



# Assaults, murders and walkers: The impact of violent crime on physical activity<sup>☆</sup>



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## ABSTRACT

We investigate an underexplored externality of crime: the impact of violent crime on individuals' participation in walking. For many adults walking is the only regular physical activity. We use a sample of nearly 1 million people in 323 small areas in England between 2005 and 2011 matched to quarterly crime data at the small area level. Within area variation identifies the causal effect of local violent crime on walking and a difference-in-difference analysis of two high-profile crimes corroborates our results. We find a significant deterrent effect of violent crime on walking that translates into a drop in overall physical activity.

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## 1. Introduction

It has been long recognised that crime has important externalities. One concern is the impact of crime on individuals' ability to undertake their daily activities. For example, Kling et al. (2001) report that parents living in areas of high crime sought to keep their children indoors to avoid them becoming victims of violence and Hamermesh (1999) demonstrates that victimisation risk affects

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working time patterns in the USA. A related concern is the effect of crime on neighbourhood quality and community. Established negative neighbourhood externalities include flight to the suburbs (Cullen and Levitt, 1999; Ellen and O'Regan, 2010), declining property values (Gibbons, 2004), a reduction in the creation of new retail and personal service businesses (Greenbaum and Tita, 2004) and geographical sorting of local businesses (Rosenthal and Ross, 2010).

Such responses to crime are likely to impact on health, both mental and physical. Recent studies that have demonstrated a causal link from crime to poor mental health include Cornaglia et al. (2014) for Australia and Dustmann and Fasani (2015) for Britain. In addition, a number of papers have estimated subjective wellbeing and behavioural impacts of high profile acts of violence, including the September 11 terrorist attacks (Metcalf et al., 2011) and the London bombings in 2005 (Rubin et al., 2005; Dustmann and Fasani, 2015). There is also a large literature showing associations between crime in an area and various aspects of poor physical health<sup>1</sup>.

<sup>1</sup> Examples include Bilger and Carrieri (2013), Sooman and Macintyre (1995), Sundquist et al. (2006) and Messer et al. (2006).

However, many of these studies have difficulty showing causality and the relatively few causal studies have not, in the main, investigated the mechanisms by which crime affects health.

The aim of the present paper is to examine one route by which crime might impact upon health: through reducing individuals' participation in the most common form of physical activity, walking. We provide causal estimates of the impact of violent crime on walking. Walking and its potential link to crime is a substantive issue for several reasons. First, walking is an important form of exercise. It is free and available to everyone regardless of age, gender or income. For many adults walking is the only form of regular exercise. In our sample of individuals living in England, 30% of respondents report no exercise other than walking, while 20% of respondents report no exercise at all. Second, the importance of moderate physical activity as a determinant of good health is well established (US Department of Health and Human Services, 1996; World Health Organization, 2002) but despite this, walking has been decreasing in many industrialised countries<sup>2</sup>. This fall has been linked to the rise in obesity and obesity related diseases (Bassett et al., 2008; Lindström, 2008), which impose substantial costs on individuals and health care systems. Third, and related to the concern over the effect of crime on neighbourhoods, walking has important externalities. Individuals who walk in their local neighbourhood contribute to a sense of community (du Toit et al., 2007). A shift from walking to driving as a mode of transport increases carbon emissions, noise levels, air pollution and congestion (Sinnott et al., 2011). Costly motorised transport as a substitute for free walking imposes an economic burden on the individual. Pedestrians are also an important factor in ensuring a vibrant local economy (Sinnott et al., 2011)<sup>3</sup>. Finally, serious physical crime is not uncommon. While homicide rates are low in Western Europe, other serious violent offences are more prevalent. In England, violent crime with injury accounts for 10% of all recorded crime and individuals tend to overestimate their chances of being a victim of such crimes<sup>4</sup>.

Concerns about personal safety have been often cited in research as a barrier to local walking (Foster and Giles-Corti, 2008)<sup>5</sup>. But the literature to date has not found clear results for the relationship between crime and walking or physical engagement in the community, in part due to non-causal research designs and small data sets (Foster and Giles-Corti, 2008). We address both of these problems. We use a large sample – nearly 1 million people in 323 small areas (local authorities) in England over six years – matched to quarterly police recorded crime data at this small area level. England is a good test bed. Crime statistics are available at small area level, with the six-year period covered by our data providing considerable variation in crime rates across time and space. In addition, the English government collects information on physical activity on a consistent basis for a very large sample of adults every year, giving many observations at small area level.

<sup>2</sup> In the UK, the average distance walked, per person per year, has fallen from 255 miles in 1975/76 to 201 miles in 2006 (NICE, 2012).

<sup>3</sup> A survey of customers on a local high street found that shoppers who had walked there visited more shops than those arriving by car (Sustrans, 2006).

<sup>4</sup> In a survey 15% of respondents said that they were 'very likely' or 'fairly likely' to be a victim of violent crime in the next 12 months, while according to the same survey only 3% of adults reported being actual victims of violent crime in the last 12 months (Home Office, 2010). Individuals get information about crime from the media (Duffy et al., 2008) and media reporting has been shown to be highly selective, focusing on the most serious examples of crime (Greer, 2007). In contrast, the lower level property offences that make up the majority of recorded crime are given sparse attention (Greer, 2007). As an example, Cornaglia and Leigh (2011) analyse local print media in Australia in 2001 to 2006 and find 600 media mentions of violent crime each year, compared to 230 mentions of property crime.

<sup>5</sup> Piro et al. (2006) look at the association between neighbourhood level violence/fear of violence and physical activity among the elderly in Norway.

These repeated cross-section data provide an identification strategy in which we can control for area effects, area specific time trends, national time effects and a number of potential time-varying confounders such as unemployment at the area level and local weather<sup>6</sup>. To further strengthen our search for causal estimates we complement this analysis by using a difference-in-difference approach to examine the impact on walking of two high-profile crimes that caused a crime shock at the local level. In December 2010, Joanna Yeates went missing in Bristol. Her body was discovered eight days later on Christmas Day. The hunt for her killer received extensive media coverage, with police issuing warnings to women to avoid walking home alone after dark in the local area while her killer remained at large. On 22 January 2011 Vincent Tabak was charged with her murder. In March 2009, Claudia Lawrence went missing in York. Her body was never found but one line of inquiry was that she was abducted while walking to work early in the morning. Her disappearance also received extensive media coverage.

We begin our analysis by showing that individuals' concerns regarding their personal safety positively co-move with recorded violent crime. An increase in recorded crime within a local area is statistically significantly associated with increased worry about being mugged or attacked and individuals equate increases in police recorded crime with their own assessment of crime changes. These results support our modelling assumption that increases in recorded violent crime in a local area induce greater concerns about personal safety, which in turn may lead to individuals changing their physical activity behaviour.

Our main results show that increased violent crime in the local area leads to a statistically significant reduction in walking and this drop translates into a drop in overall physical activity. Most of the drop is in transport walking, which is more likely to take place in the locality in which an individual lives compared to leisure walking. Our analysis of the impact of the murder of Joanna Yeates and the disappearance of Claudia Lawrence supports our main findings, showing a fall in walking and overall physical activity following these local crime shocks. Thus crime hurts walking and, partly because walking is the only form of exercise many people take, also the total amount of exercise taken by individuals. Back-of-the-envelope calculations suggest that reducing violent crime to the 25th percentile of our sample distribution could generate substantive health benefits. Further, as the main form of walking that is affected is transport walking (walking to get from place to place rather than for leisure), these estimates do not take into account possible positive externalities from reductions in traffic congestion, pollution and noise or the effect on community cohesion.

The paper is structured as follows. In Section 2 we describe our data and provide an analysis of the relationship between changes in police recorded violent crime and individuals' concerns about their own personal safety. Section 3 presents our main empirical identification strategy. Section 4 discusses our main estimates and robustness tests. Section 5 describes our analysis of the impact of the murder of Joanna Yeates and the disappearance of Claudia Lawrence. Section 6 concludes.

## 2. Data

### 2.1. The sample and our physical activity measures

Our data are from the Active People Survey (APS), a cross-sectional survey of adults in England designed explicitly to measure levels of participation in sport and active recreation at the local

<sup>6</sup> For the relationship between weather and crime see, for example, Cohn (1990) and Jacob et al. (2007).

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