereal things. I think in general there was a very good vibe going. I was kind of thinking about the whole alcohol thing and the consumption. It's a little bit like if you go to your average football match and if it's a hot day and people have drunk more than normally at a match it will get a bit louder and indeed spill over and get a bit more nonsense. But you know probably no one drinks more than when they go to the FA cup but there is hardly trouble at the FA cup. So there is just a different vibe.”

Senior Manager, Local Authority, Post-Games

In contrast to the majority of respondents, one senior hospital manager mentioned that alcohol and drug attendances had increased compared to a similar period in the previous year. When asked about their perceptions for the reasons for the increase they mentioned: the Games spirit, the time of year, the hospital's location in central London and the large increase in the number of people visiting the city. Although this response was in contrast to the majority of opinion, it does raise important considerations about the concentration of alcohol-related problems in particular places and, more generally, the multi-dimension cause of an increase in alcohol-related admissions:

“Was it the Olympics? Was it that time of the year? [...] The whole ‘everyone getting caught up in the Olympic spirit?’ One of our sites being close to the Live Sites in Hyde park with them selling alcohol from early in the morning [...] therefore more alcohol was sold and we would see more alcohol attendances at our kind of central London sites... There were more people in London. There are so many reasons, you don't ask someone why they got drunk.”

Senior Manager, Local Authority, Post-Games

As part of the evaluation, where relevant, stakeholders were asked to submit any supporting data or reports that could be used to further understand the impact of the Olympics. These have been incorporated into the report.

4.2.4. Impacts of the Games and potential barriers to service delivery

Prior to the Games, participants discussed the possible positive impacts of the Games on London. No overall theme emerged; however, the 'party' or 'carnival' atmosphere was emphasised by a small number (n=3), as was the potential raised international profile of London (n=2), and increased support for Team GB and the UK in general (n=1). The promotion of sport, both to watch and to participate in, was also emphasised as a public health benefit, as was the promotion of healthy lifestyles which were seen to be associated with the majority of athletes (n=2). There were mixed opinions about the effect of the Games on the local economy. Some interviewees noted a potential boost to the local economy as a positive impact, including the creation of jobs for local people, termed 'doorstep employment' (n=3). Others disagreed and believed that the Games were a loss-making event for the majority of industries and retailers involved. One respondent considered the possibility that a positive impact of London 2012 would be the promotion of responsible drinking and responsible practices in serving alcohol through the training, advice and guidance provided to licensed premises, managers and staff. After the Games, seven participants mentioned the positive atmosphere in London during the Games through a 'feel good factor'^{xxxvii} and good 'vibe'^{xxxviii} making London a much 'nicer place to be'^{xxxix}. Four participants discussed that the Games raised the profile of London, which could benefit the economy (n=2).

Pre-Games, when discussing potential negative impacts of the Games on London and their organisation, three issues emerged: the high cost of staging the Games (both directly and indirectly, that is through the loss of productivity in working environments; for example, travel disruption causing absenteeism and/or employees being distracted by the 'party' atmosphere); the drain on resources; and the possibility of increased crime and security threats. Seven respondents mentioned the disruption to daily life, especially in relation to travelling around London for work, 'normal activities', and patients' access to healthcare services. The expectation was that travel time would be considerably longer and appointments could be missed:

"I think the only sort of other negative impact of the Olympics is mainly probably the transport impact. So that in itself having an impact on staff travel times, patient travel times which obviously is a challenge for some people. We have done everything we can to inform people about what they can do to plan ... but it is still something they have to work through."

Senior Manager, Health Service, Pre-Games

However, post-Games, only two people mentioned transport as an issue, with one participant stating that getting to and from work had not been as difficult as expected. Three pre-Games respondents commented that around the Games period, London would be under huge reputational risk, via the international press, especially if issues arose that were reported to be due to poor planning. However, as one interviewee commented, in order to suffer significant bad publicity, the event would have to be considerable:

"An event would have to be pretty serious and something London itself could be blamed for and within our control, such as a Police incompetence, to be an adverse PR risk."

Senior Manager, Local Authority, Pre-Games

^{xxxvii} Senior Manager, Local Authority, Post-Games.

^{xxxviii} Senior Manager, Local Authority, Post-Games.

^{xxxix} Senior Manager, Health Service, Post-Games.

Post-Games, eleven interviewees thought that at least one negative impact had occurred. These included a perceived increase in low level crime (n=2), lowered reputation of individual companies who had not delivered commissioned services for the Games (n=1), and a negative financial impact for some restaurants and hotels as fewer than expected people visited the city (n=4) and some hotels may have “*priced themselves out of the market*”^{x1}.

Prior to the Games, three interviewees commented that a proportion of staff were being transferred from their regular duties towards Games-related duties, thus impacting on organisational productivity. It was also expected that delivery of normal services would also be challenging during the Games period, especially on days when local roads were closed. Nevertheless, three interviewees perceived no negative impacts of the Games for their organisation. Participants were asked whether they, or their organisation, expected to face any challenges or barriers during the Games. Key themes included: increased pressure on the system (n=5); use of resources (n=4); difficulties surrounding sharing information adequately to both healthcare patients and external organisations (n=3); and transport barriers for both employees and healthcare service users (n=6). Interviewees mentioned that there would be high demand for a wide range of resources throughout the Games period, including street cleaning and waste collection, and the capacity of staff to respond to requests for help from other Boroughs. After the Games, the most commonly cited negative impact on organisations was the extra resources required (n=5), for example, the extra staff required to cope with higher than the (predicted) usual demand for service. One participant noted that due to how their service is financed, they may face a reduction in income because of the reduction in service users. Another negative impact (n=3) was the diversion of resources from ‘business as usual’ practice:

“I suppose the only one [negative impact] really is around the diversion from other business as usual activity. So there has been a lot of focus on this and so there are a few of us sitting here thinking crikey I’ve got to now get back to the day job that we’ve put off for the last six months. But then on the other hand I suppose all of that has been about making sure everything was ready just in case and so I don’t think it has been wasted time by any stretch, definitely not, but I suppose it is a diversion away from other things. And so you wonder what you’ve not done as a consequence of having done all the Olympics [work] instead.”

Senior Manager, Health Service, Post-Games

4.2.5. Measures to mitigate against barriers and negative health risks

Pre-Games, interviewees were asked whether they, or their organisation, had put any measures in place to mitigate against the anticipated negative impacts, challenges or barriers that they expected to face throughout the Games period. Numerous measures were mentioned: ensuring secure policies are in place and enforced; providing advice and training internally and externally; and adapting staff working patterns (such as staff working remotely at a London Primary Care Trust, PCT). Westminster PCT emphasised the importance of ensuring staff were aware of the changes that may occur in relation to the Games through regularly distributing bulletins and information emails. To reduce the problems associated with travel disruption and resulting staff absenteeism, they were encouraging staff to change their travel plans in accordance with advice from the London Organisation Committee of the Olympic and Paralympic Games

^{x1} Senior manager, local authority, Post-Games.

(LOCOG) and Transport for London (TfL) to 'reduce, retime, re-mode and reroute'^{xli}. Two interviewees emphasised the importance of internal and external communication throughout the busy period of the Games, via conference calls, emails, staff briefings and steering groups. For example, at Guy's and St Thomas' staff were asked to be more vigilant in reporting difficult situations that arose to more senior staff in order to be as prepared as possible in the event of any emergencies or major issues (but to use their professional judgement). Several interviewees discussed the changing and more flexible working patterns that were available for staff throughout the Games period such as the ability to work remotely, the redistribution of duties and providing alternative transport or accommodation for staff affected by travel disruptions. One respondent viewed this change negatively, anticipating longer working hours and lower organisational capacity to deal with normal work whilst staff were side-lined onto Games duties. However, others saw these changes positively due to the flexibility available:

"If I take my specific team, we have people taking annual leave during this period...We have some people working remotely...and then the people who are coming in [to work] are looking at the routes that they take...looking at which stations will be busy on particular days and instead using a different route. There are regular bulletins and emails. I know hospitals have put extra beds in for staff to sleep over and are saying to some people who have long journeys, 'you might want to stay over'."

Senior Manager, Local Authority, Pre-Games

Participants interviewed post-Games discussed the effectiveness of the plans to mitigate risks. In addition to the measures mentioned before the Games, interviewees highlighted: a centralised Games command team that consisted of Senior Managers across NHS London to control communication streams and highlight important issues; good channels of communication including daily conference calls; strong monitoring and tracking across the system; a centralised deployment hub for the ambulance service; extra staff or contingency capacity; messaging and information about responsible drinking; dispensing of sun cream when the weather was hot; extra resources; and limiting the amount of holiday staff could take during the Games. One Health Manager felt that the information about accessing health services had been successful:

"I think there were things [lessons] about how we communicated with the public as well. I think the public were very aware of what was going on and the pressures of the emergency departments would be potentially being under and behaved appropriately."

Senior Manager, Health Service, Post-Games

Participants were asked whether any of the learning or planning assumptions that were implemented in their organisation were based on experiences from other previous events. Experience from previous Games was the dominant event mentioned but respondents also listed: New Year's Eve, sporting events (usually football Cup Finals), Notting Hill Carnival, and the 2011 Royal Wedding. Factors that were considered included the impact on health service demand (especially that of ambulance services); the impact of mass gatherings on communicable diseases; and the impact of sporting events on alcohol consumption. Interviewees consulted literature reviews to help quantify the increased demand on healthcare services that may be experienced throughout the Games. However, three participants noted that there was a lack of good

^{xli} Suggested ways of changing travel in order to reduce disruption included: reducing orders during the Games and delaying deliveries until after the Games, retiming property and equipment maintenance or servicing, arranging overnight or out of hours deliveries, changing routes to avoid roads affected by the Games, revising delivery modes, or going on foot. For example, see: www.lambeth.gov.uk/Services/LeisureCulture/SportsClubsCentres/ReduceRetimeRerouteRemode.htm

(e.g. peer-reviewed) evidence about the impact of the Games on health services. Eight participants interviewed before and nine participants interviewed after the Games discussed how they had planned for the Games. They had adapted existing plans for mass gatherings, for example the Notting Hill Carnival, and developed and tested major incidents plans, which were collaboratively tested with a range of partners including EDs, London Ambulance Service and the Police. The preparation phase brought together partners that had not previously worked in partnership who would be working together to provide services during the Games, thus the Games provided the opportunity to build relationships with different locations, people and services. The event also provided an opportunity to make sure everyone was prepared for disruption because of a large scale event. Detailed planning was undertaken to ensure risks were minimised:

“There was some really detailed planning that was undertaken not just by us but by individual organisations across London.[...] We did all of that work in advance to make sure nothing happened.[...] We had the systems in place and the relationships in place to deal with them [risks] so nothing escalated.”

Senior Manager, Health Service, Post-Games

However, one participant did not expect an increase in service demand above days that had hosted multiple events in the past, and this affected how they planned their service delivery:

“We decided to take the risk that [increased demand] was highly unlikely and not bother with that level of planning so we were delighted that we hadn't. We would obviously be feeling now very foolish had it been the case that it weren't but none of us could quite envisage the flows of people would [be] going to be so substantially greater than say a Wembley football match that coincided with an O2 concert and indeed that is exactly how it was.”

Senior Manager, Health Service, Post-Games

Plans were developed and tested to ensure they worked correctly and to boost confidence for those less experienced in their roles. For example, in the local authority transport co-ordination centre they rehearsed major incident plans and role-played potential scenarios. A strong management structure led by individuals with experience of large scale events supplemented those who were less familiar with such events:

“I think that was probably a thing that made people more confident in going into those operational roles that they didn't have much experience in. That and the fact that generally you were being directed by people who were experienced.”

Senior Manager, Health Service, Post-Games

4.2.6. Games legacy

Participants were asked whether they thought a Games legacy would result from their service. Several pre-Games interviewees struggled to answer but for both pre- and post-Games interviews, five themes emerged:

- Partnership working;
- Improving local health and wellbeing and promoting healthy lifestyles, for example, through the provision of new community sporting facilities;

- Improving existing healthcare and information systems, for example, through the newly developed London Events Co-ordinating Calendar (to provide stakeholders with an overview on events in London) and directory of health improvement projects;
- Strengthening staff skills, in relation to working across different information management systems and knowledge gained in planning major events and delivering appropriate services throughout such events; and
- Contributing to the weak evidence base surrounding health service planning for mass gatherings, especially in relation to non-emergency service planning, including public health and health promotion activities.

Eight pre-Games and four post-Games interviewees discussed that preparation for the Games had strengthened their partnerships. Partnerships were strengthened across a variety of commissioners and organisations, including: hospitals, public health teams, ambulance services, the Police, fire service, local councils, and transport agencies. A Senior Manager from a local authority stated that working closely with licence holders with regard to responsible serving had improved their relationship with licensees, managers and staff at licensed premises. One respondent considered that these new and strengthened partnerships may be a “softer legacy aspect”^{xlii} of the Games, and such networks and partnerships will be useful for future event planning, including New Year’s Eve, and the 2017 World Athletics Championships.

Participants discussed the lessons learnt for their organisations as a result of London hosting the Games. Lessons included: the ability to plan with different organisations; the benefits of sharing information and strategies; developing effective ways to communicate information; and the benefits of engaging with local authorities.

“I think the ambulance service historically has always been involved with the authorities in the planning of events, especially large events where ambulances might be needed. But the wider health system has not really had that much engagement and actually it is really, really useful to have that.”

Senior Manager, Health Service, Post-Games

After the Games, participants were asked whether they would have changed the way they planned or delivered for the Games. Five participants stated they would not change anything. Nine participants mentioned changes relating to specific organisational processes that they would like to have made (one interviewee mentioned two changes): secure and ring-fence funding before the event (n=2); begin planning procedures earlier (n=3); more planning (n=2); clearer management structure (n=1); less management time spent on planning for the Games; and more health promotion messages (n=1).

^{xlii} Senior Manager, Health Service, Post-Games.

5. Health service use for ambulances, emergency departments & hospital admissions

5.1. Methodology

Health service use data have been analysed for hospital admissions, ambulance callouts and ED presentations. Data collection, extraction, coding and analysis are described below.

5.1.1. Emergency hospital admission collection and extraction

Anonymised raw data relating to emergency hospital admissions^{xliii} from July to September 2009 to 2012 were extracted from Hospital Episode Statistics (HES), including the following fields: gender, age, ethnicity, resident lower super output area (LSOA)^{xliv}, site of treatment, date of admission, ICD-10^{xlv} diagnosis codes (all fields). Emergency admissions were used rather than all admissions as emergency admissions are more representative of seasonal patterns; elective admissions are influenced by service provision. All diagnosis fields were searched and data were extracted for emergency hospitals that were due to:

- An acute alcohol specific condition (Table 1);
- An alcohol-related external cause (that is where evidence is available to show that the incidence of the external cause has a relationship with alcohol, and where the associated alcohol attributable fraction, if applied would be greater than 0.01;^[40] Table 2); or
- Diabetes mellitus, a chronic condition, which will be used as a comparison and which has a very small positive relationship with alcohol (ICD-10 code: E11).^[40]

Data are for admissions rather than individuals admitted, and so one individual may have been admitted more than once. Individual admissions may be present in one or all condition categories, because individuals can be diagnosed with more than one condition simultaneously. Data were extracted for all of England and relate to English residents only as the developed alcohol attributable fractions (upon which the evidence is based for the external cause data), and it is not known to what extent the alcohol attributable fractions reflect the experiences of other countries.^[40]

Table 1: Acute alcohol specific conditions included in the analysis

| Description of condition | ICD-10 code |
|--------------------------------------|-------------|
| Acute intoxication of alcohol | F10.0 |
| Harmful use of alcohol | F10.1 |
| Alcohol withdrawal | F10.3-F10.4 |
| Ethanol Poisoning | T51.0 |
| Methanol poisoning | T51.1 |
| Toxic effect of alcohol, unspecified | T51.9 |

Sources: Jones et al. (2008);^[40] Morleo et al. (2010);^[46] WHO (2010).^[47]

^{xliii} Analysis related to emergency admissions referred from the emergency department, general practitioner, an outpatient clinic or through other (undefined) means.

^{xliv} LSOA is the smallest geographical unit into which an area is divided, containing an average of 1,500 individuals.

^{xlv} ICD-10 codes are the WHO International Classification of Disease codes (version 10).

Table 2: Alcohol-related external causes included in the analysis

| Description of condition | ICD-10 code |
|--|--|
| Road traffic accidents | V12-V14 (.3-.9), V19.4-V19.6, V19.9, V20-V28 (.3-.9), V29-V79 (.4-.9), V80.3-V80.5, V81.1, V82.1, V82.9, V83-V86 (.0-.3), V87.0-V87.9, V89.2, V89.3, V89.9 |
| Pedestrian traffic accidents | V02-V04 (.1-.9), V06.1, V09.2, V09.3 |
| Water transport accidents | V90-V94 |
| Air/space transport accidents | V95-V97 |
| Fall injuries | W00-W19 |
| Work/machine injuries | W24-W31 |
| Drowning | W65-W74 |
| Inhalation of gastric contents / inhalation of food causing obstruction of the respiratory tract | W78-W79 |
| Fire injuries | X00-X09 |
| Accidental excessive cold | X31 |
| Accidental poisoning by and exposure to alcohol | X45 |
| Intentional self-harm / event of undetermined intent | X60-X84, Y10-Y34 |
| Assault | X85-Y09 |

Sources: Jones et al. (2008);^[40] Morleo et al. (2010);^[46] WHO (2010).^[47]

5.1.2. Ambulance callout data collection and extraction

Anonymised raw data were requested from London Ambulance Service on all ambulance callouts with the following fields: age, gender, date of callout, time of callout, and whether the callout was due to assault for July to September 2009 to 2012. Data analyses are for all service use because of alcohol's wide-reaching impact.^[40] Some EDs record alcohol use,^[26] but variation in application and concerns about consistency of recordings mean that these data are not presented here. For example, it is not known to what extent staff would record lower levels of consumption or consumption that occurred some time ago but was still involved in the incident. Assaults are known to have strong relationship with alcohol: approximately 50% of assaults recorded through the British Crime Survey were perceived by the victim to have been conducted when the assailant was under the influence of alcohol.^[48] Thus, assault represents a reliable measure for alcohol consumption. All ambulance callouts/ED presentations, as well as those relating only to assaults have been analysed for this report. Ethnicity was poorly recorded, and so was not included, and location of residence is not recorded. Data are for callouts rather than individual involved, and so one individual may have been involved more than once.

5.1.3. Emergency department data collection and extraction

Anonymised raw data were requested from 20 EDs in London. Data were also requested from EDs in England outside London to act as a comparison^{xlvi}. Data were received from six EDs in London^{xlvii} and nine outside

^{xlvi} Data were requested from seven EDs in counties surrounding London, and from the Trauma and Injury Intelligence Group (TIIG) in the North West of England, which collects data from EDs across the North West.

^{xlvii} The six London hospitals were based in the following London boroughs: Bromley, Greenwich, Hackney, Hillingdon, Kensington and Chelsea, and Lambeth.

London^{xlviii} on all ED presentations with the following fields: age, gender, ethnicity, resident postcode/LSOA, date of presentation, time of presentation, and whether the presentation was due to an assault for July to September 2009-2012. Whilst ethnicity was collected from the EDs, differences in definitions used meant it was not possible to combine the fields, and so ethnicity has been excluded from the analysis. Resident postcode/LSOA was mapped to country of residence. Date and time of presentation were essential fields for the intended analysis (see Section 5.1.4), and so both fields had to be complete in order for a case to be included in the analysis. Four cases from the London data did not have these fields completed and so were excluded on this basis; 46 cases were excluded for the same reason from the outside London data. Of the six London EDs, one did not collect assault data and one did not have historic assault data. Thus, London assault data are presented for four EDs. All EDs outside London were able to provide assault data. Data are for presentations rather than individuals attending, and so one individual may have presented more than once.

5.1.4. Data analysis: peak days for health service use during the Games

The analysis for the ambulance callout, ED presentation and hospital admission data follow the same procedure. Data from 2012 were grouped according to Olympic period, using the following categories:

- Pre-Games (14 days before: 13 July to 26 July 2012);
- During the Olympics (17 days: 27 July to 12 August 2012);
- In between the Olympics and the Paralympics (16 days: 13 August to 28 August 2012);
- During the Paralympics (12 days: 29 August to 9 September 2012); and
- After the Games (14 days after: 10 September to 23 September 2012).

For ED and ambulance data, days were recoded into 24 hour periods starting at 6am (so Friday was defined as Friday 6am until Saturday 5.59am).^[25, 26] Time of admission is not recorded for hospital admissions and so day of admission was based on actual day admitted. Comparison periods for previous years (2009-11) covered the same time periods and were matched on weekdays (rather than dates) in order to include equal numbers of Fridays and Saturdays and the equivalent number of days (see Table 10, Appendix C).^[24] This meant that a total of 292 analysis days were investigated (73 days per year) for each dataset. Differences in mean service use were tested using ANOVA by condition type^{xlix}, and for emergency hospital admissions and ED presentations, hospital location (in or outside London).

The databases were linked, by analysis day, to a number of variables: day of week, bank holiday weekend^l, London riots in 2011^{li}, other events (see Box 2), mean temperature, the occurrence of the Games (Olympics or Paralympics) and number of GB gold medals won. Temperature data were based on the mean of the minimum and maximum air temperatures collected at Hampstead Meteorological Station for each date.^[49] General linear modelling (GLM) was used to examine the independent effects of the Olympics on health

^{xlviii} Two were based in Surrey and seven from the North West of England using the data collected by TIIG. TIIG collects data from across the North West but the seven EDs selected to represent the North West for this analysis are known to have consistent and robust historical data.

^{xlix} For emergency hospital admission, condition type refers to those that were due to: acute alcohol specific condition; alcohol-related external cause; or diabetes mellitus. For ambulance callouts and emergency department presentations, condition type refers to all callouts/presentations and those relating to assaults only.

^l For the ED and ambulance datasets a bank holiday weekend was defined as 6am Friday to 5.59am Monday. For the hospital admissions dataset (because time of admission is not recorded), the bank holiday weekend will be defined as Friday to Sunday.

^{li} The 2011 riots affected a number of cities across the country (including the cities in the outside London ED data analysis). For this analysis, for both the London and outside London datasets, only the dates of the London riots have been included in the statistical model as it is the London setting that the analysis focuses on. However, the dates between the London riots and the riots elsewhere do crossover.

service use.^[25, 26] The outcome variables were the number of emergency hospital admissions, ambulance callouts or ED presentations (as appropriate). Predictor variables were date-related: day of week, bank holiday weekend, occurrence of the Olympic or Paralympic Games, temperature, events occurring (music, sport, carnival, Olympic and Paralympic ceremonies, Olympic warm up events and other Games events; see Box 2), occurrence of the London riots and number of GB Gold medals won. Differences in service use were compared by condition type and if appropriate, hospital location.

Box 2: Identifying other large events in London

The statistical model accounted for the occurrence of other events both in the analysis periods in 2012 and in the preceding three years. This was done in order to assess the impact of the Olympic and Paralympic Games on health service use. To collect the relevant information, the London Event Co-ordinating Calendar (LECC) was consulted as it contained all major events in London during 2012. Only events that were estimated to attract over 5,000 people were included. Examples of events included in the analysis included Olympic events such as London Torch Relays and Opening Ceremonies, concerts at Hyde Park, and carnivals such as the Notting Hill Carnival and the City of London Festival. An online search was conducted to identify sports events at major stadia (such as Wembley and Lord's Cricket Ground) and to identify events in the analysis periods from 2009 to 2011. In 2009, events lasted for 27 of the 73 analysis days compared with 2012, when the total number of days lasted for 44 days. Further details can be found in Section 9.

5.1.5. Additional emergency hospital admissions analysis

Emergency hospital admission characteristics (gender, age, ethnicity, deprivation) were compared over time. To do this, as part of the data extraction, resident LSOAs were mapped to Index of Multiple Deprivation (IMD) 2010 quintiles, whereby LSOAs are allocated a deprivation rank based on area characteristics such as average income, employment, education, housing and crime.^[46, 50] Emergency hospital admission characteristics during the 2012 Olympics period were compared with the 2012 pre-Games period and 2012 in between Games period as defined in Section 3.2.1 (referred to as before the Olympics and after the Olympics). Characteristics during the 2012 Paralympics period were then compared with the 2012 in between Games period and the 2012 post Games period (referred as before the Paralympics and after the Paralympics). Differences in characteristics were then tested using chi-square by condition type and hospital location.

Repeat emergency admission rates during the analysis period were examined to further quantify any additional burden on hospital services in 2012 as a result of the Games. Repeat emergency admission is defined as individuals who were admitted more than once for an emergency within the analysis period, year, condition type and location (in or outside London). Thus an individual who was admitted twice for an acute alcohol specific condition within the analysis period in 2012 would be counted as a repeat admission. If they were admitted once in the analysis period in 2012 and once in the comparable analysis period in 2011, they would be coded as a single admission. If they had been admitted twice in the analysis period in 2012 but once for an alcohol specific condition and once for an alcohol-related external cause, this would count as a single admission for each condition group (as the data for condition groups are analysed separately). Only emergency admissions were included in the analysis; the analysis did not include follow-up admissions relating to the original emergency admission. The full analysis period is used rather than the Olympic or Paralympic periods specifically in order to allow adequate time for a repeat emergency admission to occur. The likelihood of a repeat emergency admission was examined by year, gender, age, ethnicity and IMD quintileⁱⁱⁱ. Because individual characteristics (such as age, deprivation) could change over the time period, the characteristics supplied at the first admission were used for the analysis. Differences in characteristics of those with a repeat emergency admission were compared with those with single emergency admissions

ⁱⁱⁱ Demographic details recorded at first admission were used.

using chi-square and binary logistic regression (the latter accounting for gender, age, ethnicity and deprivation).

5.1.6. Data limitations

The analysis incorporates data from previous years (2009 to 2011) and, the case of emergency hospital admission and ED data, locations outside London as a comparison for the Olympic and Paralympic periods. Despite these comparisons, only associations with the Olympics can be discussed. It is not possible to attribute health service use directly to the Olympics. Data on assaults could only be included in the analysis for four of the six contributing London EDs. Whilst the statistical model sought to include other events that were likely to have affected levels of ED presentations (such as the 2011 riots and music events), this list does not represent all events. London Ambulance Service and some EDs record whether there was any evidence of alcohol use prior to the assault. However, this is not consistently recorded,^[26] and the level of accuracy is unknown. Thus assaults have been used instead. Whilst health service use data on assaults is thought to be more comprehensive than recorded crime data (see Section 6), it requires the individual to report that an assault has occurred. Concerns over confidentiality may prevent this from occurring.^[26] Thus, caution must be employed in the data analysis.

5.2. Findings

5.2.1. Emergency hospital admissions

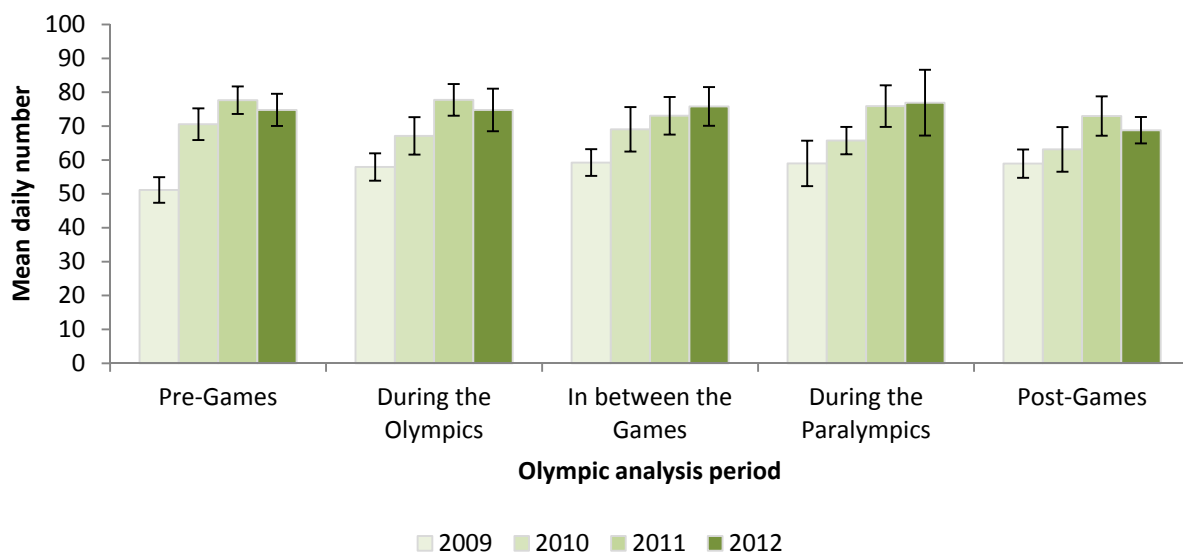
Emergency admissions for acute alcohol specific conditions during the Games (London only)

In the 2012 London Olympic period, there were a total of 1,271 emergency hospital admissions for acute alcohol specific conditions in London (daily mean: 74.8 emergency admissions). The busiest days for emergency hospital admissions for acute alcohol specific conditions in London during the Olympics were Sunday 29th July 2012 (day three of the Olympics) and Sunday 12th August 2012 (the last day of the Olympics), when 95 emergency admissions were recorded on each day. During the Paralympics, 923 emergency hospital admissions were made for acute alcohol specific conditions in London (daily mean: 76.9 emergency admissions). The busiest day for emergency hospital admissions for acute alcohol specific conditions in London during the Paralympic period was Saturday 1st September 2012 (day four of the Paralympics), when 102 emergency admissions were recorded. Figure 3 shows the mean daily number of hospital emergency admissions for the pre-Games period, during the Olympics, in between the Games, during the Paralympics and post Olympics, and for the equivalent periods in 2009, 2010 and 2011. There were significant differences between 2009 and 2012 in all of the Games periods. Overall in the Olympic period, the number of emergency hospital admissions for acute alcohol specific conditions increased by 29.0% between 2009 and 2012. Similarly in the Paralympic period, the number of emergency hospital admissions increased by 30.4%. After correcting for day of the week, year, bank holiday, other events (music, other sport, carnival, other Games), mean air temperature, London riots and number of team GB gold medals, only the Paralympics were associated with a significant increase in the number of emergency hospital admissions (by 12.1%; see Appendix D). There was no significant association for the Olympics or with the number of Gold medals won by Team GB.

In 2012 for both the Olympics and Paralympics, emergency admissions for acute alcohol specific conditions in London were most commonly made by males, those aged 35 to 54 years, those classified as White British and individuals residing in the two lowest deprivation quintiles (Tables 3 and 4). There were no significant differences in emergency admission characteristics in the Olympic period compared with before and after the Olympics in 2012. This was also the case for the Paralympic period. Overall, the rate of repeat emergency admission for acute alcohol specific conditions in London has increased over time from 8.3% of people being admitted as an emergency admission for an acute alcohol specific condition in 2009 to 10.9% in 2012 (see

Appendix D). The increase remained significant even after correcting for changes in demography (gender, age, ethnicity and deprivation). However, the difference was only really apparent when comparing 2012 with 2009; the rates of repeat emergency admission were similar when comparing 2012 with 2010 or 2011.

Figure 3: Mean daily number of emergency hospital admissions for acute alcohol specific conditions in London by Olympic period in 2012 and equivalent periods in 2009-2011



Error bars represent the 95% confidence intervals. See Appendix D for values. There were significant associations between mean daily emergency admissions and year in all of the Games periods using ANOVA (all periods: $P < 0.001$).

Table 3: Emergency hospital admission characteristic for acute alcohol specific conditions in London by Olympic Game period in 2012

| | | Before n=1,047* | During n=1,271* | After n=1,213* | P |
|--------------------|------------------------|--------------------|--------------------|-------------------|----|
| Gender | Male | 71.7% | 71.9% | 71.6% | NS |
| | Female | 28.3% | 28.1% | 28.4% | |
| Age | 0-34 years | 26.3% | 26.0% | 23.7% | NS |
| | 35-54 years | 45.1% | 47.5% | 47.4% | |
| | 55-74 years | 24.4% | 22.7% | 24.7% | |
| | 75 and over | 4.2% | 3.9% | 4.1% | |
| Ethnicity | White British | 51.5% | 50.3% | 53.1% | NS |
| | White Other | 17.6% | 18.4% | 15.7% | |
| | Asian or Asian British | 6.5% | 7.1% | 7.2% | |
| | Black or Black British | 5.5% | 6.4% | 8.1% | |
| | Other**/Refused | 18.9% | 17.9% | 16.0% | |
| Deprivation | 1 (least deprived) | 4.8% | 4.5% | 4.0% | NS |
| | 2 | 9.5% | 10.0% | 8.6% | |
| | 3 | 16.1% | 14.5% | 16.1% | |
| | 4 | 33.0% | 34.3% | 32.5% | |
| | 5 (most deprived) | 36.6% | 36.7% | 38.8% | |

Cells may not sum to 100% due to rounding. * Total sample size for the deprivation analysis was 951 for before the Olympic Games, 1,155 for during and 1,104 for after. ** Other refers to Chinese, Mixed and other (undefined). NS = Not significant.

Table 4: Emergency hospital admission characteristics for acute alcohol specific conditions in London by Paralympic period in 2012

| | | Before n=1,213* | During n=923* | After n=963* | P |
|--------------------|------------------------|--------------------|------------------|-----------------|----|
| Gender | Male | 71.6% | 73.7% | 75.4% | NS |
| | Female | 28.4% | 26.3% | 24.6% | |
| Age | 0-34 years | 23.7% | 24.6% | 22.8% | NS |
| | 35-54 years | 47.4% | 45.7% | 44.7% | |
| | 55-74 years | 24.7% | 25.2% | 28.7% | |
| | 75 and over | 4.1% | 4.4% | 3.8% | |
| Ethnicity | White British | 53.1% | 55.7% | 53.8% | NS |
| | White Other | 15.7% | 16.4% | 15.4% | |
| | Asian or Asian British | 7.2% | 5.9% | 7.9% | |
| | Black or Black British | 8.1% | 6.7% | 5.4% | |
| | Other**/Refused | 16.0% | 15.4% | 17.5% | |
| Deprivation | 1 (least deprived) | 4.0% | 3.9% | 6.2% | NS |
| | 2 | 8.6% | 10.7% | 10.2% | |
| | 3 | 16.1% | 15.2% | 15.4% | |
| | 4 | 32.5% | 33.3% | 33.3% | |
| | 5 (most deprived) | 38.8% | 36.9% | 34.9% | |

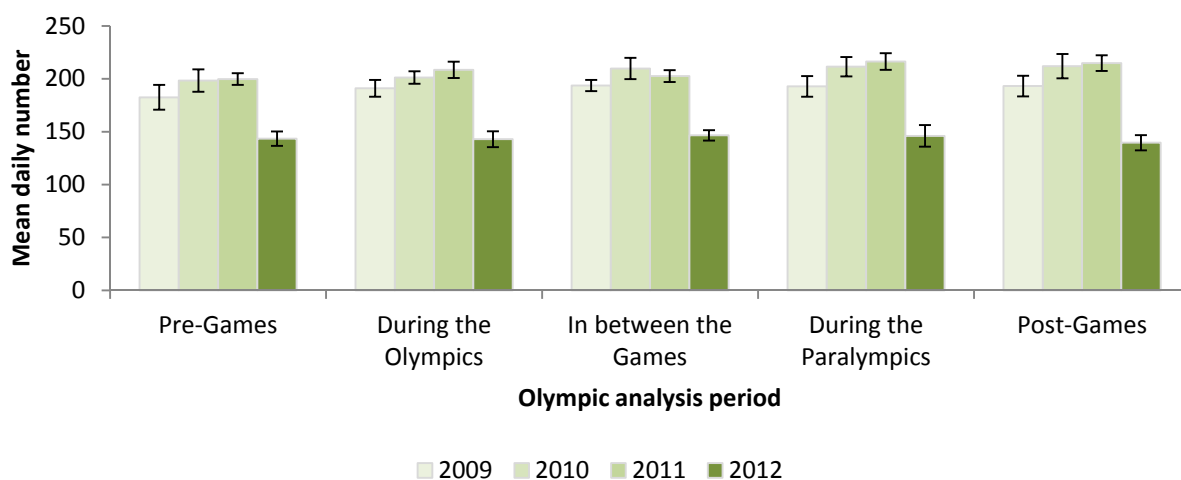
Cells may not sum to 100% due to rounding. * Total sample size for the deprivation analysis was 1,104 for before the Paralympic Games, 850 for during and 876 for after. ** Other refers to Chinese, Mixed and other (undefined). NS = Not significant.

Emergency admissions for alcohol-related external causes during the Games (London only)

In the 2012 London Olympic period, there were a total of 2,430 emergency hospital admissions for alcohol-related external causes in London (daily mean: 142.9 emergency admissions). The busiest day for emergency hospital admissions during the Olympics was Sunday 29th July 2012 (day three of the Olympics), when 176 emergency admissions were recorded. During the Paralympics, 1,753 hospital emergency admissions for alcohol-related external causes recorded were made in London (daily mean: 146.1 emergency admissions). The busiest day for emergency hospital admissions during the Paralympic period was Saturday 8th September 2012 (day 11 of the Paralympics), when 182 emergency admissions were recorded. Figure 4 shows the mean daily number of emergency hospital admissions for the pre-Olympics period, during the Olympics, in between the Games, during the Paralympics and post Olympics, and for the equivalent periods in 2009, 2010 and 2011. There were significant differences between 2009 and 2012 in all of the Games periods. Whilst the numbers of emergency hospital admissions for diabetes mellitus fluctuated, overall in the Olympic period, the number of admissions decreased by 25.2% between 2009 and 2012. Similarly in the Paralympic period, despite fluctuating, the number of emergency admissions decreased by 24.3%. After correcting for day of the week, year, bank holiday, other events (music, other sport, carnival, other Games), mean air temperature, London riots and number of team GB gold medals, neither the Olympics nor the Paralympics were associated with a significant change in the number of emergency hospital admissions (see Appendix D). There was no significant association with the number of Gold medals won by Team GB; however, the dates of the Olympic warm up events were associated with a significant decrease (by 5.9%).

In 2012 for both the Olympics and Paralympics, emergency admissions for alcohol-related external causes were most commonly made by males, those classified as White British, and individuals residing in the two lowest deprivation quintiles (Tables 5 and 6). Age was evenly distributed with the most common age category being 0 to 34 year olds for both the Olympics and Paralympics. There were no significant differences in emergency admission characteristics in the Olympic period compared with before and after the Olympics in 2012. This was also the case for the Paralympic period. Overall, the rate of repeat emergency admission for alcohol-related external causes in London has fluctuated since 2009, peaking in 2011 at 5.1% of people being admitted as an emergency admission for an alcohol-related external cause and then decreasing in 2012 to 3.8% (see Appendix D). This pattern remained constant even after correcting for changes in demography (gender, age, ethnicity and deprivation).

Figure 4: Mean daily number of emergency hospital admissions for alcohol-related external causes in London by Olympic period in 2012 and equivalent periods in 2009-2011



Error bars represent the 95% confidence intervals. See Appendix D for values. There were significant associations between mean daily emergency admissions and year in all of the Games periods using ANOVA (all periods: $P < 0.001$).

Table 5: Emergency hospital admission characteristics for alcohol-related external causes in London by Olympic period in 2012

| | | Before n=2,009* | During n=2,430* | After n=2,345* | P |
|--------------------|------------------------|--------------------|--------------------|-------------------|----|
| Gender | Male | 61.0% | 61.7% | 61.3% | NS |
| | Female | 39.0% | 38.3% | 38.7% | |
| Age | 0-34 years | 28.4% | 29.0% | 30.9% | NS |
| | 35-54 years | 24.0% | 26.8% | 26.0% | |
| | 55-74 years | 23.2% | 22.6% | 22.0% | |
| | 75 and over | 24.4% | 21.6% | 21.0% | |
| Ethnicity | White British | 51.6% | 51.3% | 52.0% | NS |
| | White Other | 13.0% | 13.4% | 12.8% | |
| | Asian or Asian British | 7.7% | 9.0% | 8.4% | |
| | Black or Black British | 7.7% | 7.1% | 6.7% | |
| | Other**/Refused | 20.1% | 19.2% | 20.0% | |
| Deprivation | 1 (least deprived) | 9.4% | 9.6% | 9.7% | NS |
| | 2 | 12.1% | 12.9% | 12.8% | |
| | 3 | 19.0% | 17.3% | 19.0% | |
| | 4 | 30.7% | 30.2% | 30.6% | |
| | 5 (most deprived) | 28.9% | 30.0% | 27.9% | |

Cells may not sum to 100% due to rounding. * Total sample size for the deprivation analysis was 1,951 for before the Olympic Games, 2,353 for during and 2,259 for after. ** Other refers to Chinese, Mixed and other (undefined). NS = Not significant.

Table 6: Emergency hospital admission characteristics for alcohol-related external causes in London by Paralympic period in 2012

| | | Before n=2,345* | During n=1,753* | After n=1,955* | P |
|--------------------|------------------------|--------------------|--------------------|-------------------|----|
| Gender | Male | 61.3% | 61.3% | 62.4% | NS |
| | Female | 38.7% | 38.7% | 37.6% | |
| Age | 0-34 years | 30.9% | 28.6% | 29.6% | NS |
| | 35-54 years | 26.0% | 25.8% | 24.0% | |
| | 55-74 years | 22.0% | 22.3% | 23.1% | |
| | 75 and over | 21.0% | 23.3% | 23.3% | |
| Ethnicity | White British | 52.0% | 53.9% | 52.2% | NS |
| | White Other | 12.8% | 12.4% | 14.1% | |
| | Asian or Asian British | 8.4% | 7.5% | 7.9% | |
| | Black or Black British | 6.7% | 7.0% | 5.6% | |
| | Other**/Refused | 20.0% | 19.2% | 20.3% | |
| Deprivation | 1 (least deprived) | 9.7% | 9.6% | 8.9% | NS |
| | 2 | 12.8% | 13.0% | 13.5% | |
| | 3 | 19.0% | 18.2% | 19.4% | |
| | 4 | 30.6% | 28.8% | 31.7% | |
| | 5 (most deprived) | 27.9% | 30.4% | 26.5% | |

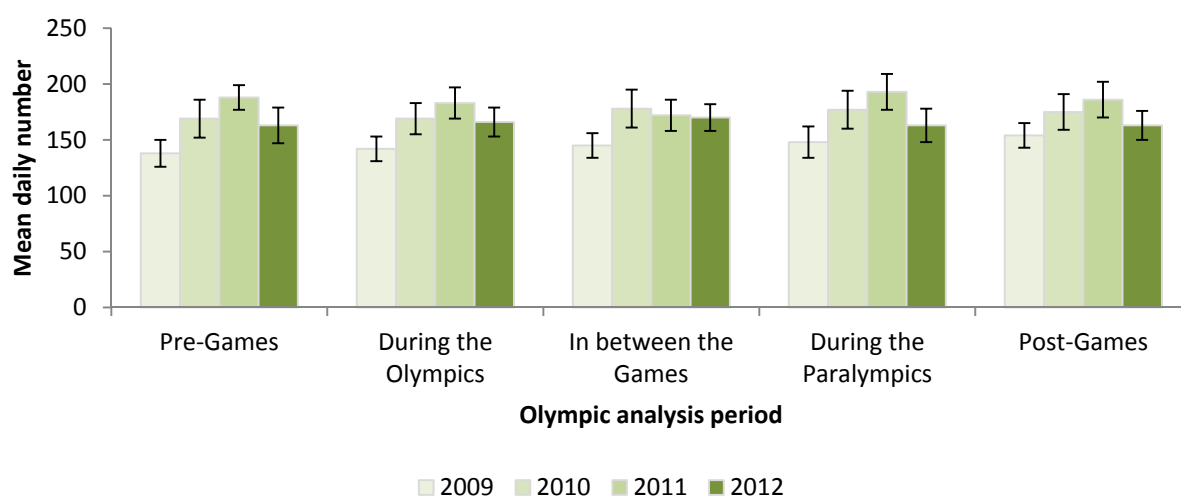
Cells may not sum to 100% due to rounding. * Total sample size for the deprivation analysis was 2,259 for before the Paralympic Games, 1,701 for during and 1,903 for after. ** Other refers to Chinese, Mixed and other (undefined). NS = Not significant.

Emergency admissions for diabetes mellitus during the Games (London only)

In the 2012 London Olympic period, there were a total of 2,814 emergency hospital admissions for diabetes mellitus in London (daily mean: 165.3 emergency admissions). The busiest day for emergency hospital admissions during the Olympics was Friday 3rd August 2012 (day eight of the Olympics), when 202 emergency admissions were recorded. During the Paralympics, 1,956 emergency hospital admissions for diabetes mellitus were made in London (daily mean: 163.0 emergency admissions). The busiest day for emergency hospital admissions during the Paralympics was Tuesday 4th September 2012 (day seven of the Paralympics), when 199 admissions were recorded. Figure 5 shows the mean daily number of emergency hospital admissions for the pre-Olympics period, during the Olympics, in between the Games, during the Paralympics and post Olympics, and for equivalent periods in 2009, 2010 and 2011. There were significant differences from 2009 to 2012 in all Games periods. Whilst the numbers of emergency admissions fluctuated, overall in the Olympic period, the number of callouts increased by 16.5% from 2009 to 2012. Similarly during the Paralympics, despite fluctuating, the number of emergency admissions increased by 10.1%. After correcting for day of the week, year, bank holiday, other events (music, other sport, carnival, other Games), mean air temperature, London riots and number of team GB gold medals, neither the Olympics nor the Paralympics were associated with a significant increase in the number of emergency hospital admissions (see Appendix D). There was no significant association with the number of Gold medals won by Team GB; however, the dates of the Olympic warm up events were associated with a significant decrease (by 7.0%).

In 2012 for both the Olympics and Paralympics, emergency admissions for diabetes mellitus were most commonly made by males and by those aged 55 to 74 years old, those classified as White British and those living in the two most deprived quintiles (Tables 7 and 8). There were no significant differences in emergency admission characteristics in the Olympic period compared with before and after the Olympics in 2012. For the Paralympics, there was a significant decrease in Asian or Asian British emergency admissions compared with before and after the Paralympics in 2012. Overall, the rate of repeat emergency admission for diabetes mellitus in London has increased from 13.4% of people being admitted for diabetes mellitus in 2009 to 15.1% in 2012. The increase remained significant after correcting for demographic changes (gender, age, ethnicity and deprivation; Appendix D). However, the difference was only apparent when comparing 2012 with 2009; the rates of repeat emergency admission were similar when comparing 2012 with 2010 or 2011.

Figure 5: Mean daily number of emergency hospital admissions for diabetes mellitus in London by Olympic period in 2012 and equivalent periods in 2009-2011



Error bars represent the 95% confidence intervals. See Appendix D for values. There were significant associations between mean daily emergency admission and year in all of the Games periods using ANOVA (pre-Games, Olympics, and Paralympic: $P < 0.001$; in between the Games and post-Games: $P < 0.01$).

Table 7: Emergency hospital admission characteristics for diabetes mellitus in London by Olympic period in 2012

| | | Before n=2,286* | During n=2,814* | After n=2,717* | P |
|--------------------|------------------------|--------------------|--------------------|-------------------|----|
| Gender | Male | 63.4% | 61.3% | 61.1% | NS |
| | Female | 36.6% | 38.7% | 38.9% | |
| Age | 0-34 years | 0.6% | 0.8% | 0.8% | NS |
| | 35-54 years | 12.6% | 12.5% | 14.3% | |
| | 55-74 years | 48.5% | 49.9% | 49.2% | |
| | 75 and over | 38.3% | 36.8% | 35.7% | |
| Ethnicity | White British | 40.4% | 39.9% | 38.4% | NS |
| | White Other | 9.0% | 9.4% | 10.6% | |
| | Asian or Asian British | 23.1% | 23.4% | 24.1% | |
| | Black or Black British | 14.0% | 15.4% | 13.3% | |
| | Other**/Refused | 13.5% | 11.8% | 13.5% | |
| Deprivation | 1 (least deprived) | 7.0% | 7.4% | 6.8% | NS |
| | 2 | 11.7% | 11.1% | 11.7% | |
| | 3 | 18.5% | 17.6% | 18.3% | |
| | 4 | 31.6% | 31.2% | 30.9% | |
| | 5 (most deprived) | 31.2% | 32.7% | 32.2% | |

Cells may not sum to 100% due to rounding. * Total sample size for the deprivation analysis was 2,278 for before the Olympic Games, 2,795 for during and 2,698 for after. ** Other refers to Chinese, Mixed and other (undefined). NS = Not significant.

Table 8: Emergency hospital admission characteristics for diabetes mellitus in London by Paralympic period in 2012

| | | Before n=2,717* | During n=1,956* | After n=2,283* | P |
|--------------------|------------------------|--------------------|--------------------|-------------------|-------|
| Gender | Male | 61.1% | 62.6% | 62.5% | NS |
| | Female | 38.9% | 37.4% | 37.5% | |
| Age | 0-34 years | 0.8% | 0.6% | 0.4% | NS |
| | 35-54 years | 14.3% | 13.7% | 14.6% | |
| | 55-74 years | 49.2% | 48.5% | 49.7% | |
| | 75 and over | 35.7% | 37.3% | 35.3% | |
| Ethnicity | White British | 38.4% | 40.0% | 41.6% | <0.05 |
| | White Other | 10.6% | 10.5% | 10.2% | |
| | Asian or Asian British | 24.1% | 20.6% | 22.9% | |
| | Black or Black British | 13.3% | 14.2% | 12.4% | |
| | Other**/Refused | 13.5% | 14.7% | 13.0% | |
| Deprivation | 1 (least deprived) | 6.8% | 7.4% | 7.3% | NS |
| | 2 | 11.7% | 10.8% | 11.1% | |
| | 3 | 18.3% | 17.5% | 19.9% | |
| | 4 | 30.9% | 30.6% | 29.8% | |
| | 5 (most deprived) | 32.2% | 33.7% | 31.9% | |

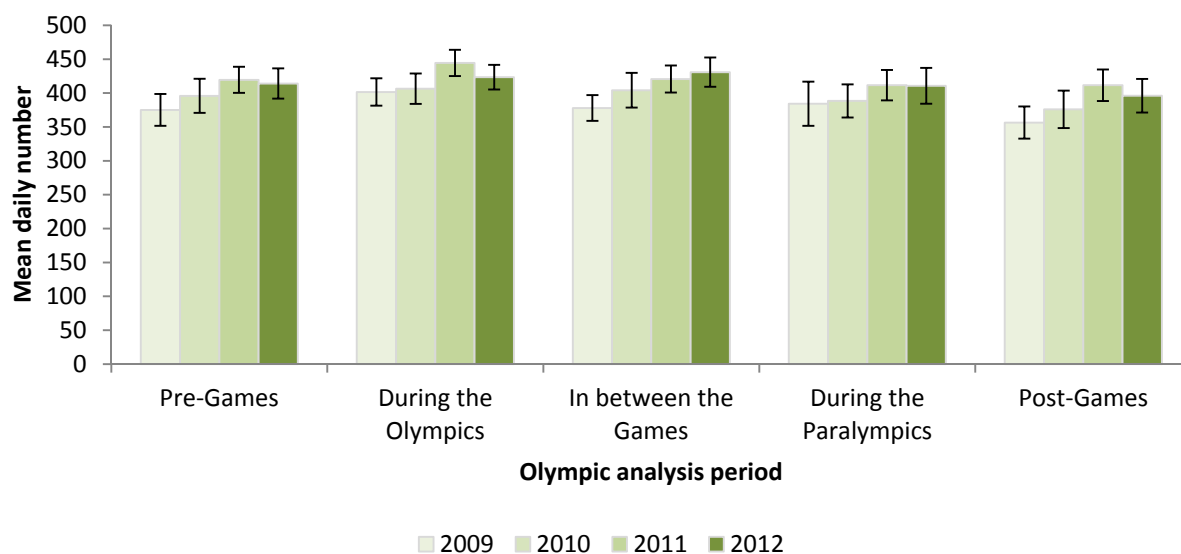
Cells may not sum to 100% due to rounding. * Total sample size for the deprivation analysis was 2,698 for before the Paralympic Games, 1,949 for during and 2,267 for after. ** Other refers to Chinese, Mixed and other (undefined). NS = Not significant.

Emergency admissions for acute alcohol specific conditions during the Games (outside London)

In the 2012 London Olympic period, there were a total of 7,200 emergency hospital admissions for acute alcohol specific conditions recorded outside London (daily mean: 423.5 emergency admissions). The busiest day for emergency hospital admissions for acute alcohol specific conditions during the Olympics was Sunday 29th July 2012 (day three of the Olympics), when 503 emergency admissions were recorded. During the Paralympics, 4,929 emergency hospital admissions were made for acute alcohol specific conditions outside London (daily mean: 410.8 emergency admissions). The busiest days for emergency hospital admissions during the Paralympic period were Saturday 1st September 2012 and Sunday 2nd September 2012 (days four and five of the Paralympics), when 471 emergency admissions were recorded on each day. Figure 6 shows the mean daily number of emergency hospital admissions for the pre-Olympics period, during the Olympics, in between the Games, during the Paralympics and post Olympics, and for the equivalent periods in 2009, 2010 and 2011. There were significant differences between 2009 and 2012 in all of the Games periods, except the Paralympics. Whilst the numbers of emergency admissions fluctuated, overall in the Olympic period, the number of emergency admissions increased by 5.5% between 2009 and 2012. After correcting for day of the week, year, bank holiday, other events (music, other sport, carnival, other Games), mean air temperature, London riots and number of team GB gold medals, neither the Olympics nor the Paralympics were associated with a significant increase in the number of emergency hospital admissions (see Appendix E). Further, there was no significant association with the number of Gold medals won by Team GB.

In 2012 for both the Olympics and Paralympics, emergency admissions for acute alcohol specific conditions outside London were most commonly made by males and those aged 35 to 54 years, those classified as White British and individuals residing in the most deprived quintile (Tables 9 and 10). There were no significant differences in emergency admission characteristics in the Olympic period compared with before and after the Olympics in 2012. This was also the case for the Paralympic period. Overall, the rate of repeat emergency admission for acute alcohol specific conditions outside London has fluctuated since 2009 peaking in 2011 at 9.9% of those admitted as an emergency for an acute alcohol specific condition and then decreasing slightly to 9.7% in 2012 (see Appendix E). This pattern remained stable after correcting for changes in demography (gender, age, ethnicity and deprivation).

Figure 6: Mean daily number of emergency hospital admissions for acute alcohol specific conditions outside London by Olympic period in 2012 and equivalent periods in 2009-2011



Error bars represent the 95% confidence intervals. See Appendix E for values. There were significant associations between mean daily emergency admission and year in all of the Games periods using ANOVA (pre-Games: $P < 0.05$; Olympics, in between the Games and post-Games: $P < 0.01$), except for the Paralympics.

Table 9: Emergency hospital admission characteristics for acute alcohol specific conditions outside London by Olympic period in 2012

| | | Before n=5,798* | During n=7,200* | After n=6,894* | P |
|--------------------|------------------------|--------------------|--------------------|-------------------|----|
| Gender | Male | 65.5% | 65.5% | 65.8% | NS |
| | Female | 34.5% | 34.5% | 34.2% | |
| Age | 0-34 years | 29.3% | 28.4% | 27.6% | NS |
| | 35-54 years | 44.7% | 46.2% | 46.3% | |
| | 55-74 years | 22.7% | 21.5% | 22.3% | |
| | 75 and over | 3.3% | 3.8% | 3.8% | |
| Ethnicity | White British | 86.9% | 86.8% | 86.8% | NS |
| | White Other | 3.2% | 3.5% | 3.5% | |
| | Asian or Asian British | 1.5% | 1.1% | 1.3% | |
| | Black or Black British | 0.4% | 0.8% | 0.5% | |
| | Other**/Refused | 8.0% | 7.8% | 8.0% | |
| Deprivation | 1 (least deprived) | 9.5% | 9.2% | 9.3% | NS |
| | 2 | 11.7% | 12.3% | 12.3% | |
| | 3 | 16.6% | 16.4% | 16.1% | |
| | 4 | 22.5% | 22.9% | 22.2% | |
| | 5 (most deprived) | 39.7% | 39.2% | 40.1% | |

Cells may not sum to 100% due to rounding. * Total sample size for the deprivation analysis was 5,599 for before the Olympic Games, 6,968 for during and 6,685 for after. ** Other refers to Chinese, Mixed and other (undefined). NS = Not significant.

Table 10: Emergency hospital admission characteristics for acute alcohol specific conditions outside London by Paralympic period in 2012

| | | Before n=6,894* | During n=4,929* | After n=5,544* | P |
|--------------------|------------------------|--------------------|--------------------|-------------------|----|
| Gender | Male | 65.8% | 66.4% | 67.3% | NS |
| | Female | 34.2% | 33.6% | 32.7% | |
| Age | 0-34 years | 27.6% | 29.7% | 29.3% | NS |
| | 35-54 years | 46.3% | 46.1% | 44.0% | |
| | 55-74 years | 22.3% | 20.7% | 22.8% | |
| | 75 and over | 3.8% | 3.5% | 3.9% | |
| Ethnicity | White British | 86.8% | 86.4% | 86.5% | NS |
| | White Other | 3.5% | 3.0% | 3.6% | |
| | Asian or Asian British | 1.3% | 1.4% | 1.7% | |
| | Black or Black British | 0.5% | 0.6% | 0.6% | |
| | Other**/Refused | 8.0% | 8.6% | 7.6% | |
| Deprivation | 1 (least deprived) | 9.3% | 9.1% | 9.0% | NS |
| | 2 | 12.3% | 12.3% | 12.2% | |
| | 3 | 16.1% | 16.1% | 16.3% | |
| | 4 | 22.2% | 23.4% | 23.0% | |
| | 5 (most deprived) | 40.1% | 39.1% | 39.4% | |

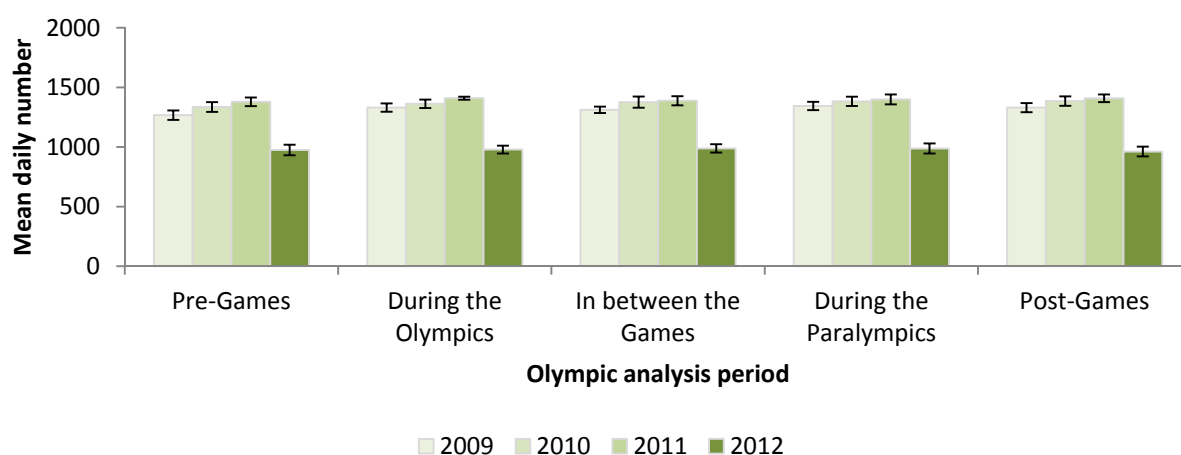
Cells may not sum to 100% due to rounding. * Total sample size for the deprivation analysis was 6,685 for before the Paralympic Games, 4,760 for during and 5,379 for after. ** Other refers to Chinese, Mixed and other (undefined). NS = Not significant.

Emergency admissions for alcohol-related external causes during the Games (outside London)

In the 2012 London Olympic period, there were a total of 16,630 hospital emergency admissions for alcohol-related external causes recorded outside London (daily mean: 978.2 emergency admissions). The busiest day for emergency hospital admissions during the Olympics was Sunday 12th August 2012 (the last day of the Olympics), when 1,110 emergency admissions were recorded. During the Paralympics, 11,847 emergency hospital admissions were made for alcohol-related external causes recorded outside London (daily mean: 987.3 emergency admissions). The busiest day for emergency hospital admissions during the Paralympic period was Sunday 9th September 2012 (the last day of the Paralympics), when 1,106 emergency admissions were recorded. Figure 7 shows the mean daily number of emergency hospital admissions for the pre-Olympics period, during the Olympics, in between the Games, during the Paralympics and post Olympics, and for equivalent periods in 2009, 2010 and 2011. There were significant differences between 2009 and 2012 in all Games periods. Whilst the numbers of emergency admissions fluctuated, overall in the Olympic period, the number of emergency admissions decreased by 26.4% between 2009 and 2012. Similarly in the Paralympic period, despite fluctuating, the number of admissions also decreased by 26.5%. After correcting for day of the week, year, bank holiday, other events (music, other sport, carnival, other Games), mean air temperature, London riots and number of team GB gold medals, neither the Olympics nor the Paralympics were associated with a significant increase in the number of emergency hospital admissions (see Appendix E). Further, there was no significant association with the number of Gold medals won by Team GB.

In 2012 for both the Olympics and Paralympics, emergency admissions for alcohol-related external causes outside London were more commonly made by males, those classified as White British and those residing in the most deprived quintile (Tables 11 and 12). Age was evenly distributed with the most common category being 0 to 34 year olds and 35 to 54 year olds for the Olympics, and 35 to 54 year olds for the Paralympics. For the Olympics, there was a significant decrease in Asian or Asian British emergency admissions and a significant increase in Black or Black British emergency admissions compared with before and after the Olympics in 2012 (although numbers were small). For the Paralympics, there was a significant increase in 35-54 year olds compared with before and after the Paralympics in 2012 and a significant decrease in White British emergency admissions. Overall, the rate of repeat emergency admission for alcohol-related external causes outside London has fluctuated since 2009, peaking in 2011 at 4.9% of people being admitted for an alcohol-related external cause and then decreasing in 2012 to 4.5% (see Appendix E). This pattern remained even after correcting for changes in demography (gender, age, ethnicity and deprivation).

Figure 7: Mean daily number of emergency hospital admissions for alcohol-related external causes outside London by Olympic period in 2012 and equivalent periods in 2009-2011



Error bars represent the 95% confidence intervals. See Appendix E for values. There were significant associations between mean daily emergency admission and year in all of the Games periods using ANOVA (all periods: $P < 0.001$).

Table 11: Emergency hospital admission characteristics for alcohol-related external causes outside London by Olympic period in 2012

| | | Before n=13,642* | During n=16,630* | After n=15,811* | P |
|--------------------|------------------------|---------------------|---------------------|--------------------|-------|
| Gender | Male | 58.3% | 58.1% | 58.2% | NS |
| | Female | 41.7% | 41.9% | 41.8% | |
| Age | 0-34 years | 27.9% | 28.8% | 27.8% | NS |
| | 35-54 years | 26.1% | 25.7% | 26.5% | |
| | 55-74 years | 22.4% | 22.6% | 22.7% | |
| | 75 and over | 23.6% | 23.0% | 23.0% | |
| Ethnicity | White British | 86.6% | 86.5% | 87.1% | <0.05 |
| | White Other | 3.0% | 3.0% | 2.9% | |
| | Asian or Asian British | 1.9% | 1.7% | 2.0% | |
| | Black or Black British | 0.4% | 0.7% | 0.5% | |
| | Other**/Refused | 8.0% | 8.1% | 7.5% | |
| Deprivation | 1 (least deprived) | 14.9% | 14.6% | 15.0% | NS |
| | 2 | 17.2% | 16.7% | 16.8% | |
| | 3 | 18.9% | 19.3% | 18.9% | |
| | 4 | 20.9% | 21.2% | 21.0% | |
| | 5 (most deprived) | 28.1% | 28.2% | 28.2% | |

Cells may not sum to 100% due to rounding. * Total sample size for the deprivation analysis was 13,467 for before the Olympic Games, 16,446 for during and 15,625 for after. ** Other refers to Chinese, Mixed and other (undefined). NS = Not significant.

Table 12: Emergency hospital admission characteristics for alcohol-related external causes outside London by Paralympic period in 2012

| | | Before n=15,811* | During n=11,847* | After n=13,461* | P |
|--------------------|------------------------|---------------------|---------------------|--------------------|-------|
| Gender | Male | 58.2% | 58.1% | 58.3% | NS |
| | Female | 41.8% | 41.9% | 41.7% | |
| Age | 0-34 years | 27.8% | 27.1% | 27.9% | NS |
| | 35-54 years | 26.5% | 27.0% | 25.7% | |
| | 55-74 years | 22.7% | 22.4% | 22.7% | |
| | 75 and over | 23.0% | 23.4% | 23.6% | |
| Ethnicity | White British | 87.1% | 86.1% | 86.5% | <0.01 |
| | White Other | 2.9% | 2.9% | 3.1% | |
| | Asian or Asian British | 2.0% | 1.7% | 1.9% | |
| | Black or Black British | 0.5% | 0.6% | 0.7% | |
| | Other**/Refused | 7.5% | 8.6% | 7.8% | |
| Deprivation | 1 (least deprived) | 15.0% | 15.0% | 14.9% | NS |
| | 2 | 16.8% | 16.8% | 17.2% | |
| | 3 | 18.9% | 19.4% | 18.9% | |
| | 4 | 21.0% | 21.2% | 20.8% | |
| | 5 (most deprived) | 28.2% | 27.5% | 28.1% | |

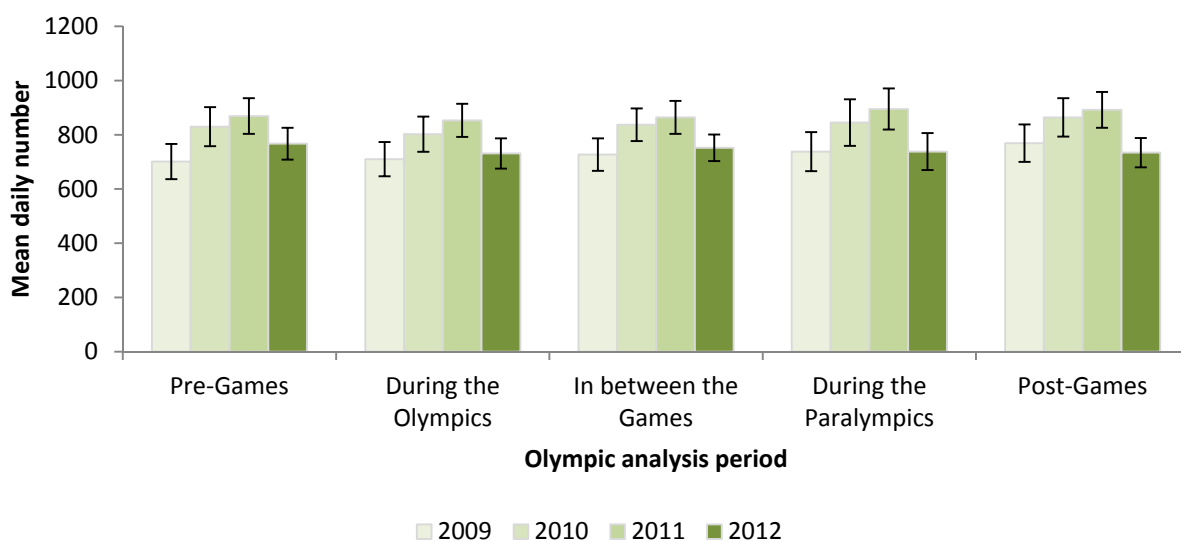
Cells may not sum to 100% due to rounding. * Total sample size for the deprivation analysis was 15,625 for before the Paralympic Games, 11,697 for during and 13,308 for after. ** Other refers to Chinese, Mixed and other (undefined). NS = Not significant.

Emergency admissions for diabetes mellitus during the Games (outside London)

In the 2012 London Olympic period, there were a total of 12,435 emergency hospital admissions for diabetes mellitus conditions recorded outside London (daily mean: 731.5 emergency admissions). The busiest day for emergency hospital admissions during the Olympics was Tuesday 7th August 2012 (day 12 of the Olympics), when 846 emergency admissions were recorded. During the Paralympics, 8,852 emergency hospital admissions were made for diabetes mellitus conditions outside London (daily mean: 737.7 emergency admissions). The busiest day for emergency hospital admissions during the Paralympic period was Friday 7th September 2012 (day ten of the Paralympics), when 868 emergency admissions were recorded. Figure 8 shows the mean daily number of hospital admissions for the pre-Olympics period, during the Olympics, in between the Games, during the Paralympics and post Olympics, and for equivalent periods in 2009, 2010 and 2011. There were significant differences between 2009 and 2012 in all Games periods. Despite fluctuations, overall in the Olympic period, the number of emergency admissions increased by 3.0% between 2009 and 2012. Similarly in the Paralympic period, despite fluctuating, overall the number of emergency admissions in 2012 was comparable to the number in 2009. After correcting for day of the week, year, bank holiday, other events (music, other sport, carnival, other Games), mean air temperature, London riots and number of team GB gold medals, neither the Olympics nor the Paralympics were associated with a significant increase in the number of emergency hospital admissions (see Appendix E). Further, there was no significant association with the number of Gold medals won by Team GB.

In 2012 for both the Olympics and Paralympics, emergency admissions for diabetes mellitus outside London were most commonly made by males, those aged 55 to 74 years old, those classified as White British and those living in the most deprived quintile (Tables 13 and 14). There were no significant differences in emergency admission characteristics in the Olympic period compared with before and after the Olympics in 2012. This was also the case for the Paralympic period. The rate of repeat emergency admission for diabetes mellitus outside London has fluctuated over time, decreasing overall from 4.3% of people being admitted as an emergency admission for diabetes mellitus in 2009 to 3.8% in 2012. The rate of repeat emergency admission remained stable after correcting for changes in demography (gender, age, ethnicity and deprivation; see Appendix E).

Figure 8: Mean daily number of emergency hospital admissions for diabetes mellitus outside London by Olympic period in 2012 and equivalent periods in 2009-2011



Error bars represent the 95% confidence intervals. See Appendix E for values. There were significant associations between mean daily emergency admission and year in all of the Games periods using ANOVA (all periods: $P < 0.01$).

Table 13: Emergency hospital admission characteristics for diabetes mellitus outside London by Olympic period in 2012

| | | Before n=10,737* | During n=12,435* | After n=12,037* | P |
|--------------------|------------------------|---------------------|---------------------|--------------------|----|
| Gender | Male | 65.7% | 64.2% | 64.6% | NS |
| | Female | 34.3% | 35.8% | 35.4% | |
| Age | 0-34 years | 0.6% | 0.6% | 0.6% | NS |
| | 35-54 years | 11.5% | 12.0% | 12.3% | |
| | 55-74 years | 47.1% | 47.8% | 46.4% | |
| | 75 and over | 40.8% | 39.6% | 40.7% | |
| Ethnicity | White British | 83.3% | 84.0% | 83.9% | NS |
| | White Other | 2.7% | 2.7% | 2.7% | |
| | Asian or Asian British | 7.1% | 6.7% | 7.0% | |
| | Black or Black British | 1.6% | 1.4% | 1.5% | |
| | Other**/Refused | 5.2% | 5.2% | 5.0% | |
| Deprivation | 1 (least deprived) | 14.2% | 14.0% | 13.8% | NS |
| | 2 | 17.1% | 17.6% | 17.4% | |
| | 3 | 19.3% | 19.7% | 19.8% | |
| | 4 | 21.5% | 20.8% | 21.1% | |
| | 5 (most deprived) | 27.9% | 27.8% | 27.9% | |

Cells may not sum to 100% due to rounding. * Total sample size for the deprivation analysis was 10,710 for before the Olympic Games, 12,406 for during and 12,017 for after. ** Other refers to Chinese, Mixed and other (undefined). NS = Not significant.

Table 14: Emergency hospital admission characteristics for diabetes mellitus outside London by Paralympic period in 2012

| | | Before n=12,037* | During n=8,852* | After n=10,314* | P |
|--------------------|------------------------|---------------------|--------------------|--------------------|----|
| Gender | Male | 64.6% | 63.9% | 64.0% | NS |
| | Female | 35.4% | 36.1% | 36.0% | |
| Age | 0-34 years | 0.6% | 0.7% | 0.5% | NS |
| | 35-54 years | 12.3% | 11.9% | 12.0% | |
| | 55-74 years | 46.4% | 45.8% | 46.1% | |
| | 75 and over | 40.7% | 41.7% | 41.3% | |
| Ethnicity | White British | 83.9% | 83.0% | 83.8% | NS |
| | White Other | 2.7% | 2.9% | 2.7% | |
| | Asian or Asian British | 7.0% | 7.0% | 6.9% | |
| | Black or Black British | 1.5% | 1.6% | 1.9% | |
| | Other**/Refused | 5.0% | 5.4% | 4.7% | |
| Deprivation | 1 (least deprived) | 13.8% | 14.5% | 14.1% | NS |
| | 2 | 17.4% | 17.0% | 17.8% | |
| | 3 | 19.8% | 19.7% | 19.3% | |
| | 4 | 21.1% | 20.4% | 21.5% | |
| | 5 (most deprived) | 27.9% | 28.4% | 27.4% | |

Cells may not sum to 100% due to rounding. * Total sample size for the deprivation analysis was 12,017 for before the Paralympic Games, 8,836 for during and 10,298 for after. ** Other refers to Chinese, Mixed and other (undefined). NS = Not significant.

5.2.2. Ambulance callouts

All ambulance callouts (London only)

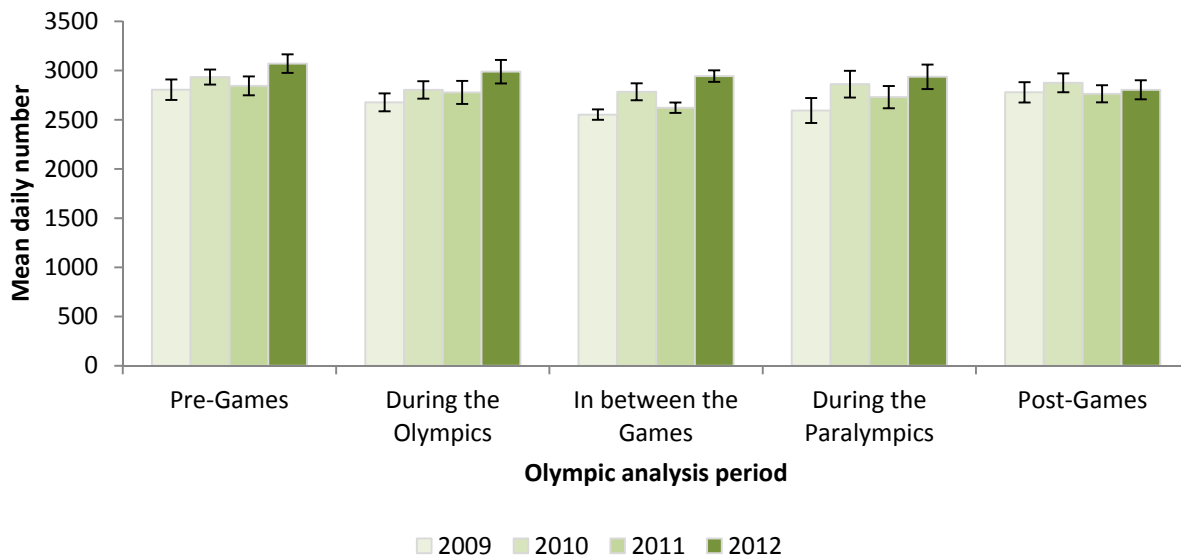
In the 2012 London Olympic period, there were a total of 50,812 ambulance callouts recorded by the London Ambulance Service. This equated to a mean of 2,989 ambulance callouts per day (95% CI: 2,869-3,109). Gender of callouts was evenly distributed (male and female: 47% each), as was age (the most common age category was 18 to 34 year olds, 23%). The busiest day for ambulance callouts during the Olympics was the first day of the Olympics (Friday 27th July 2012), when 3,529 ambulance callouts were recorded. During the Paralympics, 35,238 ambulance callouts were recorded, equating to a mean of 2,937 ambulance callouts per day (95% CI: 2,812-3,061). As with callouts during the Olympics, gender of callouts was evenly distributed (male: 48%; female: 49%) as was age (although here, the most common age category was 75 years and over, 24%). The busiest day for ambulance callouts during the Paralympic period was Friday 7th September 2012 (day ten of the Paralympics), when 3,270 callouts were recorded. Figure 9 shows the mean daily number of ambulance callouts for the pre-Games period, during the Olympics, in between the Games, during the Paralympics and post-Games, and for the equivalent periods in 2009, 2010 and 2011. There were significant differences between individual years in all of the Olympic periods, except post-Games. Pre-Games, during Olympics and in between the Games in 2012, ambulance callouts were significantly higher than in the equivalent periods in all of the previous years (2009-2011). During the Paralympics in 2012, callout rates were also significantly higher than in previous years but the same period in 2010 also experienced similarly high levels. Overall in the Olympic period, the number of callouts increased by 11.7% between 2009 and 2012. In the Paralympic period, the number of callouts increased by 13%. However, for both the Olympics and the Paralympics, there was no significant difference in the number of ambulance callouts compared with the same days in previous years after correcting for day of the week, year, bank holiday, other events (music, other sport, carnival, other Games), mean air temperature, London riots and number of team GB gold medals. The occurrence of other Games events (the London torch relay events and the Greatest Team Parade) was associated with a 4.6% increase in callouts compared with the same days in the previous years (see Appendix F).

Assault-related ambulance callouts (London only)

In the 2012 London Olympic period, 1,947 ambulance callouts for assaults were recorded by the London Ambulance Service (4% of callouts overall). This equated to a mean of 115 ambulance callouts for assault per day (95% CI: 94-136). The majority of assault callouts were for males (male: 64%; female: 32%), and the most common age group was 18 to 34 year olds (50%). The busiest day for ambulance callouts for assaults during the Olympic period was Friday 10th August 2012 (day 15 of the Olympics), when 184 callouts were recorded. During the Paralympic period, there were a total of 1,283 ambulance callouts for assault recorded, equating to a mean of 107 callouts per day (95% CI: 87-127). As with assault callouts during the Olympics, the majority of assault callouts were for males (male: 67%; female: 29%), and the most common age group was 18 to 34 year olds (50%). The busiest day for ambulance callouts for assaults during the Paralympic period was Saturday 1st September 2012 (day four of the Paralympics), when 164 callouts were recorded. Figure 10 shows the mean daily number of ambulance callouts for the periods pre-Games, during the Olympics, in between the Games, during the Paralympics and post-Games, and for the equivalent periods in 2009, 2010 and 2011. There were no significant differences between years for the Olympic or Paralympic period. However, after correcting for day of the week, year, bank holiday, other events (music, other sport, carnival, other Games), mean air temperature, London riots and number of team GB gold medals, both the Olympics

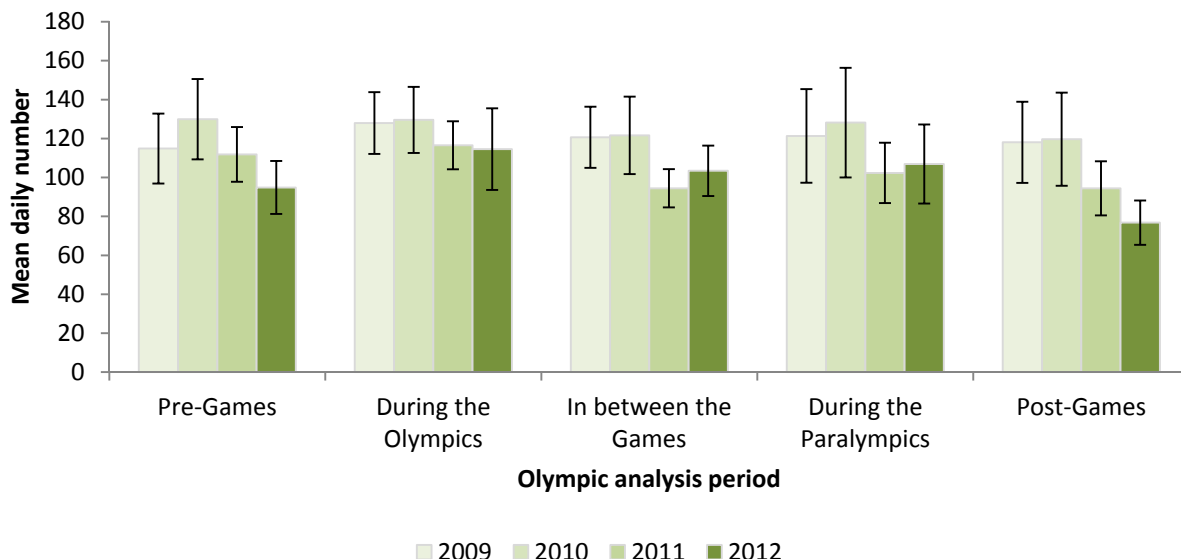
and Paralympics showed a significant increase in the number of ambulance callouts for assaults compared with the same days in previous years (Olympics: by 12%; Paralympics by 11%; see Appendix F).

Figure 9: Mean daily number of ambulance callouts to the London Ambulance Service by Olympic period in 2012 and equivalent periods in 2009-2011



Error bars represent the 95% confidence intervals. See Appendix F for values. There were significant associations between mean daily presentation and year in all of the Olympic periods using ANOVA (pre, during Olympics and in between Games: $P < 0.001$; Paralympics: $P < 0.01$), except post-Games.

Figure 10: Mean daily number of ambulance callouts for assaults to the London Ambulance Service by Olympic period in 2012 and equivalent periods in 2009-2011



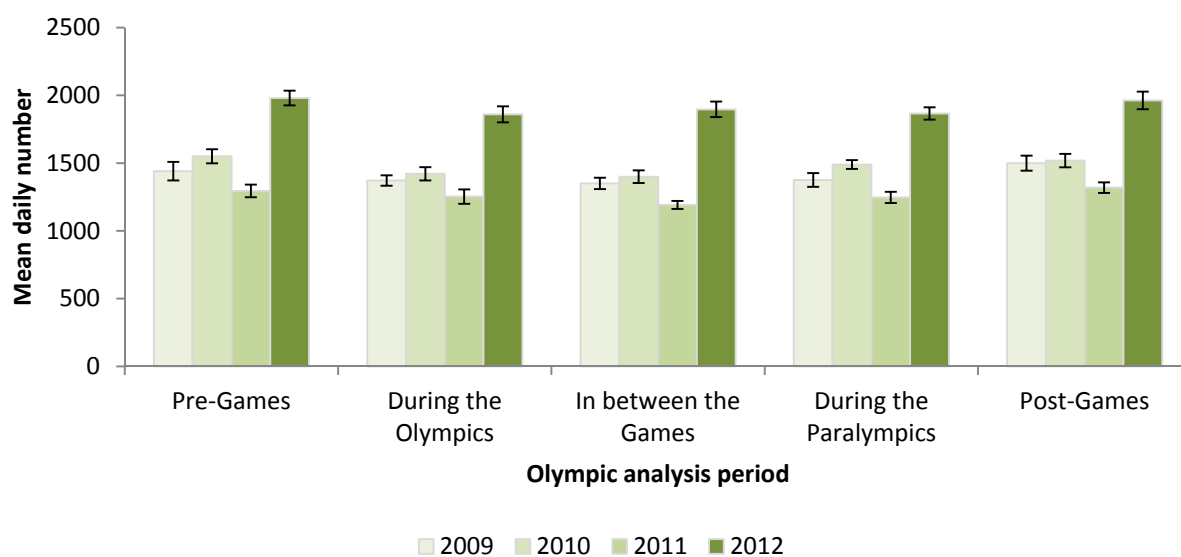
Error bars represent the 95% confidence intervals. See Appendix F for values. There were significant associations between mean daily callout and year for the pre-Games ($P < 0.05$), in between Games ($P < 0.05$) and post-Games periods ($P < 0.01$) using ANOVA. For the other Olympic periods (during the Olympics and during the Paralympics), there was no significant association.

5.2.3. Emergency department presentations

All emergency department presentations (London only)

In the 2012 London Olympic period, 27,729 ED presentations were recorded by the six London EDs included in this analysis. This equated to a mean of 1,860 ED presentations per day (95% CI: 1,801-1,919). Gender of callouts was evenly distributed (both male and female: 45%), and the most common age category was 18 to 34 year olds (32%). The majority of presentations were made by English residents (96%), with a further 0.3% made by other UK residents, and 1.9% made by non-UK residents (residence for 2.2% was unknown). The busiest day for ED presentations during the Olympic period was Monday 30th July 2012 (day four of the Olympics), when 2,132 ED presentations were recorded. During the Paralympic period, 22,393 ED presentations were recorded, equating to a mean of 1,866 per day (95% CI: 1,820-1,912). As with ED presentations during the Olympics, gender of callouts was evenly distributed (male: 45%; female: 46%) and the most common age category was 18 to 34 year olds (31%). The majority of presentations were made by English residents (96%), with a further 0.2% made by other UK residents, and 1.8% made by non-UK residents (residence for 2.1% was unknown). The busiest day for ED presentations during the Paralympic period was Monday 3rd September 2012 (day six of the Paralympics), with 2,007 presentations recorded. Figure 11 shows the mean daily number of ED presentations for the pre-Games period, during the Olympics, in between the Games, during the Paralympics and post-Games, and for the equivalent periods in 2009, 2010 and 2011. There were significant differences between 2009 and 2012 in all of the Games periods. Overall in the Olympic period, the number of callouts increased by 36% between 2009 and 2012. In the Paralympic period, the number of callouts also increased by 36%. However, in all periods, presentations were highest in 2012 compared with previous years. After correcting for day of the week, year, bank holiday, other events (music, other sport, carnival, other Games), mean air temperature, London riots and number of team GB gold medals, the Olympics were associated with a 5.2% decrease in the number of ED presentations (see Appendix G). There was no significant association for the Paralympics.

Figure 11: Mean daily number of Emergency Department presentations to six London hospitals by Olympic period in 2012 and equivalent periods in 2009-2011

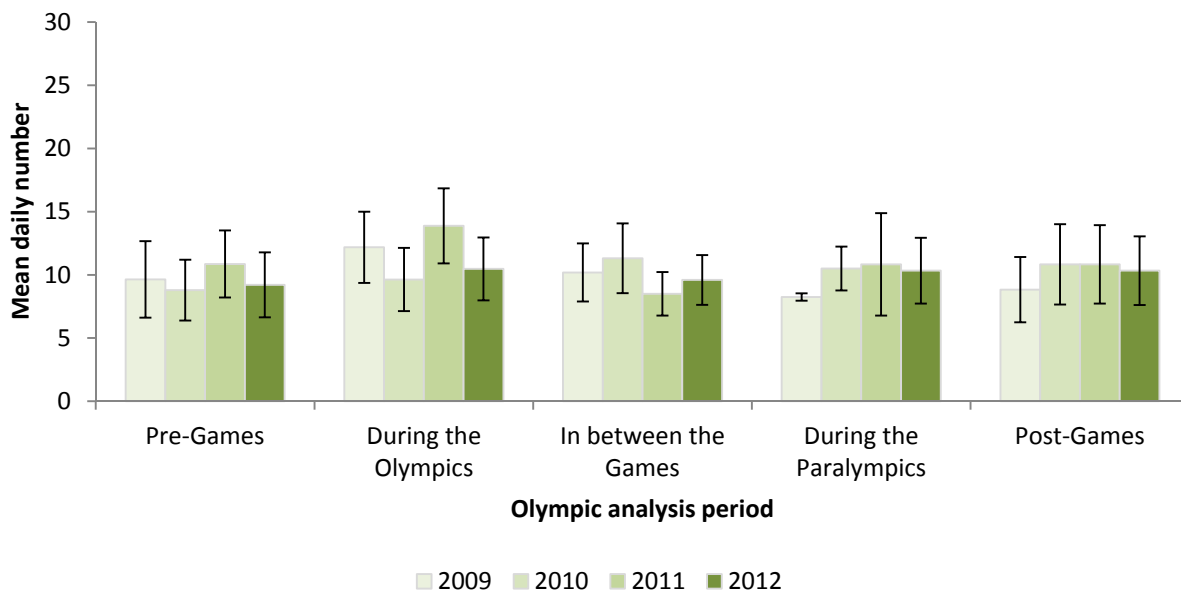


Error bars represent the 95% confidence intervals. See Appendix G for values. There were significant associations between mean daily presentation and year in all of the Games periods using ANOVA (all periods: $P < 0.001$).

Assault-related emergency department presentations (London only)

During the 2012 London Olympic period, 178 ED presentations for assaults were recorded by the four London EDs who provided data on assaults (0.7% of the total 24,381 ED presentations to the four EDs in that period). This equated to a mean of 10.5 ED presentations for assault per day (95% CI: 8.0-13.0). The majority of assault presentations were for males (male: 67%; female: 33%), and the most common age group was 18 to 34 year olds (62%). The busiest days for ED presentations for assaults during the Olympic period were Friday 3rd August and Friday 10th August 2012 (days eight and 15 of the Olympics respectively), when 19 assaults were recorded. In total, 93% of presentations were made by English residents, with a further 1.1% made by other UK residents, and 5.1% made by non-UK residents (residence for 2.8% was unknown). During the Paralympic period, there were a total of 124 presentations for assaults recorded (0.7% of the total 17,457 ED presentations to the four EDs in that period), equating to a mean of 10.3 per day (95% CI: 7.7-11.4). As with assault presentations during the Olympics, the majority of assault presentations were for males (male: 77%; female: 23%), and the most common age group was 18 to 34 year olds (61%). In total, 94% of presentations were made by English residents, none were made by other UK residents, and 1.6% were made by non-UK residents (residence for 4.8% was unknown). The busiest day for ED presentations for assaults during the Paralympic period was Saturday 8th September 2012 (day 11 of the Paralympics), when 17 presentations were recorded. Figure 12 shows the mean daily number of ED presentations for assaults for the periods; pre-Games, during the Olympics, in between the Games, during the Paralympics and post-Games, and for the equivalent periods in 2009, 2010 and 2011. There was no significant difference between mean daily number of presentations and years in any of the Games analysis periods. This remained the case after correcting for day of the week, year, bank holiday, other events (music, other sport, carnival, other Games), mean air temperature, London riots and number of team GB gold medals (see Appendix G).

Figure 12: Mean daily number of assault-related Emergency Department presentations to four London hospitals by Olympic period in 2012 and equivalent periods in 2009-2011

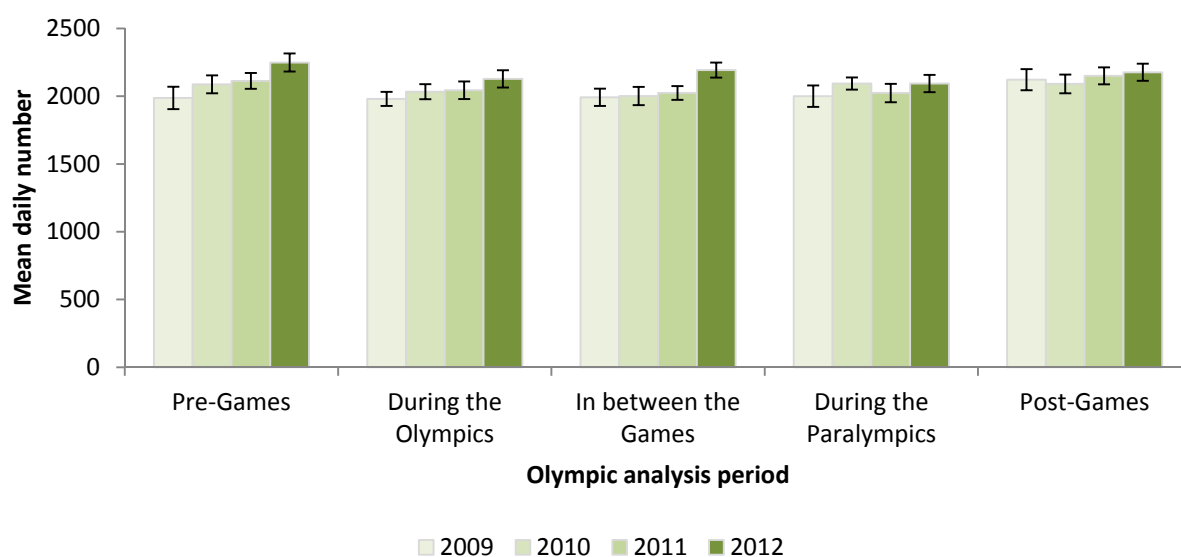


Error bars represent the 95% confidence intervals. See Appendix G for values. There were no significant associations between mean daily callout and year for any of the Games analysis periods using ANOVA.

All emergency department presentations (outside London)

Data on ED presentations were collected from EDs outside London to act as a comparison. During the 2012 London Olympic period, 36,176 ED presentations were recorded by the nine EDs outside London included in this analysis. This equated to a mean of 2,128 ED presentations per day (95% CI: 2,064-2,192). Gender of callouts was evenly distributed (male: 51%; female: 49%), and the most common age category was 18 to 34 year olds (29%). The majority of presentations were made by English residents (83%), with a further 0.2% made by other UK residents, and 0.1% made by non-UK residents (residence for 17% was unknown). The busiest day for ED presentations during the Olympic period was Monday 6th August 2012 (day 11 of the Olympics), when 2,363 ED presentations were recorded. During the Paralympic period, 25,131 ED presentations were recorded, equating to a mean of 2,094 per day (95% CI: 2,030-2,158). As with ED presentations during the Olympics, the gender of callouts was evenly distributed (male: 51%; female: 49%) and the most common age category was 18 to 34 year olds (28%). The majority of presentations were made by English residents (83%), with a further 0.2% made by other UK residents, and 0.1% made by non-UK residents (residence for 16.4% was unknown). The busiest day for ED presentations during the Paralympic period was Monday 3rd September 2012 (day six of the Paralympics), when 2,314 presentations were recorded. Figure 13 shows the mean daily number of ED presentations for the pre-Games period, during the Olympics, in between the Games, during the Paralympics and post-Games, and for the equivalent periods in 2009, 2010 and 2011. There were significant differences between individual years in the pre-Games, during the Olympics and in between the Games periods. Overall in the Olympic period, the number of callouts increased by 7.4% comparing 2009 and 2012. However, in all of the periods, the number of presentations was highest in 2012. After correcting for day of the week, year, bank holiday, other events (music, other sport, carnival, other Games), mean air temperature, London riots and number of team GB gold medals, both the Olympics and Paralympics were associated with a significant decrease in the number of ED presentations (Olympics: 4.8%; Paralympics: 5.9%; see Appendix H).

Figure 13: Mean daily number of Emergency Department presentations to nine hospitals outside London by Olympic period in 2012 and equivalent periods in 2009-2011

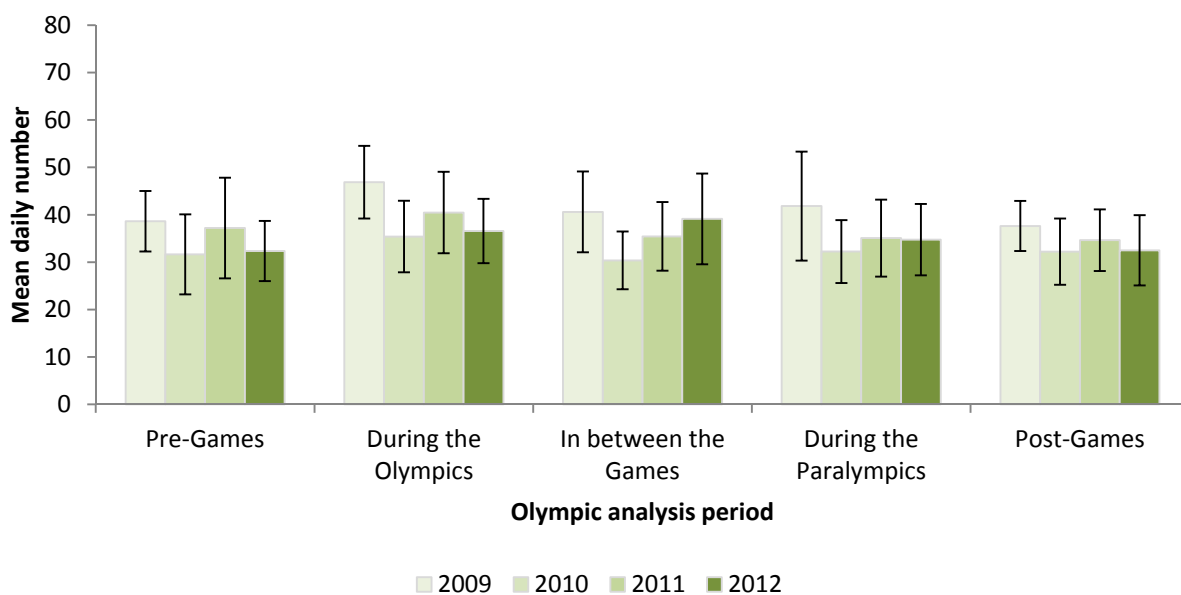


Error bars represent the 95% confidence intervals. See Appendix H for values. There were significant associations between mean daily callout and year for the pre-Games ($P < 0.001$), during the Olympics ($P < 0.01$), and in between the Games ($P < 0.001$) using ANOVA. For the other Games periods, there was no significant association.

Assault-related emergency department presentations (outside London)

Data on ED presentations for assaults were collected from EDs outside London to act as a comparison. During the 2012 London Olympic period, 622 ED presentations for assaults were recorded by the nine EDs outside London included in this analysis (1.7% of the total 36,176 ED presentations in that period). This equated to a mean of 37 ED presentations for assault per day (95% CI: 30-43). The majority of assault presentations were for males (male: 69%; female: 31%), and the most common age group was 18 to 34 year olds (56%). The busiest day for ED presentations for assaults during the Olympic period was Saturday 4th August 2012 (day nine of the Olympics), when 71 assaults were recorded. In total, 81% of presentations were made by English residents, none were recorded as being made by other UK residents or non-UK residents (residence for 19% was unknown). During the Paralympic period, there were a total of 417 presentations for assaults recorded (1.6% of the total 25,131 ED presentations in that period), equating to a mean of 35 per day (95% CI: 27-42). As with assault presentations during the Olympics, the majority of assault presentations were for males (male: 72%; female: 28%), and the most common age group was 18 to 34 year olds (56%). In total, 79% of presentations were made by English residents, 0.5% were made by other UK residents, and none were recorded as being made by non-UK residents (residence for 20% was unknown). The busiest day for ED presentations for assaults during the Paralympic period was Saturday 8th September 2012 (day 11 of the Paralympics), when 59 presentations were recorded. Figure 14 shows the mean daily number of ED presentations for assaults for the periods pre-Games, during the Olympics, in between the Games, during the Paralympics and post-Games, and for the equivalent periods in 2009, 2010 and 2011. There was no significant difference between mean daily number of presentations and years in any of the Games analysis periods. This remained the case after correcting for day of the week, year, bank holiday, other events (music, other sport, carnival, other Games), mean air temperature, London riots and number of team GB gold medals (see Appendix H).

Figure 14: Mean daily number of assault-related Emergency Department presentations to nine hospitals outside London by Olympic period in 2012 and equivalent periods in 2009-2011



Error bars represent the 95% confidence intervals. See Appendix H for values. There were no significant associations between mean daily callout and year for any of the Games analysis periods using ANOVA.

6. Health service use for other health services

6.1. Methodology

Data on service use for walk-in centres in July and August 2010-2012 in North East London were collated through the North East London NHS Foundation Trust.^[51] Data on mobile pharmacy use in Hyde Park were provided by Medicine Man Pharmacy.^[51] These data relate to mobile pharmacy use for specific events with music events being used as a comparison for the Olympics. Data on attendance at Genito-Urinary Medicine (GUM) clinics for Central and North London were provided by Central and North West London NHS Foundation Trust (CNWL).^[52] Finally, preliminary sexual health data were supplied by the Olympics Sexual Health Data Group, and cover: calls to NHS Direct; family planning clinic attendance at Southwark, Lambeth and Euston clinics; sex workers; and emergency contraception prescriptions.^[53] Because these data were preliminary, no numbers were available, only approximate percentage changes. For all datasets, data are for service use rather than individual attending (therefore one individual could have used the service more than once). No quality assurance has been performed on the data. Data for the summer months is discussed; however, it is not known how much time could elapse between a risky sexual encounter and attendance at a sexual health clinic, particularly for people who are visiting from another city or country.

6.2. Findings

6.2.1. Walk-in centre attendance

Between 2010 and 2012, typically, service use for walk-in centres in August in North East London was lower than in July (Table 15).^[51] The number of walk-in centre attendances decreased year on year between 2010 and 2012 in July (from 3,005 in 2010 to 2,798 in 2012), whilst attendance in August remained stable (at approximately 2,500).

Table 15: Number of attendances at walk-in centres in North East London

| Month | 2010 | 2011 | 2012 |
|--------|-------|-------|-------|
| July | 3,005 | 2,857 | 2,798 |
| August | 2,544 | 2,543 | 2,531 |

Source: Haggerty (2012).^[51]

6.2.2. Mobile pharmacy use

A mobile pharmacy was set up in Hyde Park for events over the summer. A total of 6,455 attendances to the pharmacy were made at the Wireless Festival, Hard Rock Calling and Madonna Concerts and the Olympics (Table 16).^[54] The majority (60.1%; n=3,881) of the attendances were for the Olympics (the duration of the Olympics period was considerably longer than the other events). The types of complaints varied significantly ($P<0.001$). The most common reason for attendance remained the same at both event types (analgesics: 43.2% at the Olympics; 55.8% at the music events); however during the Olympics, there were significantly higher proportions of antihistamine attendances compared with during the music events (23.9% compared with 2.4%). Attendances due to sun protection were also more common (13.5% compared with 1.2%). The majority of pharmacy attendances were made in the last five days of the Olympics (n=2660; 68.5%). No information was available on the number of attendances related to alcohol.

Table 16: Number and proportion of attendances to a mobile pharmacy in Hyde Park by reason for attendance

| Reason for attendance | Music Events | | Olympics | |
|---------------------------|---------------------------|--------------|-------------------------|--------------|
| | 6-8, 13-15 & 17 July 2012 | | 27 July- 12 August 2012 | |
| | n | % | n | % |
| Analgesics | 1,436 | 55.8 | 1,677 | 43.2 |
| Antihistamines | 61 | 2.4 | 926 | 23.9 |
| Sanitary | 176 | 6.8 | 166 | 4.3 |
| First aid | 290 | 11.3 | 425 | 11.0 |
| Digestion | 286 | 11.1 | 218 | 5.6 |
| Prescriptions | 38 | 1.5 | 86 | 2.2 |
| Cough/sore throat | 445 | 17.3 | 396 | 10.2 |
| Sun protection | 30 | 1.2 | 524 | 13.5 |
| Total attendances* | 2,762 | 100.0 | 3,881 | 100.0 |

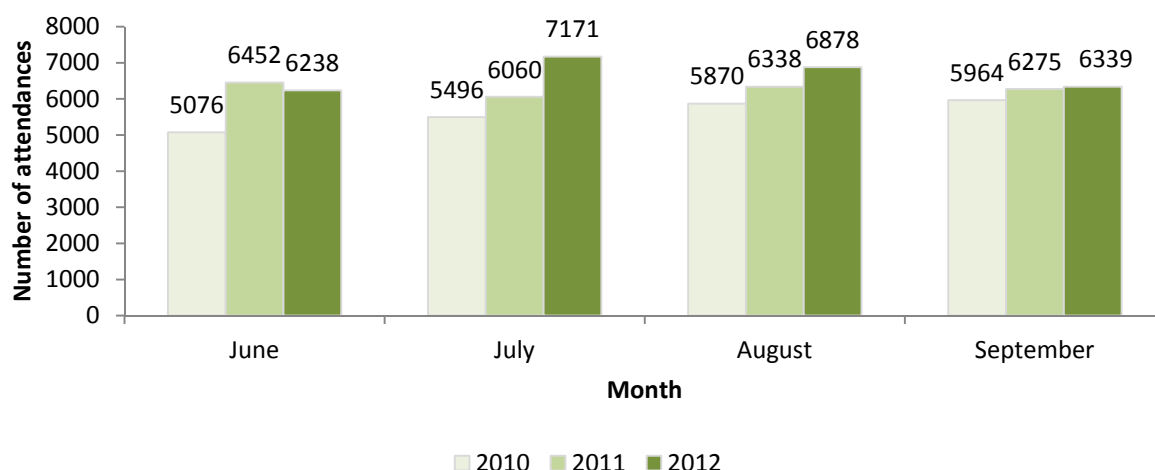
Source: Furby (2012).^[54] Music festivals included Wireless Festival (6-8 July 2012), Hard Rock Calling (13-15 July 2012) and Madonna (17 July 2012). Chi square analysis shows a significant difference between music event attendances and Olympic attendances ($P < 0.001$). *Individuals may have presented with more than one complaint.

6.2.3. Sexual health service use

Genito-Urinary Medicine clinic attendance

Between 2010 and 2012, there have been fluctuations in patterns of the number of attendances to GUM clinics in Central and North West London in the summer months (June to September; Figure 15).^[52] In 2010, the highest numbers were in September and in 2011 the numbers peaked in June. In 2012, the number of attendances peaked in July and August.

Figure 15: Genito-Urinary Medicine clinic attendance for Central and North London for July to September, 2010-2012



Source: Mercey (2012).^[52]

Other sexual health services information (preliminary data)

Preliminary data analyses suggest:^[53]

- During the three weeks of the Olympics, sexual health calls to NHS direct in London fell to approximately 15% below average. For the next four weeks, calls were 15% above average. These changes in volumes relate largely to women with urinary or vaginal symptoms.
- Data from the Southwark, Lambeth and Euston family planning clinics showed a 10% increase in attendance over the Olympic period compared with 2011. Attendance over the Paralympic period did not change compared with 2011.
- A survey of sex worker service users (n=102) reported fewer clients per sex worker and more Police raids during the Olympics, and that some sex workers had come into London specifically for the Olympics. Overall, there was a perception of less sex work during the Olympics.
- The London Tariff Dataset shows that emergency contraception prescription in London rose by 30% in August 2012 compared with July 2012.

7. Recorded crime

7.1. Methodology

All intelligence from the crime data analysis have been extracted from the Metropolitan Police Service report.^[55] Data relate to crimes occurring within Metropolitan Police District but do not include the data held by the City of London Police. Data for the reporting period Friday 6th July 2012 to Sunday 16th September 2012 have been matched to equivalent periods in 2011 (Friday 8th July 2011 to 18th September 2011) and 2010 (Friday 9th July 2010 to Sunday 19th September 2010), and so contain the same number of weekends/weekdays. Data for 2009 were not reported. The 2012 analysis period is known as the Olympic Tasking Period. The analysis reports on notifiable offences but also covers Olympic crimes, which are those defined as a “crime that has or may have an impact upon the effective delivery or image of the Games”. Notifiable offences are defined as follows: burglary, criminal damage, drugs, fraud and forgery, other notifiable offences (undefined), robbery, sexual offences, theft and handling, and violence against the person. No quality assurance has been performed on the data.

7.1.1. Limitations

The analysis does not include the data held by the City of London Police; however, whilst this represents a central London location, no Olympic venues were held within their jurisdiction. Data for 2011 are shown but should be viewed with caution due to the riots that occurred in August of that year. The Olympic flag was assigned to crime reports by individual officers; it is not known to what extent officers were aware of the flag. Recorded crime data can be confounded by policing policy and by levels of Police activity.^[26] Health service use data around assaults are not affected by such factors and include incidents that have not been reported to the Police. Finally, only associations with the Olympic periods and locations can be discussed, it will not be possible to attribute crime directly to the Olympics.

7.2. Findings

Overall, there were 156,357 notifiable offences recorded in the Olympic Tasking Period in 2012 in London. This was a decrease from 160,608 in the equivalent period in 2011 and from 164,906 in 2010 (representing a 5% decrease between 2010 and 2012). Of the London-based Olympic venues, the Olympic Park had the highest number of offences in 2012 (n=1,342; Table 17). Here, the number of offences increased by 48% between 2010 and 2012. This increase was largely due to a rise in theft and handling offences, which rose from 420 in 2010 to 767 in 2012. Other crimes such as burglary stayed stable (2010: 81; 2011: 76; 2012: 83). However, violence against the person did also witness an increase between 2010 and 2012 by 26% (2010: 130; 2011: 123; 2012: 164) North Greenwich Arena also experienced a large increase in notifiable offences (from 53 in 2010 to 128 in 2012). For other venues, such as Earls Court and Lord’s Cricket Ground, the level of crime remained relatively stable. Hyde Park, the most centrally located Live Site, was the only Live Site to experience an increase in notifiable offences between 2010 and 2012 in the analysis periods, rising by 21% to 1,654 in 2012 (Table 18). However, caution must be employed when considering individual venues as the circumstances of the venue have changed over time. For example, the Olympic Park was only completed in 2012 in time for the Games and prior data are based on the building site and the location rather than a finished venue. Overall, during the Olympic Torch Relay in London, the number of notifiable offences on individual relay days decreased compared with comparable days in 2010. Only on Day 69, when the Torch

remained largely in Central London, was there an increase (offences rose by 9%). In the Olympic Tasking Period, there were 1,724 Olympic crimes, 1% of the total number of offences committed during that time. Of these offences, 56% were for theft. An average of 1,057 extra police officers were available each day. There were 50 offences fewer per day during the Paralympics than during the Olympics.

Table 17: Number of notifiable offences by Olympic venue during the Olympic Tasking Period in 2012 and equivalent periods in 2011 and 2010*

| Olympic venue | Analysis period 2010 | Analysis period 2011 | Olympic Tasking Period 2012 | Percentage change from 2010 to 2012 |
|-----------------------------|-------------------------|-------------------------|--------------------------------|--|
| Olympic Park** | 904 | 865 | 1,342 | +48% |
| Earls Court | 210 | 192 | 199 | -5% |
| Excel | 296 | 347 | 304 | +3% |
| Greenwich Park*** | 160 | 150 | 156 | -3% |
| Horse Guards Parade*** | 342 | 344 | 265 | -23% |
| Lord's Cricket Ground | 143 | 129 | 146 | +2% |
| North Greenwich Arena**** | 53 | 53 | 128 | +142% |
| Royal Artillery Barracks*** | 478 | 474 | 386 | -19% |
| Wembley Arena and Stadium | 335 | 429 | 305 | -9% |
| Wimbledon | 313 | 284 | 343 | +10% |

Source: Murphy (2012).^[55] * The Olympic Tasking period is defined as Friday 6th July 2012 to Sunday 16th September 2012. This has been matched to equivalent periods in 2011 (Friday 8th July 2011 to Sunday 18th September 2011) and 2010 (Friday 9th July 2010 to Sunday 19th September 2010). **For the Olympic Park, construction was completed in 2012 for the Olympics. Data prior to 2012 are based on occurrences on the building site and in the location. ***For Greenwich Park, Horse Guards Parade, and the Royal Artillery Barracks, an Arena was provided specifically for the Olympics, so data prior to 2012 are based on the location rather than the venue. ****The North Greenwich Arena is otherwise known as the O2 Arena outside the context of the Olympics.

Table 18: Number of notifiable offences by Live Site venue during the Olympic Tasking Period in 2012 and equivalent periods in 2011 and 2010

| Live Site | Olympic Tasking Period 2012 | Percentage change from 2010 to 2012 |
|--|-----------------------------|--|
| Hyde Park (and surrounding 1km buffer zone) | 1,654 | +21% |
| Potters Field (and surrounding 1km buffer zone) | 843 | +9% change from 2011* |
| Victoria Park (and surrounding 1km buffer zone) | 513 | -37% |
| Waltham Forest (and surrounding 1km buffer zone) | 877 | -23% |

Source: Murphy (2012).^[55] * The percentage change from 2010 was not provided.

8. News and social media

8.1. Methodology

8.1.1. News analysis

A weekly Google news search alert was established to capture stories that related to alcohol before (1st May 2012 to 26th July 2012), during (27th July 2012 to 10th September 2012) and after the Olympic and Paralympic Games (11th September 2012 to 30th September 2012). Search terms included Olympics, Paralympics, London 2012, alcohol, violence, disorder, drunk and booze. The search returned 34 relevant news stories (that discussed both the Games and alcohol). Quantitative content analysis was used to analyse the media stories whereby text and images were coded into specific categories.^[42] Whilst this provides a useful overview of the data, resource limitations prevented the development of a more in-depth qualitative analysis to fully understand representations, context or framing of the media.^[56, 57] This analysis was intended to represent a snapshot in time, and no comparison has been made with media stories during previous years or relating to other high profile events.

8.1.2. Social media analysis

Twitter is a micro-blogging site where people can post text-based messages of up to 140 characters (known as 'tweets') to their followers.^[58] Individuals use twitter to interact with friends, and broadcast information to their 'followers'.^{liii} Some celebrities use Twitter to interact with their fans. Most twitter accounts (and their associated messages) are public so anyone can view them (however it is possible to make messages private). Tweets are publically searchable for 21 days but older tweets can only be directly accessed from the users' pages. During the Games period, social media sites were frequently used by athletes, teams and other individuals to disseminate Games-related communications to the extent that London 2012 was named by UK-based media outlets as the first 'social media Olympics'.^[59] In total, 41 million Olympic related tweets were sent during the Olympic period.^{liv, [60]} Analytical methods have been developed to understand trends across social media sites;^[61, 62] however, limited resources prevented an in-depth analysis of the Games tweets for this evaluation. Here, individual athletes' tweets were examined to understand their perspective on alcohol during the Games. Athletes were selected if their public twitter profile had been mentioned in news stories identified by the news analysis (see Section 8.1.1 and Section 8.2.1; n=3). Tweets published during the Games period (27th July 2012 to 10th September 2012) were examined. Content analysis identified those tweets mentioning alcohol and related terms such as 'drunk' and 'party'. The three identified individuals were: Athlete A (a Great Britain gold medallist); Athlete B (a Great Britain gold medallist); and Athlete C (a Great Britain athletics finalist). The tweets of the Games sponsor from the alcohol industry and any associated marketing materials disseminated during the Games were also examined. There are a number of limitations to this analysis. Firstly, our sampling frame was small. A wider sampling frame would have enabled more athletes to be included in the analysis (and so potentially provide a broader perspective). Further, content analysis requires researchers to search for predefined issues. This could introduce researcher bias. Finally, the analysis was intended to provide a snapshot in time and does not cover previous years or similar events.

^{liii} Users can follow other accounts by directly searching for the person, discovering accounts through categories of interest or being suggested accounts from Twitter

^{liv} This was defined as spanning from 27th July to 14th August 2012.

8.2. Findings

8.2.1. News analysis

Eighteen articles were identified that covered the Olympic and Paralympic Games and alcohol before the Games began. These covered a range of topics including the price and availability of alcohol, the perceived potential impact of the Games on drinking, and the potential for increased health service use (Table 19). During the Games, 14 news articles focused on incidents and celebrations involving alcohol, restriction of alcohol sales and a reflective piece on alcohol at the Games (Table 20). Afterwards, two articles covered alcohol and the Games. They described the mixed impact of the Games on drinking patterns,^[63, 64] reporting the varying effects of the Games on supermarket and bars/pub trade. Supermarkets witnessed an increase in sales of champagne (31%) and sparkling wine (29%) compared with previous years (the comparison years were not specified).^[63] The article did not state whether this was in addition to normal levels of drinking or substitution of one drink type for another. Some bars near Games sites received an increase in trade but there were many bars that recorded a decrease, particularly in the first week of the Olympics.^[64]

Table 19: Pre-Games news articles on alcohol

| Themes of pre-Games articles | Number of articles | Details |
|--|--------------------|--|
| The price and availability of alcohol at Games venues | 9 | Three articles reported on the high cost of a bottle of lager at Games venues (£4). ^[65-67] Another article discussed the promotion of Games branded wine at the Games. ^[68] However, alcohol was not universally available. One article reported that alcohol would be unavailable at the Olympic venue (Hadleigh Farm) owned by the Salvation Army. ^[69] Three articles reported that alcohol was banned by the Russian Olympic Federation because of previous incidents involving Russian athletes and alcohol at the Olympics. ^[70-72] Finally, one article critiqued the Games sponsorship by alcohol companies, noting a contradiction in the International Olympic Committee alcohol policy that excludes the promotion of spirits but not beer and wine. ^[73] |
| The impact of the Games on drinking | 3 | The alcohol industry expected a profitable summer during 2012 due to the Games, Euro 2012 and the Jubilee, predicting an extra £323m in sales for the UK on-trade. ^[74] However, until other mitigating factors (such as the weather) were confirmed, it would be difficult to predict sales. ^[75] There was a suggestion that the stronger exchange rate of the pound against the Euro might encourage trips to France to stock up on alcohol for the Games. ^[76] One article reported that: <i>“while a short-lived and localised boost for certain industry categories is not entirely out of the question, the fundamental indicators, historic lessons and brewing pan-European macroeconomic storm suggest otherwise.”</i> ^[74] |
| Drink driving | 2 | Local news outlets and insurance companies reported Police warnings not to drink and drive during the summer months. ^[77, 78] |

| Themes of pre-Games articles | Number of articles | Details |
|---|--------------------|---|
| The increased pressure on health services during the Games | 2 | One reporter discussed how EDs were expecting an increased workload due to the large number of summer events. Both articles reported that 'Booze Buses' would be used to cope with extra demand from intoxicated patients. ^[79, 80] |
| Licensing | 1 | A supermarket in Bath applied to extend the time that it was allowed to sell alcohol, until midnight every night of the week, during the Games. ^[81] |
| Health risks | 1 | This article warned about the potential health risks that could affect people travelling to the Games (such as infectious diseases, alcohol harms and accidents). ^[82] To combat this, it advised to <i>"Drink alcohol in moderation, avoid drinking and driving and use latex condoms if having sex."</i> |
| Total | 18 | |

Table 20: Games news articles on alcohol

| Themes of Games articles | Number of articles | Details |
|---|--------------------|--|
| Incidents involving Games athletes and alcohol | 7 | Two themes emerged: intoxicated athletes and intoxicated spectators. Firstly, six articles reported specifically on the intoxicated behaviour of athletes from Australia, Belgium, and Great Britain. ^[83-88] In some instances, criminal damage occurred subsequent to the intoxication. ^[83-85, 87] Secondly, one article discussed an incident whereby a spectator (thought to be intoxicated) threw a beer bottle into the stadium towards the athletes. ^[89] |
| Games celebrations involving alcohol | 6 | In contrast to the negative publicity surrounding the Australian and Belgian athletes, athletes from Great Britain tended to gain more positive publicity for being intoxicated. ^[88, 90] <i>"who can begrudge wining athletes a post-victory bender?"</i> ^[83] More generally, one article reported on the general celebrations by athletes representing Great Britain after the Games, ^[91] and two discussed the extra staff required at the security check in the Olympic Village because athletes were celebrating outside the Village after their events. ^[92, 93] |
| Restricted alcohol sales at the Irish Paralympic lodge | 1 | Alcohol was not available to purchase in the Irish Paralympic lodge because <i>"We [Paralympics] are a growing movement, growing in the eyes of the public and we don't want alcohol associated with it. We'll have a drink when the games are done and dusted"</i> . ^[94] |

| Themes of Games articles | Number of articles | Details |
|-------------------------------|--------------------|--|
| A reflective piece on alcohol | 1 | This article suggested six reasons as to why alcohol might not be a big problem at the Games: the high cost of alcohol at the venues; family based audiences; the all-day nature of the events (some were held in the morning); the spectacle encouraging people to cheer for different sports and teams (rather than watching an individual team); the variety of sports attracting different crowds; and the park atmosphere encouraging people to make the most of their day instead of overindulging on alcohol. ^[95] |
| Total | 14* | |

* Number of articles does not sum to total because one article covers two identified themes.

8.2.2. Social media analysis

All three athletes published tweets in relation to alcohol during the Olympic and Paralympic Games period. Athlete A tweeted three times, while Athlete B and Athlete C tweeted once each. All five tweets were in relation to being drunk and celebrating:

“Well what a day, blind drunk at the minute and overwhelmed with all the messages. Thank You everyone it’s been emotional X” Athlete A

“Just posted a photo [photo link]” Athlete A

“Getting wasted at at [sic] St Pauls [photo link]” Athlete A

“I’m going to get very, very drunk and probably do something silly.” Athlete B

“After party” alongside a picture of themselves with two glasses of champagne. Athlete C

One Games sponsor aimed “to reach untapped audiences in emerging markets through its sponsorship of the Olympic Games.”^[75] Their online twitter account published 100 tweets during the Olympic and Paralympic Games period. They encouraged users to share their experiences and pictures with the hash tag^{lv} ‘#CelebrateLondon2012’. For example, ‘See your #CelebrateLondon2012 pictures on the big screen. Head to our Flickr group to find out more [website link]’. In total, 273 photos were uploaded by the public during the Games period to the group. The campaign also attempted to infuse celebrating with drinking: ‘Beautiful weather for a ... [name of product] #celebratelondon2012’.

^{lv} The hash tag (#) symbol is used before a keyword in their tweet to categorise them and make the tweets easier to search.

9. London events

9.1. Methodology

To collect details of large events occurring during 2012, we consulted the London Events Co-ordination Calendar (LECC), which contained all major events in London during 2012 (see Box 3). Large events were defined as those estimated to attract over 5,000 people. Thus, examples of events included in this analysis included concerts at Hyde Park, and carnivals such as the Notting Hill Carnival and the City of London Festival. An online search was conducted to identify sports events at major stadia (such as Wembley and Lord's Cricket Ground) and to identify events in the analysis periods from 2009 to 2011. Details of events included are listed in Table 21. As with the health service data analysis (see Section 5.1), events from 2012 were matched to days in previous years (2009-2011) by day of the week (rather than date) in order to include equal numbers of Fridays and Saturdays, and the equivalent number of days (see Table 10, Appendix C). This meant that events for a total of 292 days were analysed (73 days per year). The data collected were used to inform the statistical models generated for the health service data analysis (see Section 5.1), and to inform the descriptive analyses below. For the latter, differences in the number of days with at least one event (all events and by event type) were explored using chi square.

Box 3: Forming the London Events Coordination Calendar

In 2010 the Greater London Authority (GLA) asked all event organisers to submit details of any planned events for 2012 onto the London Events Coordination Calendar (LECC) or into the Culture Diary by the end of March 2011^[96]. These events were assessed by the Pan London Resourcing Group (PLRG), which consisted of the GLA, Metropolitan Police Service, London Fire Brigade, London Ambulance Service, Transport for London, British Transport Police, Port of London Authority and the National Health Service/London Ambulance Service, and the Government Olympic Executive (GOE). The PLRG categorised the groups into 'events of interest' or 'events requiring no further action'. All organisers of 'events of interest' had to liaise with their local Augmented Safety Advisory Group (ASAG), which were established to handle events occurring during the Games-Time Plus period (GTP; 15th July to 16th September 2012) and to give due consideration to the Olympic context when planning resources for these events, examining concerns such as transport, policing and security requirements, and supply chain issues. They were then able to submit their licence application to their local authority. This approach allowed event organisers to develop plans that would mitigate any concerns arising from the emergency services prior to the licensing committee, enabling a smoother licensing process. In this way, the ASAGs provided the services involved with the opportunity to: discuss plans with event organisers; advise the organisers on appropriate modifications to their plans in order to minimise or eliminate the need for resources from the ASAG organisations; consider the requirements for each event in the context of others that have already been considered; monitor the cumulative requirement for resources as the event portfolio grows; and advise the council on their ability to provide any necessary resources. This approach should enable services to feel confident that GTP 'events of interest' can be managed safely. However, any events submitted after the application deadline or spontaneous events held without council approval would need further action.

9.2. Results

There was a significant increase in the number of days with at least one event from 30 events in 2009 to 58 events (Table 22). This increase was largely due to the large number of events held for the Olympics in 2011 and 2012, but a significant increase in carnival events was also apparent (from nine for each year in 2009 to 2011, doubling to 20 in 2012).

Table 21: Large London events included in the analysis by event type

| Event type | Examples |
|--|---|
| Music | Gigs at large arenas (such as O2), music festivals (including South West Four Weekender, Underage Festival, 1234 Shoreditch, Carnival del Pueblo) |
| Carnival | Great British Beer Festival, Notting Hill Carnival, Mayor’s Thames Festival, Notting Hill Festival, Shoreditch Festival, City of London Festival, Wyck Gardens Festival |
| Other sport event | International cricket tests, international football games*, FA community shield, Carnegie Challenge Cup (football), international rugby games, |
| Olympic warm up event | Volleyball, basketball, badminton, basketball, triathlon, BWF World Badminton series, beach volley ball |
| Olympic/Paralympic Ceremony | Opening or closing ceremonies for the Olympics and Paralympics |
| Other Olympic /Paralympic event | Torch relays in London, Greatest Team Parade |

* Not all of the football games were based in London but because of football’s large following in England, these games were included for comparison purposes.

Table 22: Number of days with at least one large event in London by event type for the 2012 analysis period and comparison periods in 2009-2011

| Year | Music events | Other sports events | Carnival events** | Games* events** | All event types** |
|-------------|--------------|---------------------|-------------------|-----------------|-------------------|
| 2009 | 12 | 12 | 9 | 0 | 30 |
| 2010 | 13 | 13 | 9 | 0 | 28 |
| 2011 | 12 | 18 | 9 | 19 | 40 |
| 2012 | 18 | 11 | 20 | 40 | 58 |

* Games events includes Olympic warm up events, Olympic and Paralympic opening and closing ceremonies, torch relays and the Greatest Team Parade. ** Chi square analysis shows a significant difference between year and number of days with at least one event for carnival events (P<0.05), Games events (P<0.001), and all event types (P<0.001).

10. Local authority data: licensing, noise & disturbance

10.1. Methodology

Data were supplied by Newham Borough and relate to premises licence applications (new premises licences, premises licences variations, time limited licences) and Temporary Event Notices (TENs) for Newham postcodes E15 and E20 (E20 was created for the Olympic Stadium area).^[97] Kensington and Chelsea Borough Council supplied data on instances of noise and disturbance reported to the Council from July to September 2010 to 2012.^[98] Data relate to instances not complaints (so if two individuals report one occasion of noise and/or disturbance, it is logged as one instance). No quality assurance has been performed on the data.

10.2. Findings

10.2.1. Licensing

The number of premise licence applications for Newham postcodes E15 and E20 more than doubled from 2011 to 2012 (Jan-Jun: 41 to 91; Table 23). Of the 2011 applications, 11 were for applications for premises in the Games Park itself. The number of Temporary Event Notices also increased considerably from 260 in January to August 2011 to 395 in the same period in 2012.

10.2.2. Noise and disturbance

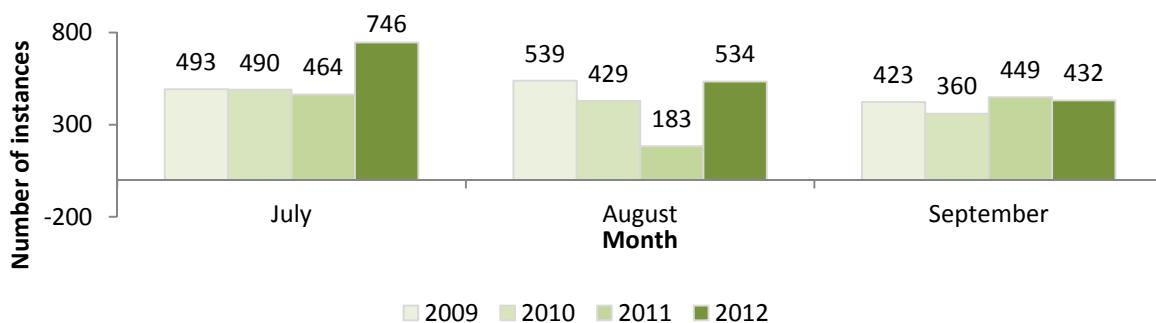
The numbers of reports to Kensington and Chelsea Borough Council for noise and disturbance have fluctuated over time (Figure 16). In 2012, there was a decreasing trend from July to September. However, August reports were higher than those for August in the two previous years.

Table 23: Licensing in Newham (E15 and E20 postcodes), London

| | Date of data | 2011 | 2012 |
|---|------------------------|------|------|
| New premises licences, premises licences variations, time limited licences | 1 January to 1 June | 41 | 91 |
| Temporary Event Notices | 1 January to 30 August | 260 | 395 |

Source: Roberts (2013).^[97]

Figure 16: Instances of noise and disturbance reported to Kensington and Chelsea Borough Council in July to September, 2009-2012



Source: Crowley (2012).^[98]

11. Alcohol consumption

11.1. Methodology

Alcohol consumption datasets are not designed to capture data on consumption in a way that would be meaningful for this analysis. Consumption estimates derived from taxation paid or industry sales are provided for the whole year and cannot be broken down into smaller geographies.^[99, 100] Surveys, in comparison, are only repeated if they are large-scale (in which case, they tend not to provide a local understanding) and large-scale surveys describe typical weekly or sessional consumption rather than consumption during a set period of time.^[101] Estimates provided through the Local Alcohol Profiles for England (LAPE) are based on surveys (and so subject to the same limitations) but cannot be used to monitor change in consumption over time.^[102] However, other sources have been used to provide an indication of consumption patterns during the Olympics. These sources include:

- The Morning Advertiser, whose authors report directly from individual pubs and pub chains, describing change in revenue gained and perceptions of customer footfall.^[103, 104]
- The Association of Licensed Multiple Retailers (ALMR), who issued a press release (15th August 2012) detailing a survey of their 160 member companies who represent 12,500 licensed premises (bars, pubs, and casual dining venues).^[105]

However, these sources can only provide an indication of potential changes, and are often focused on individual venues. They do not represent a robust analysis of consumption or sales patterns. No quality assurance has been performed on the data.

11.2. Findings

In total, there were 34 Olympic venues.^[1] Ticketholders could not take alcohol into any of these venues, although alcohol was available once inside. For example, at the Olympic Park, a premises licence allowed alcohol to be served in the Live Site from 7am until 1am and in the Olympic Stadium from 7.30am to 12am^{lvi}. Inside each venue, Heineken had 'sole pouring rights', which meant that only their lager, bitter and cider could be sold and some alcohol products had to be sold without branding.^[106] Of the 34 venues, one did not serve alcohol: Hadleigh Farm in Essex (where the mountain biking was staged). Its owners, the Salvation Army, agreed to the Olympics being staged there on the condition that alcohol was not to be served in the venue (and as with the other venues, no alcohol could be taken inside).^[69] Events were held across the country to tie in with the Olympics. Some of these were alcohol-free, such as the Medway Mile where participants and spectators could watch the opening ceremony.^[107] No alcohol was sold in the Olympic village,^[108] although this does not mean that athletes did not bring it in or that it was not available.

^{lvi} Details of Newham's licences can be found:

<http://pa.newham.gov.uk/online-applications/search.do?action=simple&searchType=LicencingApplication>

Pubs in and out of London hoped to maximise revenue during the Olympics.^[109] Pubs events were held to celebrate the Olympic torch relay passing by: showing the Olympics on the television; offering free drinks to Olympics medallists; offering free drinks when particular athletes won medals; and renaming themselves after athletes. Revenue gained from alcohol did increase in certain licensed premises near Olympic venues and/or sporting events:

- On the opening night and first few days of the Olympics in Stratford, one pub (which holds a 24-hour licence) reported 'strong trade'.^[103] On the opening night, it remained open until 5am, when the first trains started running and could take people home.
- On the first Saturday of the Olympics, one pub in Surrey took a record £43,000 from customers who had been watching the road races (more than triple their normal weekend revenue of £12,000).^[103] The Managing Director reported: "We were mobbed".
- On the first Sunday of the Olympics, a bar in Weymouth (where the sailing events were being held) reported a 40% uplift in sales compared with what would be expected on the busiest Sundays during the summer.^[103]
- Other pubs also reported an increase in trade in the first few days of the Olympics, particularly in the areas of: Eton Dorney (where rowing was held); Manchester (where football was held) and Otley (where GB Olympic cyclist Lizzie Armistead is from).^[103]

However, in Central London, licensed premises were struggling for business.^[104] One pub in Covent Garden reported a 20% downturn, whilst a second in Islington reported a 50% downturn since the start of the Olympics. The Manager of a pub in Oxford Circus described the surrounding streets as being like a "ghost town". A pub located in Holborn and Glendola Leisure (which has a number of venues in Central London) also reported downturns. The author and contributors to the article postulated that the downturn was due to tourists avoiding London, Games viewers staying up and around the venues rather than venturing into the city centre, poor weather, and commuters avoiding Central London.

Overall, in the first week of the Olympics, ALMR reported that of eight of its member companies, 75% of their pubs experienced a downturn in revenue compared with sales from last year (ALMR has a total of 160 member companies who represent 12,500 premises).^[110] However, in the second week, ALMR estimated that 60% of their members' pubs experienced an upturn in revenue gained and 20% experienced an 11% or higher increase in revenue gained compared with sales made last year.^[105] (The survey is based on 20 member companies who represent 1,180 premises.) However, no details are given on sampling methods and all comparisons made with last year should be viewed with caution due the riots.

12. Discussion

A systematic review of 54 studies from 1987 to 2008 found no conclusive evidence that major sporting events affected health or socioeconomics;^[32] however, 85% of studies were of poor methodological quality, largely due to their lack of a control group. Evidence collated through the literature review here shows a mixed association between sporting events such as the Olympics and alcohol-related (or other) harm.^[22, 24, 25, 38] In order to prepare for the Olympic and Paralympic Games, organisers studied these experiences from other countries but published evidence, particularly around the Olympics, has inevitably been focussed on events held outside the UK, and it is not known to what extent these studies may reflect the UK situation. So, commissioners and service providers involved in the stakeholder interviews of this evaluation supplemented data from literature and reports with their own experiences of busy times (such as those caused by winter influenza and New Year's Eve). They worked in partnership to test protocols, establish monitoring procedures and plan for effective service delivery (for example, through the Augmented Safety Advisory Groups). This is because the majority of service providers, as shown through the stakeholder interviews and stakeholder documentation, expected an increase in service demand.^[2] Further, established planning tools such as the London Events Coordination Calendar (LECC) indicated that the volume of activity in London would be much greater than usual (our analyses showed a significant increase in the number of days with at least one event from 30 events in 2009 to 58 events in 2012; $P < 0.001$), potentially, increasing demand for public and private services^[96]. Thus, the Olympic Polyclinic was established for the Olympic family and medical services were available for spectators within the Olympic Park, helping to divert service demand away from busy EDs, when appropriate.^[111] In venues outside the Park, first aid and medical staff were available at many events in line with recommendations outlined in the HSE Event safety guide.^[112] An increase in alcohol-related harm was also expected, which led to the involvement of existing services such as the Alternate Response Vehicle (ARV) and the Soho Alcohol Recovery Centre to provide appropriate treatment to intoxicated individuals outside the ED during the Games.

As part of the planning and preparation for the Games, a range of guidance documents were published for members of the public, service providers and businesses. For the public, this guidance revolved around ways of staying healthy during the Games, which included 'sensible drinking'.^[113, 114] For service providers, information was published on a wide range of factors relating to key dates for the Games (when service demand could peak), transport issues, the media protocol and advice around healthcare provision and health protection, evidence from previous events around impacts on service demand, and details of healthcare eligibility.^[2, 113] For alcohol suppliers at the Games, NHS London identified scope for further action including: promotion of non-alcoholic and low alcohol drinks and the avoidance of higher strength drinks, no low-price promotions, developing a responsible approach to drinking based on 'safe limits', using an alternative to glass containers, not using the Olympic logo on advertising or marketing, not associating sports activities as part of the advertising or marketing campaign, providing server training around drink strength and not serving to clearly intoxicated individuals, and using identity cards to prevent underage drinking.^[115] Also for alcohol suppliers, the Greater London Authority urged alcohol sales to be responsibly managed to prevent crime and disorder by: avoiding the sale of alcohol where possible, if it is to be sold, implementing responsible drinking policies such as Challenge 21, glassware alternatives, no low price promotions, and availability of low alcohol and no alcohol drinks.^[116] Whilst such suggestions are key for reducing harm associated with alcohol,^[117, 118] it is not known to what extent each of these areas were adhered to in practice. However, alcohol prices in the Games venues were high. A pint of beer was priced at

£7.23 per pint,^[65] equating to £2.58 per unit (for a beer of 5% ABV). Price affects consumption,^[119] a minimum price of 50 pence per unit strategies could reduce consumption by 6.9% per drinker and consequently instances of acute illness by 8,100 in the first year.^[120] As well as the recommendations developed by the Greater London Authority and NHS London, advertising regulations were established ahead of the Games that prevented marketing of alcohol (and other products) in and around the Games (see Box 4). Such restrictions are not typically in place around other sporting events that are more commonly associated with health harms such as violence,^[26] and legislation was specifically developed to ensure that advertising did not contravene the expectations of the Games. Whilst some of these regulations were primarily to protect sponsorship agreements, their impacts would have been more wide-ranging. Whilst data on the effectiveness of promotion restrictions varies, advertising can affect consumption, particularly amongst young people. For example, modelled data for England suggest that a complete ban on alcohol advertising could reduce mean consumption by up to 27%.^[120]

Whilst service providers expected an increase in service demand and planned accordingly, actual experiences of service delivery during the Olympics and Paralympics Games varied widely. Some interviewees reported an increase in service demand but others reported that demand for services dropped dramatically during the Games. Overall, there was a strong feeling that whether increases in service demand had occurred or not, the anticipated large influx of service demand had not happened. The LAS reported that

Box 4: Examples of advertising restrictions established for London 2012 Olympic and Paralympic Games

- No advertising or other commercial branding was allowed on the Olympic ‘field of play’, and other locations that were in sight of television cameras or seated spectators.^[121] This was not the case for the Paralympics, which saw branding on the field of play and branded team clothing.^[122]
- For both the Olympic and Paralympic Games, no advertising was allowed within the Event Zones, which cover the Olympic venues and routes themselves as well as a surrounding buffer zone unless authorised by LOCOG^{lvii}. Trading in public places near the venues also required authorisation from LOCOG. These restrictions covered the times of the events at individual venues but in some cases, covered the day before the event as well.
- A brewing company was appointed as a sponsor for the Games.^[123] This provided them with exclusive ‘pouring rights’ for lager and cider at the Games. Whilst Marston’s beer was sold at Lord’s cricket ground and Pimm’s at Wimbledon, they were served in unbranded containers and were allocated generic names.^[69]
- Alcohol was designated a prohibited item at London 2012 venues, and could not be brought into any venue.^[124]
- All but one Games venue served alcohol, the exception being the mountain biking venue of Hadleigh Farm, which is run by the Salvation Army.^[69]
- Non-sponsors were not able to use images or wording that could be considered a link with the Games. So, for example, they were unable to use two words from the following list: Games, Two Thousand and Twelve, 2012, and Twenty-Twelve.^[125]
- Restrictions were put in place with regards to advertising through social media, and athletes were issued with a social media and blogging policy to enable them to stay within the regulations.^[125]

^{lvii} For further details see: www.london2012.com/business/advertising-and-trading-regulations.

an increase in workload occurred but was not significant, and so established plans were able to manage the situation well.^[126] Allocated resources were even reduced in the second week. Elsewhere, healthcare planning had been anticipated to be similar to what would be needed for a mild winter but with added pressures from staff volunteering, summer leave, Ramadan, transport and heightened security risks.^[127] In practice, activity had been lower than expected but peaks were evidenced during the torch relay and on peak days (undefined). The health service data shown in this report support the mixed experiences of the stakeholder interviews. In the 2012 London Olympic period, 50,812 ambulance callouts were recorded (daily mean: 2,989 callouts) and 27,729 ED presentations were recorded by the six London EDs included in the analysis (daily mean: 1,860 presentations). During the Paralympics, 35,238 ambulance callouts (daily mean: 2,937 callouts) and 22,393 ED presentations were recorded (daily mean: 1,866 presentations). Across the 2012 Games periods, the busiest day for the London Ambulance Service was the first day of the Olympics (Friday 27th July 2012; n=3,529) and the busiest day for the EDs was Monday 30th July 2012 (day four of the Olympics; n=2,132). The ED findings reflect those identified for the 1996 European Football Championship (held in England), where on average presentations were 9% higher on a Monday compared with other days^{lviii}.^[21] Mondays have also been shown to experience higher numbers of presentations in national analyses from the United States.^[128] In our study, after accounting for confounding factors^{lix}, there was no significant difference in the mean daily number of ambulance callouts in London compared with the same days in previous years whilst the Olympics were associated with a 5% decrease in the mean daily number of ED presentations in London. However, there was a 4% increase in the mean daily number of ambulance callouts in London associated with other Olympic events (that is the London torch relay events and the Greatest Team Parade) compared with the same days in previous years (after accounting for confounding variables). This apparent lack of increase in service demand could be due, in part, to interventions such as the Olympic Park Polyclinic, which treated a large number of spectators and athletes on site, and was reported to have effectively diverted people away from the EDs.^[129] Other interventions could also have contributed including the ARV, Soho Alcohol Recovery Centre, increased signposting for accessing healthcare appropriately (for example through pharmacies as a first point of call),^[111, 114] and the first aiders available at the events.

The number of victims of assaults seen by health care providers during the Games would have been less likely to have been affected by interventions such as the ARV and Soho Alcohol Recovery Centre because such individuals would have needed medical treatment. Here, the data presented a mixed picture on whether the number of assaults increased during the Olympic and Paralympic periods. In the 2012 London Olympic period, 1,947 ambulance callouts for assaults were recorded by the London Ambulance Service (daily mean: 115 callouts) and 178 ED presentations for assaults were recorded by the four London EDs who provided data on assaults (daily mean: 10.5 presentations). During the Paralympics, 1,283 ambulance callouts for assault (daily mean: 107 callouts) and 124 presentations for assaults were recorded (daily mean: 10.3 presentations). Across the 2012 Games periods, the busiest day for ambulance callouts for assaults was Friday 10th August 2012 (day 15 of the Olympics; n=184) and the busiest days for ED presentations were Friday 3rd and Friday 10th August 2012 (days eight and 15 of the Olympics respectively; both: n=19). Previous analyses have also shown that presentations for assaults are typically higher at the weekend.^[25] In our study,

^{lviii} This was based on an analysis of 172,366 ED presentations in 14 British EDs during the 1996 European Football Championship (held in England). Data were collected for a nine week period (20th May to 21st July 1996), which represented three weeks before, three weeks during and three weeks after the tournament. Seven of the EDs involved were located next to a tournament venue and seven were not.^[21]

^{lix} These included: day of the week, year, bank holiday, other events (music, other sport, carnival, other Games), mean air temperature, London riots and number of team GB gold medals

after accounting for confounding variables, the mean daily number of ambulance callouts for assaults increased by 14% during the Olympics period and 15% during the Paralympics periods. The ED data saw no such association (in and outside London). However, London data were only from four of the six London EDs and numbers were low (for example, 170 in the Olympics period). Further, questions remain over the quality of the ED data. In the datasets analysed here, the proportion of violent offences in the London hospitals during the Olympic and Paralympic Games was half of that reported by those EDs outside London (London: 0.7%; outside London: 1.7%). Whilst this reflects the higher levels of harm experienced in the North West compared with London with regards to both alcohol (seven of the nine EDs were from the North West) and violence,^[102, 130] the difference may also be due to data quality issues and under-reporting (which may affect the EDs outside London as well).^[26, 130] Further work is needed on data collection and data recording for assault-related ED presentations in order that the data can be used to monitor health and wellbeing, and the impact of any interventions.

Emergency hospital admissions data enabled a more focused exploration of the impact of alcohol during the Games. Here, a total of 1,271 emergency admissions for acute alcohol specific conditions were recorded during the Olympics and 923 during the Paralympics (daily means: 74.8 and 76.9 admissions respectively). Further, 2,430 emergency hospital admissions for alcohol-related external causes were recorded during the Olympics in London and 1,753 during the Paralympics (daily mean: 142.9 and 146.1 admissions respectively). The busiest day for emergency hospital admissions for acute alcohol specific conditions in London during the Games was Saturday 1st September 2012 (day four of the Paralympics; n=102) whilst the busiest day for emergency hospital admissions for alcohol-related external causes was Saturday 8th September 2012 (day 11 of the Paralympics; n=182). After correcting for confounding factors, overall there was no significant association between the number of emergency hospital admissions for alcohol-related conditions (in this case, acute alcohol-specific conditions and conditions due to alcohol-related external causes) and the Olympics in London. Only the Paralympics showed such an association; during the dates of the Paralympic Games, there was a 12.1% increase in the number of emergency hospital admissions for acute alcohol specific conditions in London. With no such association with the Olympic Games (or the number of Gold medals won by Team GB), it is not clear whether the Paralympics themselves were related to the increases particularly as no such association was found for conditions relating to alcohol-related external causes for either the Olympic or Paralympic periods. Other confounding factors (such as the onset of the new academic year and individual university's Freshers' Weeks) could also have been involved. However, it was not possible to account for the dates of these in the model. Emergency hospital admissions for diabetes mellitus in London were analysed to act as a comparison. Here, similar patterns were evident with no significant association between the either the Olympics or Paralympics and the number of emergency admissions for diabetes mellitus. Data from hospital admissions outside London were also analysed, and these again showed no significant association between the either the Olympics or Paralympics and the number of emergency admissions for any of the three conditions.

Recorded crime figures also depict a mixed impact of the Olympic and Paralympic Games. Overall, there was a 5% decrease in notifiable offences in the Olympic Tasking Period between 2010 and 2012 (164,906 in 2010; 156,357 in 2012).^[22, 55] However, for specific areas in London, experience of crime was more variable: North Greenwich Arena and Hyde Park experienced an increase in notifiable offences from 2010 to 2012, whilst for others such as Earls Court and Lord's Cricket Ground, the level of crime remained relatively stable. Extra Police were on duty in the Olympic Park during the Olympic Tasking Period, but initial analyses suggest that the volume of crime in this instance were not related to the number of officers deployed. Further, the

circumstances of Olympic venues have changed over time. The Olympic Park was completed in 2012 in time for the Games and prior data are based on the building site and the location rather than a finished venue. Further analyses are required to account for the impact of Police numbers and other factors as has been possible for the analyses around ambulance callouts and ED presentations.

The data analyses presented here have been used to evaluate the impact of the Olympics and Paralympic Games on alcohol consumption and related harm. Health data, in particular, have been used to demonstrate any potential impact on the local population. Whilst events of this kind do not happen every day, the analyses used here could be repeated to monitor both alcohol consumption and related harm at events on a smaller scale and alcohol consumption and related harm more generally. Health data is becoming more important in such monitoring activities as health authorities become more involved in areas such as licensing. Health authorities are now responsible authorities under the latest changes to licensing legislation through the Police Reform and Social Responsibility Act (2011).^[131] It is anticipated that this will be in the form of presenting data from EDs which could provide evidence for any breaches in licensing conditions. Whilst this is an important step in recognising the value of health data in licensing decisions, the inclusion of public health as a fifth licensing objective would provide wider scope for action against activities such as irresponsible drinks promotions.^[132]

In conclusion, this evaluation provides an indication of the impact of the Olympics and Paralympic Games on alcohol consumption and related harm. To understand the impact of the Games on alcohol-related harm in a comprehensive and robust way, data on all health service use (ambulance callouts, ED presentations and crime) have been used because of the wide impact alcohol has on so many aspects of health and wellbeing. To focus more specifically on incidents with a strong relationship with alcohol, detailed analyses have been performed on assault-based data because approximately 50% of assaults are thought to be related to alcohol.^[48] Recording of alcohol consumption at the point of service use is not standard and such data can be inconsistent and of poor quality. The hospital admissions analysis intended for June 2013 will provide further understanding of the direct impact of alcohol, because, as well as providing a general overview of admission for acute conditions, it will specifically investigate conditions that have been diagnosed as involving alcohol (such as acute intoxication due to the use of alcohol and ethanol poisoning). Surveys could also be used to understand the impact of the Games on alcohol consumption but surveys typically underestimate consumption.^[133, 134] National surveys that are run recurrently cannot provide local analyses, and local surveys are typically one-off and commissioned with a specific need in mind and cannot be used to monitor changes in consumption for an evaluation such as this. However, these are not direct measures of alcohol consumption. More robust, regularly collected alcohol consumption data that can be monitored over time at a local level are required to understand the impact of events such as the Games, and of interventions designed to improve wellbeing. Sales or taxation data could fill this gap, and examples of sales data have been included in the report. Whilst sales and taxation data do not capture all consumption (for example, they do not include alcohol brought into the country illegally or home brew), they could provide a valuable indication of alcohol consumption and change over time. In this evaluation, they have shown a mixed impact of the Games, depending on timing during the Olympic period, day of the week, occurrence of an event nearby and location of the pub. However, the sales data highlighted here were based on individual pubs or groups of pubs, with each source using different parameters with which to discuss the potential impact of the Olympics.^[103-105] As such, they can only present a snapshot understanding of any effects of the Olympics.

Feasibility overview

This evaluation used a range of different approaches to maximise understanding around the health outcomes (alcohol-related and generally) of the London 2012 Olympic and Paralympic Games. The main parts of the evaluation included: a literature review of 34 relevant studies on health outcomes at mass events; 26 interviews before and after the Games with health service and local authority stakeholders to understand organisational experiences; data analyses of emergency hospital admissions, ambulance callouts and ED presentations to identify changes in health service use; and analyses of Police recorded crime data. In order to fulfil all of the parts of the evaluation, considerable cooperation was required externally both to access data and/or reports, and to gain participation in interviews. This presented particular obstacles because the evaluation was ongoing at such a busy time in organisational lives. Such obstacles are common in studies of this nature.^[135] Thus, for this study, commissioners were required to purposively identify individuals for participation and individuals had to be contacted multiple times to arrange interviews and to organise the collection of data and/or reports. Any future evaluation hoping to replicate this study should account for these factors.

12.1. Conclusions and recommendations

Overall, as this evaluation has shown, the London 2012 Olympic and Paralympic Games had a minimal impact on alcohol-related harm. Whilst it is unclear precisely which interventions contributed to the success of the Games in preventing increases in alcohol-related harm, published literature would suggest that restricted advertising, appropriate service planning, and pricing strategies that were in place for the Games would have played an important role in harm prevention. The Games have provided a legacy by demonstrating that successful delivery of an international sporting event can take place without an overarching impact on healthcare service demand above and beyond any ongoing trends. In order to deliver the Games, organisations have worked in partnership to share information and strategies, and to deliver co-ordinated services. The lessons learned will go on to inform future multi-agency practice both in future day-to-day business and in future event planning. Such lessons should include the opportunities that the Games presented through the direct and indirect interventions provided in terms of the advertising restrictions, prohibition of taking own alcohol into events, appropriate pricing strategies and the use of interventions to divert intoxicated people away from EDs where appropriate.

12.1.1. Recommendations

- For any future events of this nature, to aim for planning and preparation, as well as delivery stages to occur in partnership with other relevant agencies, as occurred for the London 2012 Olympic and Paralympic Games, and to establish multi-agency planning tools such as the London Events Coordination Calendar to aid estimates of local activity which could increase demand for public and private services so that appropriate resources can be put in place.
- For any future events of this nature, to incorporate interventions which can reduce alcohol-related harm (such as appropriate pricing strategies, advertising bans and prohibition of taking own alcohol into events) and divert people from main service providers which are expected to experience extremely high levels of demand (as the Olympic Polyclinics, provision of first aid at the venues, ARV and Soho Alcohol Recovery Centre aimed to do here in relation to reducing ED presentations).

- For any future similar evaluations, to access data from other service providers established and/or specifically for the Olympics (such as the Olympic Polyclinics, first aid provision, ARV, and Soho Alcohol Recovery Centre).
- To ensure all data extractions from individual EDs follow a standard approach for identifying assault attendees when extracting the data using fields from the national ED dataset.
- For EDs to collect enhanced data on assaults as recommended by the College of Emergency Medicine.^[136]
- To identify ways of accessing and using alcohol consumption data (through sales and taxation) to monitor the impact of events such as these and alcohol interventions.
- To encourage data sharing amongst EDs, the police, and licensing authorities to inform decisions on licensing for example, in terms of licensing conditions that can be applied to temporary event notices and new licensed premises.

13. Appendices

13.1. Appendix A: Pre-Olympic interview schedule

13.1.1. Section A: You and your organisation

- Job role / Organisation type.
- What does your job involve?
- Does your organisation do anything to prevent alcohol harm? If so please explain.
- Do you have a direct role in preventing alcohol harm as part of your job? If so, please explain.

13.1.2. Section B: The impact of the Olympics

- Do you think there will be any positive impacts of the Olympics on a) London b) your organisation / service? If so, what will these be?
- Do you think there are any health risks associated with the Olympics? If so, what are these and what is their likelihood of occurrence? Prompt: Do they envisage an increase in the need for health services during the Games and if so, why / and nature of increase.
- Do you think there will be any negative impacts of the Olympics for a) London b) your organisation / service? If so, what will these be?

13.1.3. Section C: Challenges and barriers

- Do you expect to face any challenges or barriers during the Olympics? Both for a) you and b) your organisation? If so, what are these?
- Have you or your organisation put any measures in place to overcome these (i.e. enablers, facilitators)? If so, what? Prompt: changes to your service you plan to implement during the Games.
- Could anything more be done to overcome barriers / mitigate against any potential negative impacts of the Games? If so, please explain.
- Are you using the Games to improve your services / partnerships? If so, how?
- Do you feel there will be any Olympic legacy from your service?
- Have any learning / planning assumptions been implemented in your organisation based on learning from other large gatherings / previous experience?

13.1.4. Section D: Final questions

- Are there any other comments that you would like to make?
- Are you happy for us to contact you for the post Olympics interview or if we have further questions?
- THANK YOU.

13.2. Appendix B: Post Olympic interview schedule

13.2.1. Section A: You and your organisation

- Job role / Organisation type.

13.2.2. Section B: The impact of the Olympics

- How did the Olympics go for you and your organisation?
- Did any alcohol-related problems emerge? If so, please describe.
- Have there been any positive impacts of hosting the Olympics for: a) London b) your organisation / service? If so, what?
- Have there been any negative impacts of hosting the Olympics for: a) London b) your organisation / service? If so, what? Prompt: specific impacts on health/health behaviours.

13.2.3. Section C: Challenges and barriers

- Did a) you b) your organisation face any challenges / barriers during the Games? If so, what? Prompt: had all of these been planned for, or were any unforeseen?
- Did you overcome these challenges/barriers (for you and for your organisation/service)? If so, how?

13.2.4. Section D: Lessons learned and future planning

- Have you or your organisation learned any lessons from how you managed the changes that occurred during the Olympic period?
- Do you feel there is anything more that local organisations (e.g. NHS London, local councils) could have done to help during the Olympics?
- Is there anything you or your organisation would do differently if London were hosting a large sporting event in the future?

13.2.5. Section E: Final questions

- Are there any other comments that you would like to make?
- Are you happy for us to contact you if we have any further questions?
- THANK YOU.

13.3. Appendix C: Health service data analysis details

Table 24: Health service data analysis period by year and Olympic status

| Analysis day | Day of the week | Date in 2009 | Date in 2010 | Date in 2011 | Date in 2012 | 2012 Olympics status |
|--------------|-----------------|--------------|--------------|--------------|--------------|----------------------|
| 1 | Fri | 17.7.09 | 16.7.10 | 15.7.11 | 13.7.12 | Pre-Olympics |
| 2 | Sat | 18.7.09 | 17.7.10 | 16.7.11 | 14.7.12 | Pre-Olympics |
| 3 | Sun | 19.7.09 | 18.7.10 | 17.7.11 | 15.7.12 | Pre-Olympics |
| 4 | Mon | 20.7.09 | 19.7.10 | 18.7.11 | 16.7.12 | Pre-Olympics |
| 5 | Tue | 21.7.09 | 20.7.10 | 19.7.11 | 17.7.12 | Pre-Olympics |
| 6 | Wed | 22.7.09 | 21.7.10 | 20.7.11 | 18.7.12 | Pre-Olympics |
| 7 | Thu | 23.7.09 | 22.7.10 | 21.7.11 | 19.7.12 | Pre-Olympics |
| 8 | Fri | 24.7.09 | 23.7.10 | 22.7.11 | 20.7.12 | Pre-Olympics |
| 9 | Sat | 25.7.09 | 24.7.10 | 23.7.11 | 21.7.12 | Pre-Olympics |
| 10 | Sun | 26.7.09 | 25.7.10 | 24.7.11 | 22.7.12 | Pre-Olympics |
| 11 | Mon | 27.7.09 | 26.7.10 | 25.7.11 | 23.7.12 | Pre-Olympics |
| 12 | Tue | 28.7.09 | 27.7.10 | 26.7.11 | 24.7.12 | Pre-Olympics |
| 13 | Wed | 29.7.09 | 28.7.10 | 27.7.11 | 25.7.12 | Pre-Olympics |
| 14 | Thu | 30.7.09 | 29.7.10 | 28.7.11 | 26.7.12 | Pre-Olympics |
| 15 | Fri | 31.7.09 | 30.7.10 | 29.7.11 | 27.7.12 | Olympics |
| 16 | Sat | 1.8.09 | 31.7.10 | 30.7.11 | 28.7.12 | Olympics |
| 17 | Sun | 2.8.09 | 1.8.10 | 31.7.11 | 29.7.12 | Olympics |
| 18 | Mon | 3.8.09 | 2.8.10 | 1.8.11 | 30.7.12 | Olympics |
| 19 | Tue | 4.8.09 | 3.8.10 | 2.8.11 | 31.7.12 | Olympics |
| 20 | Wed | 5.8.09 | 4.8.10 | 3.8.11 | 1.8.12 | Olympics |
| 21 | Thu | 6.8.09 | 5.8.10 | 4.8.11 | 2.8.12 | Olympics |
| 22 | Fri | 7.8.09 | 6.8.10 | 5.8.11 | 3.8.12 | Olympics |
| 23 | Sat | 8.8.09 | 7.8.10 | 6.8.11 | 4.8.12 | Olympics |
| 24 | Sun | 9.8.09 | 8.8.10 | 7.8.11 | 5.8.12 | Olympics |
| 25 | Mon | 10.8.09 | 9.8.10 | 8.8.11 | 6.8.12 | Olympics |
| 26 | Tue | 11.8.09 | 10.8.10 | 9.8.11 | 7.8.12 | Olympics |
| 27 | Wed | 12.8.09 | 11.8.10 | 10.8.11 | 8.8.12 | Olympics |
| 28 | Thu | 13.8.09 | 12.8.10 | 11.8.11 | 9.8.12 | Olympics |
| 29 | Fri | 14.8.09 | 13.8.10 | 12.8.11 | 10.8.12 | Olympics |
| 30 | Sat | 15.8.09 | 14.8.10 | 13.8.11 | 11.8.12 | Olympics |
| 31 | Sun | 16.8.09 | 15.8.10 | 14.8.11 | 12.8.12 | Olympics |
| 32 | Mon | 17.8.09 | 16.8.10 | 15.8.11 | 13.8.12 | In between |
| 33 | Tue | 18.8.09 | 17.8.10 | 16.8.11 | 14.8.12 | In between |
| 34 | Wed | 19.8.09 | 18.8.10 | 17.8.11 | 15.8.12 | In between |
| 35 | Thu | 20.8.09 | 19.8.10 | 18.8.11 | 16.8.12 | In between |
| 36 | Fri | 21.8.09 | 20.8.10 | 19.8.11 | 17.8.12 | In between |
| 37 | Sat | 22.8.09 | 21.8.10 | 20.8.11 | 18.8.12 | In between |
| 38 | Sun | 23.8.09 | 22.8.10 | 21.8.11 | 19.8.12 | In between |
| 39 | Mon | 24.8.09 | 23.8.10 | 22.8.11 | 20.8.12 | In between |

| Analysis day | Day of the week | Date in 2009 | Date in 2010 | Date in 2011 | Date in 2012 | 2012 Olympics status |
|---------------------|------------------------|---------------------|---------------------|---------------------|---------------------|-----------------------------|
| 40 | Tue | 25.8.09 | 24.8.10 | 23.8.11 | 21.8.12 | In between |
| 41 | Wed | 26.8.09 | 25.8.10 | 24.8.11 | 22.8.12 | In between |
| 42 | Thu | 27.8.09 | 26.8.10 | 25.8.11 | 23.8.12 | In between |
| 43 | Fri | 28.8.09 | 27.8.10 | 26.8.11 | 24.8.12 | In between |
| 44 | Sat | 29.8.09 | 28.8.10 | 27.8.11 | 25.8.12 | In between |
| 45 | Sun | 30.8.09 | 29.8.10 | 28.8.11 | 26.8.12 | In between |
| 46 | Mon | 31.8.09 | 30.8.10 | 29.8.11 | 27.8.12 | In between |
| 47 | Tue | 1.9.09 | 31.8.10 | 30.8.11 | 28.8.12 | In between |
| 48 | Wed | 2.9.09 | 1.9.10 | 31.8.11 | 29.8.12 | Paralympics |
| 49 | Thu | 3.9.09 | 2.9.10 | 1.9.11 | 30.8.12 | Paralympics |
| 50 | Fri | 4.9.09 | 3.9.10 | 2.9.11 | 31.8.12 | Paralympics |
| 51 | Sat | 5.9.09 | 4.9.10 | 3.9.11 | 1.9.12 | Paralympics |
| 52 | Sun | 6.9.09 | 5.9.10 | 4.9.11 | 2.9.12 | Paralympics |
| 53 | Mon | 7.9.09 | 6.9.10 | 5.9.11 | 3.9.12 | Paralympics |
| 54 | Tue | 8.9.09 | 7.9.10 | 6.9.11 | 4.9.12 | Paralympics |
| 55 | Wed | 9.9.09 | 8.9.10 | 7.9.11 | 5.9.12 | Paralympics |
| 56 | Thu | 10.9.09 | 9.9.10 | 8.9.11 | 6.9.12 | Paralympics |
| 57 | Fri | 11.9.09 | 10.9.10 | 9.9.11 | 7.9.12 | Paralympics |
| 58 | Sat | 12.9.09 | 11.9.10 | 10.9.11 | 8.9.12 | Paralympics |
| 59 | Sun | 13.9.09 | 12.9.10 | 11.9.11 | 9.9.12 | Paralympics |
| 60 | Mon | 14.9.09 | 13.9.10 | 12.9.11 | 10.9.12 | Post-Paralympics |
| 61 | Tue | 15.9.09 | 14.9.10 | 13.9.11 | 11.9.12 | Post-Paralympics |
| 62 | Wed | 16.9.09 | 15.9.10 | 14.9.11 | 12.9.12 | Post-Paralympics |
| 63 | Thu | 17.9.09 | 16.9.10 | 15.9.11 | 13.9.12 | Post-Paralympics |
| 64 | Fri | 18.9.09 | 17.9.10 | 16.9.11 | 14.9.12 | Post-Paralympics |
| 65 | Sat | 19.9.09 | 18.9.10 | 17.9.11 | 15.9.12 | Post-Paralympics |
| 66 | Sun | 20.9.09 | 19.9.10 | 18.9.11 | 16.9.12 | Post-Paralympics |
| 67 | Mon | 21.9.09 | 20.9.10 | 19.9.11 | 17.9.12 | Post-Paralympics |
| 68 | Tue | 22.9.09 | 21.9.10 | 20.9.11 | 18.9.12 | Post-Paralympics |
| 69 | Wed | 23.9.09 | 22.9.10 | 21.9.11 | 19.9.12 | Post-Paralympics |
| 70 | Thur | 24.9.09 | 23.9.10 | 22.9.11 | 20.9.12 | Post-Paralympics |
| 71 | Fri | 25.9.09 | 24.9.10 | 23.9.11 | 21.9.12 | Post-Paralympics |
| 72 | Sat | 26.9.09 | 25.9.10 | 24.9.11 | 22.9.12 | Post-Paralympics |
| 73 | Sun | 27.9.09 | 26.9.10 | 25.9.11 | 23.9.12 | Post-Paralympics |

13.4. Appendix D: Emergency hospital admission data in London

Table 25: Mean daily number of emergency hospital admissions for acute alcohol specific conditions in London by Olympic period in 2012 and equivalent periods in 2009-2011

| | 2009 | | 2010 | | 2011 | | 2012 | |
|------------------------|------|--------|------|--------|------|--------|------|--------|
| | mean | 95% CI | mean | 95% CI | mean | 95% CI | mean | 95% CI |
| Pre-Games | 51 | 47-55 | 71 | 66-75 | 78 | 74-82 | 75 | 70-80 |
| During the Olympics | 58 | 54-62 | 67 | 62-73 | 78 | 73-82 | 75 | 68-81 |
| In between the Games | 59 | 55-63 | 69 | 63-76 | 73 | 68-78 | 76 | 70-82 |
| During the Paralympics | 59 | 52-66 | 66 | 62-70 | 76 | 70-82 | 77 | 67-87 |
| Post-Games | 59 | 55-63 | 63 | 57-70 | 73 | 67-79 | 69 | 65-73 |

There were significant associations between mean daily emergency admission and year in all of the Games periods using ANOVA (all periods: P<0.001).

Table 26: Generalised linear modelling for daily number of emergency hospital admissions for acute alcohol specific conditions in London for the analysis period in 2012 and equivalent periods in 2009-2011

| Factor | Estimate | 95% confidence intervals | P |
|--------------------------------|----------|--------------------------|--------|
| At least one event* | | | |
| Olympic Games | | Not significant | |
| Paralympic Games | 8.3 | 0.4 - 16.1 | <0.05 |
| Olympic warm up event | | Not significant | |
| Olympic or Paralympic ceremony | | Not significant | |
| Other Games event | | Not significant | |
| Carnival | | Not significant | |
| Music | | Not significant | |
| Other sport | | Not significant | |
| Year | | | |
| 2012 | 15.9 | 12.2 - 19.6 | <0.001 |
| 2011 | 20.0 | 16.8 - 23.1 | <0.001 |
| 2010 | 10.9 | 8.0 - 13.8 | <0.001 |
| 2009 | | Reference category | |
| Day of week | | | |
| Monday | | Not significant | |
| Tuesday | | Not significant | |
| Wednesday | | Reference category | |
| Thursday | | Not significant | |
| Friday | | Not significant | |
| Saturday | 10.6 | 6.8 - 14.4 | <0.001 |
| Sunday | 7.8 | 4.0 - 11.6 | <0.001 |
| Bank holiday weekend** | | Not significant | |
| 2011 London riots*** | | Not significant | |
| Average air temperature | | Not significant | |
| Number of Team GB Gold | | Not significant | |

* The reference category for these factors is no event. **Bank Holiday weekend is defined as Friday to Sunday, with the reference category of not a bank holiday weekend *** The reference category is no London riots.

Table 27: Likelihood of patients having a repeat emergency hospital admission for acute alcohol specific conditions in London in the analysis period using chi squared and binary logistic regression

| | N | Percentage | P | AOR | 95%CI | P |
|---------------------|---------------|------------|--------|--------------------|---------|--------|
| Year | | | | | | |
| 2009 | 3,756 | 8.3 | | Reference category | | |
| 2010 | 4,292 | 10.1 | <0.001 | 1.2 | 1.0-1.4 | <0.01 |
| 2011 | 4,814 | 10.0 | | 1.1 | 1.1-1.6 | |
| 2012 | 4,650 | 10.9 | | 1.3 | 1.1-1.3 | |
| Gender | | | | | | |
| Male | 12,531 | 10.2 | <0.05 | 1.1 | 1.0-1.3 | <0.05 |
| Female | 4,981 | 9.1 | | Reference category | | |
| Age | | | | | | |
| 0-34 years | 4,717 | 6.3 | | 1.9 | 1.6-2.2 | |
| 35-54 years | 7,960 | 11.7 | <0.001 | 1.6 | 1.4-1.9 | <0.001 |
| 55-74 years | 3,991 | 11.4 | | 1.0 | 0.7-1.3 | |
| 75 and over | 839 | 6.3 | | Reference category | | |
| Ethnicity | | | | | | |
| White British | 9,177 | 11.1 | | 1.0 | 0.9-1.2 | |
| White Other | 3,044 | 10.7 | <0.001 | 1.0 | 0.8-1.2 | <0.001 |
| Asian/Asian British | 1,245 | 10.9 | | 0.8 | 0.6-0.9 | |
| Black/Black British | 1,088 | 11.4 | | 0.5 | 0.4-0.6 | |
| Other*/Refused | 2,958 | 6.3 | | Reference category | | |
| Deprivation | | | | | | |
| 1 (least deprived) | 897 | 6.0 | | Reference category | | |
| 2 | 1,513 | 8.6 | <0.001 | 1.5 | 1.0-2.0 | <0.001 |
| 3 | 2,595 | 9.0 | | 1.5 | 1.1-2.1 | |
| 4 | 5,266 | 11.0 | | 1.8 | 1.4-2.5 | |
| 5 (most deprived) | 5,543 | 12.5 | | 2.1 | 1.6-2.8 | |
| Total | 17,512 | 9.9 | | | | |

N may not sum to total due to missing data. Percentages may not sum to 100% due to rounding. * Other refers to Chinese, Mixed and other (undefined).

Table 28: Mean daily number of emergency hospital admissions for alcohol-related external causes in London by Olympic period in 2012 and equivalent periods in 2009-2011

| | 2009 | | 2010 | | 2011 | | 2012 | |
|------------------------|------|---------|------|---------|------|---------|------|---------|
| | mean | 95% CI | mean | 95% CI | mean | 95% CI | mean | 95% CI |
| Pre-Games | 183 | 171-194 | 198 | 188-209 | 200 | 194-205 | 144 | 137-150 |
| During the Olympics | 191 | 183-199 | 201 | 195-207 | 209 | 201-216 | 143 | 135-150 |
| In between the Games | 194 | 188-199 | 210 | 200-220 | 203 | 197-208 | 147 | 142-152 |
| During the Paralympics | 193 | 183-203 | 212 | 202-221 | 216 | 209-224 | 146 | 136-156 |
| Post-Games | 193 | 183-203 | 212 | 201-224 | 215 | 207-223 | 140 | 132-147 |

There were significant associations between mean daily emergency admission and year in all of the Games periods using ANOVA (all periods: P<0.001).

Table 29: Generalised linear modelling for daily number of emergency hospital admissions for alcohol-related external causes in London for the analysis period in 2012 and equivalent periods in 2009-2011

| Factor | Estimate | 95% confidence intervals | P |
|--------------------------------|----------|--------------------------|--------|
| At least one event* | | | |
| Olympic Games | | Not significant | |
| Paralympic Games | | Not significant | |
| Olympic warm up event | -11.9 | -20.3 - -3.5 | <0.01 |
| Olympic or Paralympic ceremony | | Not significant | |
| Other Olympic Games | | Not significant | |
| Carnival | | Not significant | |
| Music | -7.0 | -11.7 - -2.3 | <0.01 |
| Other sport | | Not significant | |
| Year | | | |
| 2012 | -48.1 | -54.0 - -42.1 | <0.001 |
| 2011 | 18.9 | 13.8 - 24.0 | <0.001 |
| 2010 | 15.4 | 10.7 - 20.1 | <0.001 |
| 2009 | | Reference category | |
| Day of week | | | |
| Monday | | Not significant | |
| Tuesday | | Not significant | |
| Wednesday | | Reference category | |
| Thursday | | Not significant | |
| Friday | | Not significant | |
| Saturday | 15.2 | 9.1 - 21.3 | <0.001 |
| Sunday | 7.9 | 1.8 - 14.1 | <0.05 |
| Bank holiday weekend** | | Not significant | |
| 2011 London riots*** | | Not significant | |
| Average air temperature | | Not significant | |
| Number of Team GB Gold | | Not significant | |

* The reference category for these factors is no event. **Bank Holiday weekend is defined as Friday to Sunday, with the reference category of not a bank holiday weekend *** The reference category is no London riots.

Table 30: Likelihood of patients having a repeat emergency hospital admission for an alcohol-related external cause in London in the analysis period in the analysis period using chi squared and binary logistic regression

| | N | Percentage | P | AOR | 95%CI | P |
|---------------------|---------------|------------|--------|--------------------|---------|--------|
| Year | | | | | | |
| 2009 | 13,280 | 4.3 | | Reference category | | |
| 2010 | 14,275 | 4.9 | <0.001 | 1.1 | 1.0-1.3 | <0.01 |
| 2011 | 14,344 | 5.1 | | 1.2 | 1.1-1.3 | |
| 2012 | 10,034 | 3.8 | | 1.0 | 0.8-1.1 | |
| Gender | | | | | | |
| Male | 26,446 | 4.2 | <0.001 | Not significant | | |
| Female | 25,487 | 4.9 | | Reference category | | |
| Age | | | | | | |
| 0-34 years | 12,812 | 3.4 | | 1.3 | 1.1-1.4 | |
| 35-54 years | 10,457 | 4.5 | <0.001 | 1.1 | 1.1-1.4 | <0.001 |
| 55-74 years | 9,311 | 3.9 | | 1.5 | 1.3-1.7 | |
| 75 and over | 19,350 | 5.7 | | Reference category | | |
| Ethnicity | | | | | | |
| White British | 30,530 | 5.3 | | 0.9 | 0.7-1.0 | |
| White Other | 6,304 | 4.3 | <0.001 | 0.7 | 0.6-0.8 | <0.001 |
| Asian/Asian British | 3,707 | 3.3 | | 0.7 | 0.6-0.8 | |
| Black/Black British | 3,252 | 3.5 | | 0.6 | 0.5-0.7 | |
| Other*/Refused | 8,140 | 2.9 | | Reference category | | |
| Deprivation | | | | | | |
| 1 (least deprived) | 5,316 | 3.9 | | Reference category | | |
| 2 | 6,978 | 4.2 | <0.001 | 1.1 | 0.9-1.3 | <0.001 |
| 3 | 9,549 | 4.3 | | 1.2 | 1.0-1.4 | |
| 4 | 14,869 | 5.0 | | 1.5 | 1.3-1.7 | |
| 5 (most deprived) | 13,585 | 5.0 | | 1.5 | 1.3-1.8 | |
| Total | 51,933 | 4.6 | | | | |

N may not sum to total due to missing data. Percentages may not sum to 100% due to rounding. * Other refers to Chinese, Mixed and other (undefined).

Table 31: Mean daily number of emergency hospital admissions for diabetes mellitus in London by Olympic period in 2012 and equivalent periods in 2009-2011

| | 2009 | | 2010 | | 2011 | | 2012 | |
|------------------------|------|---------|------|---------|------|---------|------|---------|
| | mean | 95% CI | mean | 95% CI | mean | 95% CI | mean | 95% CI |
| Pre-Games | 138 | 126-150 | 169 | 152-185 | 188 | 177-199 | 163 | 147-180 |
| During the Olympics | 142 | 131-154 | 169 | 155-183 | 183 | 169-197 | 166 | 153-178 |
| In between the Games | 145 | 134-156 | 178 | 161-196 | 172 | 158-186 | 170 | 158-182 |
| During the Paralympics | 148 | 134-162 | 177 | 160-193 | 193 | 177-209 | 163 | 148-178 |
| Post-Games | 154 | 143-165 | 175 | 159-192 | 186 | 170-202 | 163 | 150-176 |

There were significant associations between mean daily emergency admission and year in all of the Games periods using ANOVA (pre-Games, Olympics, and Paralympic: $P < 0.001$; in between the Games and post-Games: $P < 0.01$).

Table 32: Generalised linear modelling for daily number of emergency hospital admissions for diabetes mellitus in London for the analysis period in 2012 and equivalent periods in 2009-2011

| Factor | Estimate | 95% confidence intervals | P |
|--------------------------------|----------|--------------------------|--------|
| At least one event* | | | |
| Olympic Games | | Not significant | |
| Paralympic Games | | Not significant | |
| Olympic warm up event | -10.4 | -18.9 - -2.0 | <0.05 |
| Olympic or Paralympic ceremony | | Not significant | |
| Other Games event | | Not significant | |
| Carnival | -8.6 | -13.2 - -4.1 | <0.001 |
| Music | | Not significant | |
| Other sport | | Not significant | |
| Year | | | |
| 2012 | 23.0 | 17.1 - 29.0 | <0.001 |
| 2011 | 43.5 | 38.5 - 48.6 | <0.001 |
| 2010 | 30.0 | 25.4 - 34.7 | <0.001 |
| 2009 | | Reference category | |
| Day of week | | | |
| Monday | | Not significant | |
| Tuesday | | Not significant | |
| Wednesday | | Reference category | |
| Thursday | | Not significant | |
| Friday | | Not significant | |
| Saturday | -35.4 | -41.6 - -29.2 | <0.001 |
| Sunday | -44.0 | -50.1 - -37.8 | <0.001 |
| Bank holiday weekend** | | Not significant | |
| 2011 London riots*** | | Not significant | |
| Average air temperature | 1.2 | 0.5 - 1.9 | <0.01 |
| Number of Team GB Gold | | Not significant | |

* The reference category for these factors is no event. **Bank Holiday weekend is defined as Friday to Sunday, with the reference category of not a bank holiday weekend *** The reference category is no London riots.

Table 33: Likelihood of patients having a repeat emergency hospital admission for diabetes mellitus in London in the analysis period in the analysis period using chi squared and binary logistic regression

| | N | Percentage | P | AOR | 95%CI | P |
|---------------------|---------------|-------------|--------|--------------------|---------|--------|
| Year | | | | | | |
| 2009 | 9,074 | 13.4 | | Reference category | | |
| 2010 | 10,717 | 14.2 | <0.01 | 1.1 | 1.0-1.2 | <0.01 |
| 2011 | 11,291 | 14.8 | | 1.1 | 1.0-1.2 | |
| 2012 | 10,105 | 15.1 | | 1.1 | 1.1-1.2 | |
| Gender | | | | | | |
| Male | 22,758 | 14.9 | <0.001 | 1.1 | 1.1-1.2 | <0.001 |
| Female | 18,429 | 13.8 | | Reference category | | |
| Age | | | | | | |
| 0-34 years | 278 | 12.2 | | 1.0 | 0.7-1.4 | |
| 35-54 years | 5,411 | 12.9 | <0.001 | 1.1 | 0.7-1.5 | <0.001 |
| 55-74 years | 18,438 | 14.1 | | 1.2 | 0.8-1.7 | |
| 75 and over | 17,060 | 15.2 | | Reference category | | |
| Ethnicity | | | | | | |
| White British | 17,941 | 14.5 | | 1.1 | 1.0-1.2 | |
| White Other | 3,915 | 16.0 | <0.001 | 1.0 | 0.9-1.1 | <0.001 |
| Asian/Asian British | 9,005 | 14.7 | | 1.0 | 0.9-1.1 | |
| Black/Black British | 5,596 | 14.8 | | 0.8 | 0.4-0.9 | |
| Other*/Refused | 4,730 | 11.8 | | Reference category | | |
| Deprivation | | | | | | |
| 1 (least deprived) | 3,204 | 12.5 | | Reference category | | |
| 2 | 4,835 | 13.2 | <0.001 | 1.1 | 0.9-1.2 | <0.001 |
| 3 | 7,689 | 13.8 | | 1.1 | 1.0-1.3 | |
| 4 | 12,427 | 14.9 | | 1.3 | 1.1-1.4 | |
| 5 (most deprived) | 12,658 | 15.4 | | 1.3 | 1.2-1.5 | |
| Total | 41,187 | 14.4 | | | | |

N may not sum to total due to missing data. Percentages may not sum to 100% due to rounding. * Other refers to Chinese, Mixed and other (undefined).

13.5. Appendix E: Emergency hospital admission data outside London

Table 34: Mean daily number of emergency hospital admissions for acute alcohol specific conditions outside London by Olympic period in 2012 and equivalent periods in 2009-2011

| | 2009 | | 2010 | | 2011 | | 2012 | |
|------------------------|------|---------|------|---------|------|---------|------|---------|
| | mean | 95% CI | mean | 95% CI | mean | 95% CI | mean | 95% CI |
| Pre-Games | 375 | 352-399 | 396 | 371-421 | 420 | 400-439 | 414 | 392-437 |
| During the Olympics | 402 | 381-422 | 406 | 384-429 | 444 | 425-464 | 424 | 405-442 |
| In between the Games | 378 | 359-397 | 404 | 379-430 | 421 | 401-441 | 431 | 409-452 |
| During the Paralympics | 384 | 352-417 | 388 | 364-413 | 412 | 389-434 | 411 | 384-437 |
| Post-Games | 356 | 333-380 | 376 | 348-403 | 412 | 388-435 | 396 | 371-421 |

There were significant associations between mean daily emergency admission and year in all of the Games periods using ANOVA (pre-Games: P<0.05; Olympics, in between the Games and post-Games: P<0.01), except for the Paralympics.

Table 35: Generalised linear modelling for daily number of emergency hospital admissions for acute alcohol specific conditions outside London for the analysis period in 2012 and equivalent periods in 2009-2011

| Factor | Estimate | 95% confidence intervals | P |
|--------------------------------|----------|--------------------------|--------|
| At least one event* | | | |
| Olympic Games | | Not significant | |
| Paralympic Games | | Not significant | |
| Olympic warm up event | | Not significant | |
| Olympic or Paralympic ceremony | | Not significant | |
| Other Games event | | Not significant | |
| Carnival | 8.0 | 0.4 - 15.6 | <0.05 |
| Music | | Not significant | |
| Other sport | | Not significant | |
| Year | | | |
| 2012 | 39.4 | 29.4 - 49.3 | <0.001 |
| 2011 | 46.0 | 37.4 - 54.5 | <0.001 |
| 2010 | 20.0 | 12.2 - 27.8 | <0.001 |
| 2009 | | Reference category | |
| Day of week | | | |
| Monday | 15.9 | 5.9 - 25.9 | <0.01 |
| Tuesday | | Not significant | |
| Wednesday | | Reference category | |
| Thursday | | Not significant | |
| Friday | | Not significant | |
| Saturday | 75.3 | 65.1 - 85.4 | <0.001 |
| Sunday | 77.0 | 66.8 - 87.3 | <0.001 |
| Bank holiday weekend** | | Not significant | |
| 2011 London riots*** | | Not significant | |
| Average air temperature | 2.1 | 0.9 - 3.3 | <0.001 |
| Number of Team GB Gold | | Not significant | |

* The reference category for these factors is no event. **Bank Holiday weekend is defined as Friday to Sunday, with the reference category of not a bank holiday weekend *** The reference category is no London riots.

Table 36: Likelihood of patients having a repeat emergency hospital admission for acute alcohol specific conditions outside London in the analysis period in the analysis period using chi squared and binary logistic regression

| | N | Percentage | P | AOR | 95%CI | P |
|---------------------|----------------|------------|--------|--------------------|---------|--------|
| Year | | | | | | |
| 2009 | 24,650 | 9.1 | | Reference category | | |
| 2010 | 25,539 | 9.2 | <0.01 | 1.0 | 0.9-1.1 | <0.05 |
| 2011 | 27,108 | 9.9 | | 1.1 | 1.0-1.2 | |
| 2012 | 26,601 | 9.7 | | 1.1 | 1.0-1.1 | |
| Gender | | | | | | |
| Male | 68,062 | 10.1 | <0.001 | 1.2 | 1.2-1.3 | <0.001 |
| Female | 35,836 | 8.4 | | Reference category | | |
| Age | | | | | | |
| 0-34 years | 32,832 | 6.8 | | 1.8 | 1.7-1.9 | |
| 35-54 years | 45,814 | 11.9 | <0.001 | 1.3 | 1.2-1.6 | <0.001 |
| 55-74 years | 21,162 | 9.1 | | 0.8 | 0.7-1.0 | |
| 75 and over | 4,072 | 5.7 | | Reference category | | |
| Ethnicity | | | | | | |
| White British | 89,584 | 10.0 | | 0.8 | 0.7-0.9 | |
| White Other | 3,441 | 8.1 | <0.001 | 1.0 | 0.8-1.2 | <0.001 |
| Asian/Asian British | 1,422 | 10.4 | | 0.7 | 0.5-1.0 | |
| Black/Black British | 604 | 7.6 | | 0.5 | 0.5-0.6 | |
| Other*/Refused | 8,847 | 5.0 | | Reference category | | |
| Deprivation | | | | | | |
| 1 (least deprived) | 9,623 | 7.3 | | Reference category | | |
| 2 | 12,381 | 8.1 | <0.001 | 1.1 | 1.0-1.2 | <0.001 |
| 3 | 16,237 | 8.6 | | 1.2 | 1.1-1.3 | |
| 4 | 22,956 | 9.5 | | 1.3 | 1.2-1.4 | |
| 5 (most deprived) | 39,889 | 10.7 | | 1.4 | 1.3-1.6 | |
| Total | 103,898 | 9.7 | | | | |

N may not sum to total due to missing data. Percentages may not sum to 100% due to rounding. * Other refers to Chinese, Mixed and other (undefined).

Table 37: Mean daily number of emergency hospital admissions for alcohol-related external causes outside London by Olympic period in 2012 and equivalent periods in 2009-2011

| | 2009 | | 2010 | | 2011 | | 2012 | |
|------------------------|------|-----------|------|-----------|------|-----------|------|----------|
| | mean | 95% CI | mean | 95% CI | mean | 95% CI | mean | 95% CI |
| Pre-Games | 1267 | 1227-1306 | 1335 | 1295-1376 | 1378 | 1342-1415 | 974 | 930-1019 |
| During the Olympics | 1330 | 1295-1365 | 1362 | 1327-1398 | 1409 | 1396-1449 | 978 | 946-1011 |
| In between the Games | 1311 | 1284-1338 | 1376 | 1328-1423 | 1388 | 1349-1426 | 988 | 953-1023 |
| During the Paralympics | 1344 | 1309-1379 | 1382 | 1343-1421 | 1399 | 1357-1440 | 987 | 946-1029 |
| Post-Games | 1330 | 1292-1368 | 1385 | 1345-1424 | 1408 | 1376-1440 | 962 | 921-1002 |

There were significant associations between mean daily emergency admission and year in all of the Games periods using ANOVA (all periods: P<0.001).

Table 38: Generalised linear modelling for daily number of emergency hospital admissions for alcohol-related external causes outside London for the analysis period in 2012 and equivalent periods in 2009-2011

| Factor | Estimate | 95% confidence intervals | P |
|--------------------------------|----------|--------------------------|--------|
| At least one event* | | | |
| Olympic Games | | Not significant | |
| Paralympic Games | | Not significant | |
| Olympic warm up event | | Not significant | |
| Olympic or Paralympic ceremony | | Not significant | |
| Other Games event | | Not significant | |
| Carnival | | Not significant | |
| Music | -17.7 | -33.7 - -1.8 | <0.05 |
| Other sport | | Not significant | |
| Year | | | |
| 2012 | -344.5 | -364.6 - 1118.9 | <0.001 |
| 2011 | 82.7 | 65.4 - 100.0 | <0.001 |
| 2010 | 51.6 | 35.8 - 67.5 | <0.001 |
| 2009 | | Reference category | |
| Day of week | | | |
| Monday | 60.3 | 40.0 - 80.6 | <0.001 |
| Tuesday | | Not significant | |
| Wednesday | | Reference category | |
| Thursday | | Not significant | |
| Friday | 34.7 | 14.6 - 54.9 | <0.001 |
| Saturday | 130.0 | 109.4 - 150.7 | <0.001 |
| Sunday | 125.5 | 104.7 - 146.3 | <0.001 |
| Bank holiday weekend** | | Not significant | |
| 2011 London riots*** | | Not significant | |
| Average air temperature | | Not significant | |
| Number of Team GB Gold | | Not significant | |

* The reference category for these factors is no event. **Bank Holiday weekend is defined as Friday to Sunday, with the reference category of not a bank holiday weekend *** The reference category is no London riots.

Table 39: Likelihood of patients having a repeat emergency hospital admission for alcohol-related external causes outside London in the analysis period in the analysis period using chi squared and binary logistic regression

| | N | Percentage | P | AOR | 95%CI | P |
|---------------------|----------------|------------|--------|--------------------|---------|--------|
| Year | | | | | | |
| 2009 | 90,752 | 4.8 | | Reference category | | |
| 2010 | 94,332 | 4.8 | <0.001 | 1.0 | 1.0-1.0 | <0.001 |
| 2011 | 96,153 | 4.9 | | 1.0 | 1.0-1.1 | |
| 2012 | 67,438 | 4.5 | | 0.9 | 0.9-1.0 | |
| Gender | | | | | | |
| Male | 167,281 | 4.6 | <0.001 | 0.9 | 0.9-0.9 | <0.001 |
| Female | 181,394 | 4.9 | | Reference category | | |
| Age | | | | | | |
| 18-34 years | 80,591 | 5.1 | | 1.2 | 1.2-1.3 | |
| 35-54 years | 70,781 | 6.2 | <0.001 | 0.7 | 0.6-0.7 | <0.001 |
| 55-74 years | 63,120 | 3.5 | | 0.8 | 0.8-0.9 | |
| 75 and over | 134,176 | 4.4 | | Reference category | | |
| Ethnicity | | | | | | |
| White British | 303,599 | 5.0 | | 0.8 | 0.7-0.8 | |
| White Other | 9,690 | 3.9 | <0.001 | 0.6 | 0.5-0.7 | <0.001 |
| Asian/Asian British | 5,461 | 3.4 | | 0.6 | 0.5-0.8 | |
| Black/Black British | 2,026 | 3.8 | | 0.6 | 0.6-0.7 | |
| Other*/Refused | 27,899 | 3.1 | | Reference category | | |
| Deprivation | | | | | | |
| 1 (least deprived) | 55,515 | 3.9 | | Reference category | | |
| 2 | 61,982 | 4.1 | <0.001 | 1.0 | 1.0-1.1 | <0.001 |
| 3 | 67,449 | 4.5 | | 1.1 | 1.1-1.2 | |
| 4 | 71,071 | 5.0 | | 1.2 | 1.2-1.3 | |
| 5 (most deprived) | 89,428 | 5.7 | | 1.4 | 1.4-1.5 | |
| Total | 348,675 | 4.7 | | | | |

N may not sum to total due to missing data. Percentages may not sum to 100% due to rounding. * Other refers to Chinese, Mixed and other (undefined).

Table 40: Mean daily number of emergency hospital admissions for diabetes mellitus outside London by Olympic period in 2012 and equivalent periods in 2009-2011

| | 2009 | | 2010 | | 2011 | | 2012 | |
|------------------------|------|---------|------|---------|------|---------|------|---------|
| | mean | 95% CI | mean | 95% CI | mean | 95% CI | mean | 95% CI |
| Pre-Games | 701 | 636-766 | 830 | 758-902 | 869 | 803-935 | 767 | 708-826 |
| During the Olympics | 710 | 647-774 | 802 | 737-867 | 853 | 792-915 | 731 | 675-788 |
| In between the Games | 727 | 667-788 | 837 | 777-897 | 864 | 803-924 | 752 | 703-801 |
| During the Paralympics | 738 | 666-809 | 845 | 759-931 | 895 | 819-970 | 738 | 670-805 |
| Post-Games | 769 | 700-839 | 864 | 793-934 | 892 | 826-959 | 734 | 680-793 |

There were significant associations between mean daily emergency admission and year in all of the Games periods using ANOVA (all periods: P<0.01).

Table 41: Generalised linear modelling for daily number of emergency hospital admissions for diabetes mellitus outside London for the analysis period in 2012 and equivalent periods in 2009-2011

| Factor | Estimate | 95% confidence intervals | P |
|--------------------------------|----------|--------------------------|--------|
| At least one event* | | | |
| Olympic Games | | Not significant | |
| Paralympic Games | | Not significant | |
| Olympic warm up event | | Not significant | |
| Olympic or Paralympic ceremony | | Not significant | |
| Other Games event | | Not significant | |
| Carnival | -15.3 | -28.4 - -2.2 | <0.05 |
| Music | | Not significant | |
| Other sport | | Not significant | |
| Year | | | |
| 2012 | 20.3 | 3.1 - 37.5 | <0.05 |
| 2011 | 156.3 | 141.5 - 171.0 | <0.001 |
| 2010 | 110.5 | 96.9 - 124.0 | <0.001 |
| 2009 | | Reference category | |
| Day of week | | | |
| Monday | 31.9 | 14.7 - 49.2 | <0.001 |
| Tuesday | 20.0 | 2.7 - 37.3 | <0.05 |
| Wednesday | | Reference category | |
| Thursday | | Not significant | |
| Friday | 35.3 | 18.2 - 52.5 | <0.001 |
| Saturday | -191.1 | -208.7 - -173.5 | <0.001 |
| Sunday | -217.2 | -234.9 - -199.5 | <0.001 |
| Bank holiday weekend** | | Not significant | |
| 2011 London riots*** | | Not significant | |
| Average air temperature | 2.1 | 0.0 - 4.1 | <0.05 |
| Number of Team GB Gold | | Not significant | |

* The reference category for these factors is no event. **Bank Holiday weekend is defined as Friday to Sunday, with the reference category of not a bank holiday weekend *** The reference category is no London riots.

Table 42: Likelihood of patients having a repeat emergency hospital admission for diabetes mellitus outside London in the analysis period in the analysis period using chi squared and binary logistic regression

| | N | Percentage | P | AOR | 95%CI | P |
|---------------------|----------------|-------------|--------|--------------------|---------|--------|
| Year | | | | | | |
| 2009 | 46,464 | 11.9 | | Reference category | | |
| 2010 | 52,674 | 12.7 | <0.001 | 1.1 | 1.0-1.1 | <0.001 |
| 2011 | 55,080 | 12.7 | | 1.1 | 1.0-1.1 | |
| 2012 | 46,924 | 12.9 | | 1.1 | 1.0-1.1 | |
| Gender | | | | | | |
| Male | 110,027 | 13.0 | <0.001 | 1.1 | 1.1-1.1 | <0.001 |
| Female | 91,115 | 12.1 | | Reference category | | |
| Age | | | | | | |
| 0-34 years | 1,120 | 15.3 | | 0.8 | 0.7-1.0 | |
| 35-54 years | 20,646 | 12.8 | <0.05 | 0.8 | 0.7-0.9 | <0.05 |
| 55-74 years | 83,114 | 12.5 | | 0.8 | 0.7-0.9 | |
| 75 and over | 96,262 | 12.6 | | Reference category | | |
| Ethnicity | | | | | | |
| White British | 169,521 | 12.8 | | 1.0 | 0.9-1.1 | |
| White Other | 5,293 | 13.0 | <0.001 | 0.9 | 0.9-1.0 | <0.001 |
| Asian/Asian British | 12,514 | 12.4 | | 1.0 | 0.9-1.1 | |
| Black/Black British | 2,936 | 13.7 | | 0.7 | 0.6-0.7 | |
| Other*/Refused | 10,878 | 8.8 | | Reference category | | |
| Deprivation | | | | | | |
| 1 (least deprived) | 29,102 | 11.6 | | Reference category | | |
| 2 | 35,459 | 12.0 | <0.001 | 1.1 | 1.0-1.1 | <0.001 |
| 3 | 39,692 | 12.2 | | 1.1 | 1.0-1.1 | |
| 4 | 42,199 | 13.0 | | 1.2 | 1.1-1.2 | |
| 5 (most deprived) | 54,260 | 13.2 | | 1.2 | 1.1-1.2 | |
| Total | 197,451 | 12.5 | | | | |

N may not sum to total due to missing data. Percentages may not sum to 100% due to rounding. * Other refers to Chinese, Mixed and other (undefined).

13.6. Appendix F: Ambulance callout data

Table 43: Mean daily number of ambulance callouts to the London Ambulance Service by Olympic period in 2012 and equivalent periods in 2009-2011

| | 2009 | | 2010 | | 2011 | | 2012 | |
|-------------------------------|-------|-------------|-------|-------------|-------|-------------|-------|-------------|
| | mean | 95% CI | mean | 95% CI | mean | 95% CI | mean | 95% CI |
| Pre-Games | 2,806 | 2,702-2,909 | 2,934 | 2,857-3,010 | 2,844 | 2,748-2,940 | 3,071 | 2,976-3,165 |
| During the Olympics | 2,677 | 2,585-2,769 | 2,803 | 2,714-2,892 | 2,778 | 2,661-2,896 | 2,989 | 2,869-3,109 |
| In between the Games | 2,552 | 2,500-2,605 | 2,784 | 2,698-2,870 | 2,622 | 2,569-2,676 | 2,944 | 2,885-3,002 |
| During the Paralympics | 2,594 | 2,467-2,720 | 2,862 | 2,726-2,997 | 2,730 | 2,617-2,843 | 2,937 | 2,812-3,061 |
| Post-Games | 2,779 | 2,676-2,882 | 2,875 | 2,780-2,971 | 2,764 | 2,677-2,850 | 2,804 | 2,708-2,901 |

There were significant associations between mean daily callout and year in all of the Games periods (pre, during Olympics and in between Olympics: $P < 0.001$; Paralympics: $P < 0.01$) using ANOVA, except post-Games.

Table 44: Generalised linear modelling for daily number of ambulance callouts to the London Ambulance Service for the analysis period in 2012 and equivalent periods in 2009-2011

| Factor | Estimate | 95% confidence intervals | P |
|--------------------------------|----------|--------------------------|--------|
| At least one event* | | | |
| Olympic Games | | Not significant | |
| Paralympic Games | | Not significant | |
| Olympic warm up event | -102.4 | -165.2 - -39.7 | <0.01 |
| Olympic or Paralympic ceremony | | Not significant | |
| Other Games event | 125.8 | 45.0 - 206.6 | <0.01 |
| Carnival | | Not significant | |
| Music | 43.1 | 3.8 - 82.3 | <0.05 |
| Other sport | | Not significant | |
| Year | | | |
| 2012 | 251.3 | 200.7 - 301.8 | <0.001 |
| 2011 | 126.4 | 83.2 - 169.6 | <0.001 |
| 2010 | 194.8 | 155.1 - 234.5 | <0.001 |
| 2009 | | Reference category | |
| Day of week | | | |
| Monday | 74.5 | 23.6 - 125.5 | <0.01 |
| Tuesday | | Not significant | |
| Wednesday | | Reference category | |
| Thursday | | Not significant | |
| Friday | 298.2 | 247.8 - 348.5 | <0.001 |
| Saturday | 94.6 | 43.1 - 146.0 | <0.001 |
| Sunday | -182.4 | -234.5 - -130.2 | <0.001 |
| Bank holiday weekend** | -128.7 | -193.6 - -63.8 | <0.001 |
| 2011 London riots*** | | Not significant | |
| Average air temperature | 13.5 | 7.4 - 19.1 | <0.001 |
| Number of Team GB Gold | | Not significant | |

* The reference category for these factors is no event. **Bank Holiday weekend is defined as Friday to Sunday, with the reference category of not a bank holiday weekend *** The reference category is no London riots.

Table 45: Mean daily number of ambulance callouts for assaults to the London Ambulance Service by Olympic period in the analysis period in 2012 and equivalent periods in 2009-2011

| | 2009 | | 2010 | | 2011 | | 2012 | |
|-------------------------------|------|---------|------|---------|------|---------|------|--------|
| | mean | 95% CI | mean | 95% CI | mean | 95% CI | mean | 95% CI |
| Pre-Games | 115 | 97-133 | 130 | 109-151 | 112 | 98-126 | 95 | 81-108 |
| During the Olympics | 128 | 112-144 | 130 | 113-147 | 117 | 104-129 | 115 | 94-136 |
| In between the Games | 121 | 105-136 | 122 | 102-142 | 94 | 85-104 | 103 | 91-116 |
| During the Paralympics | 121 | 97-145 | 128 | 100-156 | 102 | 87-118 | 107 | 87-127 |
| Post-Games | 118 | 97-139 | 120 | 96-144 | 94 | 81-108 | 77 | 65-88 |

There were significant associations between mean daily callout and year for the pre-Games (P<0.05), in between Games (P<0.05) and post-Games periods (P<0.01) using ANOVA. For the other Games periods, there was no significant association.

Table 46: Generalised linear modelling for daily number of ambulance callouts for assaults to the London Ambulance Service in the analysis period in 2012 and equivalent periods in 2009-2011

| Factor | Estimate | 95% confidence intervals | P |
|--------------------------------|----------|--------------------------|--------|
| At least one event* | | | |
| Olympic Games | 19.1 | 7.4 - 30.8 | <0.01 |
| Paralympic Games | 17.2 | 6.1 - 28.4 | <0.01 |
| Olympic warm up event | | Not significant | |
| Olympic or Paralympic ceremony | | Not significant | |
| Other Games event | | Not significant | |
| Carnival | | Not significant | |
| Music | | Not significant | |
| Other sport | | Not significant | |
| Year | | | |
| 2012 | -27.7 | -34.6 - -20.7 | <0.001 |
| 2011 | -14.3 | -20.3 - -8.4 | <0.001 |
| 2010 | 8.4 | 2.9 - 13.8 | <0.01 |
| 2009 | | Reference category | |
| Day of week | | | |
| Monday | 8.3 | 1.3 - 15.3 | <0.05 |
| Tuesday | | Not significant | |
| Wednesday | | Reference category | |
| Thursday | 7.7 | 0.8 - 14.6 | <0.05 |
| Friday | 60.6 | 53.7 - 67.5 | <0.001 |
| Saturday | 63.5 | 56.5 - 70.5 | <0.001 |
| Sunday | 10.8 | 3.7 - 18.0 | <0.01 |
| Bank holiday weekend** | | Not significant | |
| 2011 London riots*** | | Not significant | |
| Average air temperature | 1.5 | 0.7 - 2.4 | <0.001 |
| Number of Team GB Gold | | Not significant | |

* The reference category for these factors is no event. **Bank Holiday weekend is defined as Friday to Sunday, with the reference category of not a bank holiday weekend *** The reference category is no London riots.

13.7. Appendix G: Emergency Department data from London

Table 47: Mean daily number of Emergency Department presentations to six London hospitals by Olympic period in 2012 and equivalent periods in 2009-2011

| | 2009 | | 2010 | | 2011 | | 2012 | |
|-------------------------------|-------|-------------|-------|-------------|-------|-------------|-------|-------------|
| | mean | 95% CI | mean | 95% CI | mean | 95% CI | mean | 95% CI |
| Pre-Games | 1,441 | 1,373-1,509 | 1,550 | 1,498-1,603 | 1,295 | 1,248-1,341 | 1,981 | 1,926-2,035 |
| During the Olympics | 1,372 | 1,334-1,410 | 1,421 | 1,372-1,470 | 1,253 | 1,199-1,307 | 1,860 | 1,801-1,919 |
| In between the Games | 1,350 | 1,308-1,392 | 1,400 | 1,353-1,447 | 1,191 | 1,162-1,220 | 1,897 | 1,839-1,954 |
| During the Paralympics | 1,376 | 1,325-1,427 | 1,490 | 1,457-1,522 | 1,247 | 1,206-1,288 | 1,866 | 1,820-1,912 |
| Post-Games | 1,499 | 1,444-1,555 | 1,519 | 1,469-1,586 | 1,319 | 1,280-1,358 | 1,963 | 1,898-2,028 |

There were significant associations between mean daily presentation and year in all Games periods (all periods: P<0.001) using ANOVA.

Table 48: Generalised linear modelling for daily number of Emergency Department presentations to six London hospitals for the analysis period in 2012 and equivalent periods in 2009-2011

| Factor | Estimate | 95% confidence intervals | P |
|--------------------------------|----------|--------------------------|--------|
| At least one event* | | | |
| Olympic Games | -72.5 | -121.7 - -23.2 | <0.01 |
| Paralympic Games | | Not significant | |
| Olympic warm up event | | Not significant | |
| Olympic or Paralympic ceremony | | Not significant | |
| Other Games event | | Not significant | |
| Carnival | | Not significant | |
| Music | 32.8 | 8.5 - 57.2 | <0.01 |
| Other sport | -43.0 | -66.3 - -20.0 | <0.001 |
| Year | | | |
| 2012 | 535.8 | 505.0 - 566.7 | <0.001 |
| 2011 | -129.0 | -155.5 - -102.6 | <0.001 |
| 2010 | 67.2 | 42.9 - 91.4 | <0.001 |
| 2009 | | Reference category | |
| Day of week | | | |
| Monday | 158.0 | 127.0 - 189.0 | <0.001 |
| Tuesday | | Not significant | |
| Wednesday | | Reference category | |
| Thursday | | Not significant | |
| Friday | 63.7 | 32.9 - 94.5 | <0.001 |
| Saturday | | Not significant | |
| Sunday | -45.4 | -77.1 - -13.6 | <0.01 |
| Bank holiday weekend** | -117.2 | -161.4 - -72.9 | <0.001 |
| 2011 London riots*** | | Not significant | |
| Average air temperature | | Not significant | |
| Number of Team GB Gold | | Not significant | |

* The reference category for these factors is no event. **Bank Holiday weekend is defined as Friday to Sunday, with the reference category of not a bank holiday weekend *** The reference category is no London riots.

Table 49: Mean daily number of assault-related Emergency Department presentations to four London hospitals by Olympic period in 2012 and equivalent periods in 2009-2011

| | 2009 | | 2010 | | 2011 | | 2012 | |
|-------------------------------|------|----------|------|----------|------|-----------|------|----------|
| | mean | 95% CI | mean | 95% CI | mean | 95% CI | mean | 95% CI |
| Pre-Games | 9.6 | 6.6-12.7 | 8.8 | 6.4-11.2 | 10.9 | 8.2-13.5 | 9.2 | 6.6-11.8 |
| During the Olympics | 12.2 | 9.4-15.0 | 9.6 | 7.1-12.1 | 13.9 | 10.9-16.9 | 10.5 | 8.0-13.0 |
| In between the Games | 10.2 | 7.9-12.0 | 11.3 | 8.6-13.6 | 8.5 | 6.8-10.2 | 9.6 | 7.6-11.0 |
| During the Paralympics | 8.3 | 8.0-12.4 | 10.5 | 8.8-13.9 | 10.8 | 6.8-10.2 | 10.3 | 7.7-11.4 |
| Post-Games | 8.8 | 6.3-11.4 | 10.8 | 7.7-14.0 | 10.8 | 7.7-13.9 | 10.3 | 7.6-13.1 |

There were no significant associations between mean daily callout and year for any of the Games analysis periods using ANOVA.

Table 50: Generalised linear modelling for daily number of Emergency Departments presentations for assaults to four London hospitals for the analysis period in 2012 and equivalent periods in 2009-2011

| Factor | Estimate | 95% confidence intervals | P |
|--------------------------------|----------|--------------------------|--------|
| At least one event* | | | |
| Olympic Games | | Not significant | |
| Paralympic Games | | Not significant | |
| Olympic warm up event | -2.1 | -4.2 - -0.1 | <0.05 |
| Olympic or Paralympic ceremony | | Not significant | |
| Other Games event | | Not significant | |
| Carnival | | Not significant | |
| Music | | Not significant | |
| Other sport | | Not significant | |
| Year | | | |
| 2012 | | Not significant | |
| 2011 | | Not significant | |
| 2010 | | Not significant | |
| 2009 | | Reference category | |
| Day of week | | | |
| Monday | | Not significant | |
| Tuesday | | Not significant | |
| Wednesday | | Reference category | |
| Thursday | | Not significant | |
| Friday | 6.2 | 4.7 - 7.8 | <0.001 |
| Saturday | 7.3 | 5.7 - 8.9 | <0.001 |
| Sunday | 1.8 | 0.2 - 3.4 | <0.05 |
| Bank holiday weekend** | -3.0 | -5.2 - -0.8 | <0.01 |
| 2011 London riots*** | 9.8 | 6.2 - 13.5 | <0.001 |
| Average air temperature | | Not significant | |
| Number of Team GB Gold | | Not significant | |

* The reference category for these factors is no event. **Bank Holiday weekend is defined as Friday to Sunday, with the reference category of not a bank holiday weekend *** The reference category is no London riots.

13.8. Appendix H: Emergency Department data outside London

Table 51: Mean daily number of Emergency Department presentations to nine hospitals outside London by Olympic period in 2012 and equivalent periods in 2009-2011

| | 2009 | | 2010 | | 2011 | | 2012 | |
|-------------------------------|-------|-------------|-------|-------------|-------|-------------|-------|-------------|
| | mean | 95% CI | mean | 95% CI | mean | 95% CI | mean | 95% CI |
| Pre-Games | 1,988 | 1,905-2,070 | 2,088 | 2,021-2,154 | 2,113 | 2,054-2,171 | 2,249 | 2,182-2,316 |
| During the Olympics | 1,981 | 1,928-2,033 | 2,033 | 1,978-2,089 | 2,044 | 1,979-2,109 | 2,128 | 2,064-2,192 |
| In between the Games | 1,992 | 1,929-2,056 | 2,001 | 1,934-2,069 | 2,024 | 1,973-2,075 | 2,193 | 2,138-2,249 |
| During the Paralympics | 2,000 | 1,921-2,049 | 2,094 | 2,048-2,139 | 2,024 | 1,956-2,092 | 2,094 | 2,030-2,158 |
| Post-Games | 2,122 | 2,044-2,200 | 2,091 | 2,021-2,160 | 2,150 | 2,088-2,213 | 2,177 | 2,114-2,240 |

There were significant associations between mean daily callout and year for pre-Games ($P<0.001$), during the Olympics ($P<0.01$), and in between the Games ($P<0.001$) using ANOVA. For the other periods, there was no significant association.

Table 52: Generalised linear modelling for daily number of Emergency Departments presentations to nine hospitals outside London for the analysis period in 2012 and equivalent periods in 2009-2011

| Factor | Estimate | 95% confidence intervals | P |
|--------------------------------|----------|--------------------------|--------|
| At least one event* | | | |
| Olympic Games | -95.1 | -153.1 - -37.1 | <0.01 |
| Paralympic Games | -119.5 | -197.5 - -41.5 | <0.01 |
| Olympic warm up event | | Not significant | |
| Olympic or Paralympic ceremony | | Not significant | |
| Other Games event | 68.3 | 10.2 - 126.6 | <0.05 |
| Carnival | | Not significant | |
| Music | | Not significant | |
| Other sport | -39.0 | -66.1 - -11.9 | <0.01 |
| Year | | | |
| 2012 | 178.3 | 142.0 - 214.7 | <0.001 |
| 2011 | 79.9 | 48.7 - 111.0 | <0.001 |
| 2010 | 51.5 | 23.0 - 80.1 | <0.001 |
| 2009 | | Reference category | |
| Day of week | | | |
| Monday | 230.7 | 194.3 - 267.2 | <0.001 |
| Tuesday | | Not significant | |
| Wednesday | | Reference category | |
| Thursday | | Not significant | |
| Friday | 43.6 | 7.3 - 79.9 | <0.05 |
| Saturday | | Not significant | |
| Sunday | | Not significant | |
| Bank holiday weekend** | | Not significant | |
| 2011 London riots*** | -102.6 | -188.2 - -17.0 | <0.05 |
| Average air temperature | | Not significant | |
| Number of Team GB Gold | | Not significant | |

* The reference category for these factors is no event. **Bank Holiday weekend is defined as Friday to Sunday, with the reference category of not a bank holiday weekend *** The reference category is no London riots.

Table 53: Mean daily number of assault-related Emergency Department presentations to nine hospitals outside London by Olympic period in 2012 and equivalent periods in 2009-2011

| | 2009 | | 2010 | | 2011 | | 2012 | |
|-------------------------------|------|--------|------|--------|------|--------|------|--------|
| | mean | 95% CI | mean | 95% CI | mean | 95% CI | mean | 95% CI |
| Pre-Games | 39 | 32-45 | 32 | 23-40 | 37 | 27-48 | 32 | 26-39 |
| During the Olympics | 47 | 39-55 | 35 | 28-43 | 40 | 32-49 | 37 | 30-43 |
| In between the Games | 41 | 32-48 | 30 | 24-36 | 35 | 28-43 | 39 | 30-49 |
| During the Paralympics | 42 | 30-53 | 32 | 26-39 | 35 | 27-43 | 35 | 27-42 |
| Post-Games | 38 | 32-43 | 32 | 25-39 | 35 | 28-41 | 33 | 25-40 |

There were no significant associations between mean daily callout and year for any of the Games analysis periods using ANOVA.

Table 54: Generalised linear modelling for the daily number of assault-related Emergency Department presentations to nine hospitals outside London in the analysis period in 2012 and equivalent periods in 2009-2011

| Factor | Estimate | 95% confidence intervals | P |
|--------------------------------|----------|--------------------------|--------|
| At least one event* | | | |
| Olympic Games | | Not significant | |
| Paralympic Games | | Not significant | |
| Olympic warm up event | 7.1 | 2.2 - 12.1 | <0.01 |
| Olympic or Paralympic ceremony | | Not significant | |
| Other Games event | | Not significant | |
| Carnival | 4.6 | 1.9 - 7.3 | <0.001 |
| Music | | Not significant | |
| Other sport | | Not significant | |
| Year | | | |
| 2012 | -6.0 | -9.6 - -2.5 | <0.001 |
| 2011 | -5.2 | -8.2 - -2.2 | <0.001 |
| 2010 | -8.5 | -11.3 - -5.7 | <0.001 |
| 2009 | | Reference category | |
| Day of week | | | |
| Monday | 7.0 | 3.5 - 10.5 | <0.001 |
| Tuesday | | Not significant | |
| Wednesday | | Reference category | |
| Thursday | 6.4 | 2.9 - 10.0 | <0.001 |
| Friday | 22.3 | 18.7 - 25.8 | <0.001 |
| Saturday | 29.5 | 25.9 - 33.1 | <0.001 |
| Sunday | 14.9 | 11.3 - 18.6 | <0.001 |
| Bank holiday weekend** | | Not significant | |
| 2011 London riots*** | -10.4 | -18.7 - -2.1 | <0.05 |
| Average air temperature | | Not significant | |
| Number of Team GB Gold | | Not significant | |

* The reference category for these factors is no event. **Bank Holiday weekend is defined as Friday to Sunday, with the reference category of not a bank holiday weekend *** The reference category is no London riots.

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Authors: Michela Morleo, Alyson Jones, Mark O’Keefe, Nicola Leckenby, Phil McHale, Clare Perkins, Karen Hughes, Mark A Bellis

Centre for Public Health

Research Directorate
Faculty of Health and Applied Social Sciences
Liverpool John Moores University
2nd Floor, Henry Cotton Campus
15-21 Webster Street
Liverpool
L3 2ET

Tel: +44 (0) 151 231 4107
Fax: +44 (0) 151 231 4552

Web: www.cph.org.uk

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