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I have been researching crime on public transport systems around the world for over 15 years, and when Transport for London (TfL) contacted me to assist them in tackling pick-pocketing on the London Underground I realised they faced a new challenge. Recently the use of foot patrols targeting crime hot spots have proven to be an effective crime reduction measure, for example in Manchester, and, further afield in Philadelphia. However, there are a number of problems with introducing this approach to dynamic and transient systems such as the London Underground which have a continual movement of passengers and infrastructure, and therefore the hot-spots tend to move fairly rapidly.

Operation Beck (2012) demonstrated the use of hot-spot policing as an effective crime reduction tool on the underground, yet incidents of pick-pocketing were removed from this analysis. Whilst crime on the underground is low, with less than 10 crimes per million passengers, almost half of the crime recorded on the underground is pick-pocketing. The problem is that by its very nature the precise location of pick-pocketing is often unknown; usually it is only discovered by the victim post offence and somewhere else on the network. Identifying the hot spots of pick-pocketing is therefore highly challenging. Indeed the conventional end of line recording used by British Transport Police (BTP) places the offence at the last station of a passenger's journey, which, clearly, is not appropriate for hot-spot policing and targeted enforcement.

Through an adaptation of a technique called aoristic analysis, used to better estimate the time of a burglary (sometime between a victim leaving their property and returning home), a new algorithm termed Interstitial Crime Analysis (ICA) was developed in collaboration with BTP and TfL to calculate the probability of where theft is most likely to occur based on all victim's journeys on the underground. In addition to helping target resources more effectively, this tool identified that 'above' ground pick-pocketing, in the vicinity of underground stations, and 'below' ground pick-pocketing within the underground, tended to coincide at the same times and locations, especially at peak travel times. This suggests that offenders who operate below ground may also operate above ground on major transit systems.

Further research has also identified particular characteristics of station design and features of the nearby environment which also influence the risk of pick-pocketing. Risk was increased by factors associated with higher levels of congestion within stations including lifts, waiting rooms and fewer platforms; and greater levels of accessibility close to stations, more paths and roads. The risk was reduced by factors such as those likely to encourage detection and guardianship; stations with more personal validators, staff levels and shop rentals; and the presence of more domestic buildings nearby. Station type was also important; those that were 'attractors' of crime (which had both high counts of pick-pocketing, and high rates

of pick-pocketing per million passengers at the station) and those frequently used by tourists were at greater risk. The most important feature of this analysis is that these factors should not be viewed in isolation, and it is the combination of the above factors that increases or reduces risk, both within and near to stations.

As a result of this research a number of policy recommendations have been generated, for policing and the design and management of stations. The elevated risk both inside and near stations at peak travel times highlights the clear importance of shared intelligence and joint operations between the Metropolitan Police Force and BTP. Careful management and design of stations alone is not likely to be sufficient in deterring offenders without consideration of the design and management of the external environment, and the risk factors present in and around stations. Whilst much of the attention here is on how to increase the risk for offenders, passengers should also be made aware of behaviour that may make them more susceptible to victimisation, particularly when tired, easily distracted and in congested situations. The traditional "pick-pockets may be in operation at this station" sign may not be the most appropriate; anecdotal evidence suggests offenders may simply situate themselves close to these warning signs, and, by passengers patting their pockets, an offender implicitly knows which pocket they keep their wallet in.

Targeted policing needs to be both time and locations specific based on the available intelligence, although further research should explore the effectiveness of visible versus non-uniform (DIP) plain clothed officers. Additionally, the increased use of smart phones and new technologies on transport systems such as the London Underground may impact the patterns and manifestations of pick-pocketing offences. A final challenge for me is in translating these research findings into policy. Indeed, I recently presented the findings of the research to the House of Commons Select Committee inquiry into 'Security on the Railway'. The ICA is now available as an automated tool which BTP officers can use to identify high risk locations and times on their Force Performance and Mapping Portal. Only time will tell as to the extent to which the research will be used in practice.