The following paper was researched and written as part of LSE GROUPS 2023.

LSE GROUPS takes place during the final fortnight of the LSE summer term. Undergraduate students are placed in small groups; these are cross-year, interdisciplinary, and group members do not know one another in advance. Each group must then devise its own research question, and carry out every stage of a small-scale research project in less than two weeks.

LSE GROUPS is part of the LSE commitment to students learning through enquiry, and developing the skills for knowledge creation.

The overall theme of LSE GROUPS 2023 was *Connections.*

This paper was submitted on the final Thursday afternoon of the project. Students then presented their work at a conference, on the closing Friday.

More information on LSE GROUPS, and other papers.

Papers are presented as submitted by the students, without corrections.

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Mind the Perception Gap: LSE Community's Perceptions and Experiences of Crime in the London Underground

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Abstract

Despite the importance of the London underground in connecting people, little is known about the impact of perceptions of safety in this context. This research examines such a link within the LSE community. The paper builds upon existing literature on the fear of crime in urban metro systems (Priks 2015). It employs a quantitative approach, utilising online surveys distributed within the LSE community alongside statistical crime data to contextualise our primary data. We find that the LSE community perceives crime in a more negative light when new infrastructure developments are implemented in underground stations, echoing previous research findings (Spicer & Song 2017). However, we do acknowledge that some of the underground stations that we included in our survey were overrepresented due to their proximity to the LSE campus. Based on our findings, we suggest that the connecting nature of the London underground might be affected by negative perceptions of the likelihood of victimisation within the LSE community.

Keywords: London underground, crime risk, infrastructure, crime perception, LSE community

Introduction

Public transport connects us with places and people. It is thus an important determinant of people's quality of life, depending on the quality of its infrastructure and people's experiences of it. Focusing on the London underground and people's sense of safety in it, we investigate whether infrastructure developments in underground stations impact the perception of crime of the LSE community We utilise a quantitative analytical approach, using primary and secondary data to address the following research question:

Do infrastructure improvements in underground stations impact LSE community's perceptions of and attitudes to crime?

This study builds upon the existing literature on fear of crime and urban metro infrastructure (Priks 2015). A variety of contexts have been studied in relation to the installation of station infrastructure, such as surveillance cameras, and its impact on both the actual risk of crime and the perceived risk of crime. For example, in Stockholm's subway system from 2006-2008, crime decreased by 25% after the installation of surveillance cameras (Priks 2015). The impact of similar infrastructure in London's underground stations on the perception of crime remains an underexplored topic in the existing literature. Our study aims to fill this gap.

For the purpose of this study, we utilise Newton, Partridge & Gill's (2014) analysis of crime in the London underground to define a *station* in the following way: inside the premises of a station, either before or after the paid access barrier. This definition excludes carriages (those in a station) and the immediate vicinity of the station. *Crime* in this case signifies vandalism, theft, violence, sexual harassment and verbal harassment within the defined area of an underground station. Lastly, the *LSE community* refers to those who study or work at LSE.

The concept of 'connection' is central to this paper as it directly links to underground modes of transport, which are primarily designed to connect commuters to different geographical locations (Spicer & Song 2017). This connection aims at enhancing the life of commuters. However, when those using public transport have higher perceptions of crime, the connectivity of these modes of transport is likely to be undermined as these negative perceptions discourage people from using such transport (Cozens et al. 2003).

In order to address our research question, we will first embark on a literature review, followed by an outline of the research design and the methodology employed. The paper will then turn to data analysis, followed by an appraisal of research limitations.

Literature Review

Firstly, this review will address the general concept of the fear of crime. We will then seek to examine how metro stations are linked to perceptions of crime and actual crime rates. Important predictors of crime perceptions and attitudes, according to previous literature, such as gender and previous victimisation, will also be discussed. Building on this body of work, we identify a gap in the literature in relation to the London underground in the context of crime risk and crime risk perceptions, which our study seeks to address.

Fear of Crime

Fear of crime is a broad term referring to a variety of different feelings, thoughts and behaviours that people have in relation to the subjective risk of victimisation (Gouseti & Jackson, 2012). As Jackson (2005) argues, multiple factors, such as worry, risk perception and interpretation of one's social and physical environment contribute to the fear of crime. It is particularly important to highlight the subjective nature of risk perception - it is embedded in the "context of a social and physical environment" (Jackson 2005, p.309).

The fear of crime research shows that its explanatory parameters include both individual and environmental factors (Hale, 1996). Brunton-Smith & Sturgis (2011) highlight how differences in expressed fear of crime are both exacerbated and ameliorated by the physical characteristics of an area. Specifically, they focus on the structural characteristics of British neighbourhoods along with visual signs of disorder within those neighbourhoods, such as vandalism and graffiti, which inform people about their risk of victimisation (Brunton-Smith & Sturgis, 2011). Thus, the fear of crime literature indicates the importance of physical characteristics in contributing to perceptions of crime. This study seeks to advance this latter point in the context of urban metro systems, namely the London Underground.

Physical characteristics of underground stations

Smith and Clarke (2000) argue that "crimes cannot be properly explained, nor effectively prevented, without a thorough understanding of the environments in which they occur. Nowhere is this more apparent than in urban public transport." In addition, Der Hoeven & van Nes (2012, p.64) argue that the spatial configuration of an underground space can influence crime, highlighting how situational measures, such as the physical layout of a station, can influence incidence of crime alongside organisational measures (Lopez 1996). The latter refers to organisational factors, such as **management practices,** which if poorly developed can impact actual rates of crime and perceptions of crime (Eck 2019). The influence of underground station environments on crime perception has also been demonstrated in multiple studies (Ceccato & Uittenbogaard 2014).

An important infrastructure development in metro stations is the **installation of CCTV**, which has been analysed by Webb & Laycock (1992) through three London underground pilot projects and by Priks (2015) through the introduction of surveillance cameras in Stockholm subway stations.

In the latter study, Priks (2015) links the introduction of surveillance cameras with a reduction of crime by 25% (Priks 2015). The literature also highlights how infrastructure can influence Another study on the Washington DC metro (La Vigne 1996) suggests that a well lighted metro station contributes to an overall decrease in fear of crime among metro users, highlighting the effect of an **improved lighting system** on the crime perception. The literature includes limited discussion of the effects of a **new underground line** on crime perception (Neiss 2015).

Spicer & Song (2017) identify a link between the development of metro stations and increasing perceptions of crime in the specific example of the Skytrain transit system in Vancouver. The development of the Broadway and Commercial station resulted in increased ridership on the Skytrain, which in turn contributed to a compression and intensification of human activity within the station (Spicer & Song, 2017). This intensification of activity resulted in increasingly negative commuter perceptions of crime (Spicer & Song 2017). Spicer & Song (2017) conclude that in the context of the Skytrain, physical developments of a station are linked to increased perception of crime through growing usage.

Individual differences in perception of crime

The intersection of individual and contextual characteristics shapes individual perceptions of crime (Crenshaw 1989). Our paper focuses on two primary characteristics that contribute to differences in perception of crime as identified by the literature, namely gender and previous victimisation.

Gender is an important determinant in the fear of crime literature. There is a clear consensus within the literature that women exhibit higher levels of fear than men (Madan & Nalla 2015; Schafer et al. 2006; Fox et al. 2009). These findings clearly apply to perceptions in urban transport settings (Spicer & Song 2017). The Swedish National Council for Crime Prevention reported in 2019 that 42% of young women in Sweden change their travel routes because of a fear of being victimised by crime (Sundling & Ceccato 2022). As Spicer & Song (2017) argue, there are varying patterns in the perception of crime in transit environments between people of different genders. Yavuz & Welch (2010) develop this latter point by advocating that gender specific policies should be introduced for transit systems to improve perceptions of safety. In addition, **past victimisation experience** continues to be an important determinant of perception (Otis 2007; Hirtenlehner & Farrall 2014; Yates & Ceccato 2020; Hale 1996; Spicer & Song 2017; Yavuz & Welch 2010).

Methodology

This research employs triangulation of quantitative methods to address its research question. We analyse primary and secondary data to provide a comprehensive understanding of the impact of new infrastructure in tube stations on crime and safety. The two components of our methodology include: an online survey and secondary data analysis.

Survey methodology

The primary research was conducted through online surveys using the Qualtrics platform, which is widely used by academic researchers. The target population for this survey was the LSE community, as it provided feasibility and accessibility in terms of data collection. To ensure a relatively representative sample, the survey was distributed through various channels within the LSE community, including student networks, group chats of student societies, student accommodations, and department networks. Non-probability sampling was adopted due to limitations, with participants voluntarily filling out the questionnaires. Ethical considerations were taken into account by obtaining participants' informed consent, which explained the purpose and nature of the study and assured them that their data would only be used for academic purposes.

The design of the survey questions was informed by relevant literature to ensure internal validity. The survey included four types of questions: demographic questions, perceptions of infrastructure questions, perceptions of crime questions, and general safety questions.

Demographic questions aimed to collect information about key explanatory variables, such as gender, which is known to influence the fear of crime. Respondents were also asked to indicate their most frequently used station among the 10 selected stations, which served as a reference point for subsequent questions related to perceptions of crime.

Perceptions of infrastructure questions focused on participants' opinions regarding the impact of infrastructure improvements on crime levels in general. Specific infrastructure features, such as new or widened platforms, increased CCTV surveillance, enhanced lighting systems, improved signage and wayfinding, new escalators and/or improved lift access, and new station entrance and ticket hall, were addressed. Likert-scale answering style was employed to translate participants' responses into continuous variables for regression analysis.

Perceptions of crime questions measured both perception and experience. Fear of crime was measured using an "ABC" approach, which captured attitudes, actions, and perceived likelihood of falling victim to different types of crimes (theft, violence, sexual harassment, verbal harassment, and vandalism). Additionally, participants were asked about their actual experiences as victims or witnesses of these crimes, providing further contextual data for the research.
General safety questions aimed to explore participants' levels of worry about crime at different times of the day and in various locations.

Secondary data inclusion

Our study utilised secondary data to select 10 specific stations for investigation; 5 with recent infrastructure improvements and 5 without. To determine the stations with recent infrastructure improvements, information about station improvements provided by TFL was examined (Transport For London 2017). To refine our selection of stations, crime concentration maps for reported crimes in Zone 1 were identified and created using station coordinates and crime statistics. Concentrations of reported crimes in Zone 1 of London, particularly in a specific area, were identified. 5 stations in this area with recent infrastructure improvements were chosen: Bond Street, Farringdon, Liverpool Street, Paddington, and Tottenham Court Road. To provide a comparative analysis, 5 stations without recent infrastructure improvements but near to LSE Halls of Residence within Zone 1 were selected: Angel, Euston, Holborn, Warren Street, and Waterloo. The selection was based on comparative footfall levels obtained from Transport for London data.

To further refine the selection of stations, crime concentration maps were created using station coordinates and crime statistics, as shown by Figure 1. Concentrations of reported crimes in Zone 1 of London, particularly in a specific area, were identified, as seen in Figure 2. Therefore, five stations in this area with recent infrastructure improvements were chosen: Bond Street, Farringdon, Liverpool Street, Paddington, and Tottenham Court Road. To match these stations, five stations without recent infrastructure improvements but in proximity to LSE Halls of Residence were selected: Angel, Euston, Holborn, Warren Street, and Waterloo. The selection was based on comparative footfall levels obtained from Transport for London data.

By analysing the responses to the survey questions and conducting secondary data analysis, this research aims to gain insights into participants' perceptions, experiences, and concerns regarding crime and safety in tube stations, as well as the impact of new infrastructure on these factors.

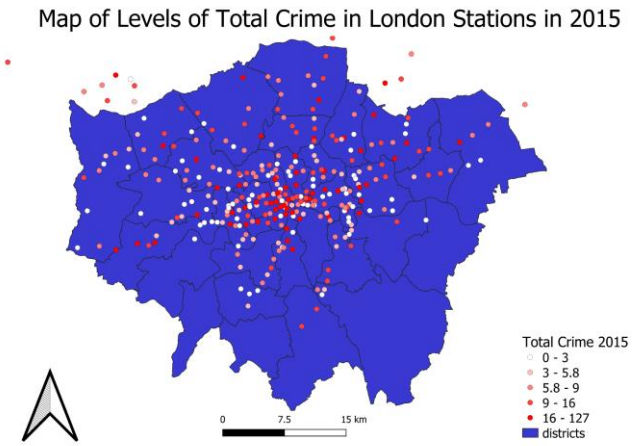

Figure 1

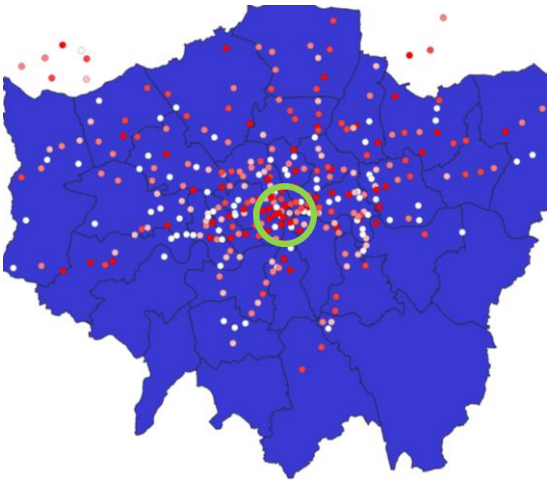

Figure 2

Analytical strategies

Descriptive statistical analysis

We first adopt a univariate analysis by applying frequency tables and measures of central tendency and dispersion. We then use a mix of bar charts and histograms for discrete categorical variables, like gender, and continuous variables, like age, respectively to visualise the data. To further visualise the relationship between explanatory and response variables we want to explore in the later regression model, we adopt multivariate analysis to incorporate more elements in the graphs. For instance, we use grouped bar charts to visualise how the average perception of falling victim to crime differs with respect to different stations and types of crime and sex.

Multivariate regression - Inferential statistics analysis

The analytical strategy that we employed to explore our research hypotheses is multivariate linear regression. Our regression model runs 4 types of regression in total, highlighting the significance of a control variable that indicates whether stations have new infrastructure improvements or whether they do not. We also performed these same 4 regressions twice, this time without the control variable of with and without new infrastructure, by splitting the dataset into stations with new infrastructure and stations without. This allows us to measure the impact of the stations having new infrastructure, whilst identifying any possible variation between the other explanatory variables when looking at stations with and without new infrastructure improvements separately. The first three response variables, average worry of falling victim to crime, average perceived likelihood of falling victim to crime, and number of preventative measures taken, reflect people's perception of crime. The fourth response variable is linked to general safety.

Firstly, our regression model aims to separately investigate the relationship between 3 response variables (measures of perception of crime) and the 7 explanatory variables. The first four are the aggregate mean of perception of the impact of infrastructure improvement on crime, level of trust in TfL levels of worry for different times of day, and level of general worry about travelling on the tube. The rest three are binary dummy variables about gender, and past experience of a witness or falling victim of crime.

Secondly, our regression model aims to investigate the relationship between average general level of worry of travelling on the tube and the 9 explanatory variables. Compared to explanatory variables mentioned, we exclude the general safety variable as it has become the response variable, and incorporate the three previous response variables into analysis.

In general we take a step-wise approach, for each regression, we start with the one explanatory that we are most interested in and incorporate other control variables gradually. This stepwise addition allows us to observe the changes in the model when each variable is included, which allows us to see which variables have higher explanatory power. By following this systematic approach, we aim to provide a rational and informed methodology for our study.

Discussion

Contextual Secondary Data

The five new stations see a sharper climb in the crime counts compared to the old ones after the opening of the Elizabeth Line in 2022 (Fig 5). On average, crime rates in new stations have been consistently higher than old stations since 2018 when infrastructure improvements started to be developed for the Elizabeth Line (Fig 6). This data support the findings of Spicer and Song (2016) who argue that infrastructure improvements are closely related to higher footfall as a result of station development. However, the link between higher footfall and increased crime may indicate that if the percentage increase in footfall is greater than the percentage increase in crime rate, one's individual vulnerability can actually decrease. This is highlighted by the dramatic increase in the crime rate statistic in control for the footfall during the Covid, as compared to the fall in crime counts for both new and old stations, given the decrease in footfall during Covid (Fig 3). The control for the footfall gives that the average crime rate (i.e. individual vulnerability) still has a sharper hike in the new stations in 2022 for the opening of the Elizabeth line, although the difference between the old and new station becomes insignificant for the years of the preparation (Fig 4).

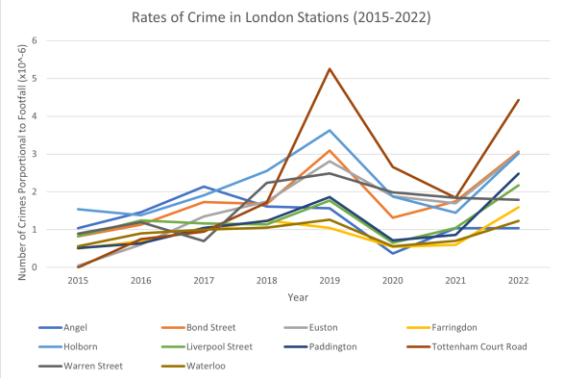

Fig 3

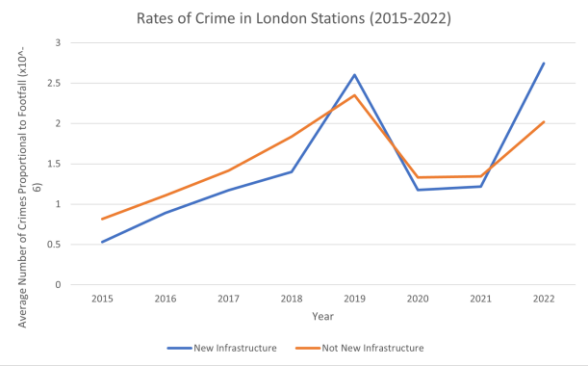

Fig 4

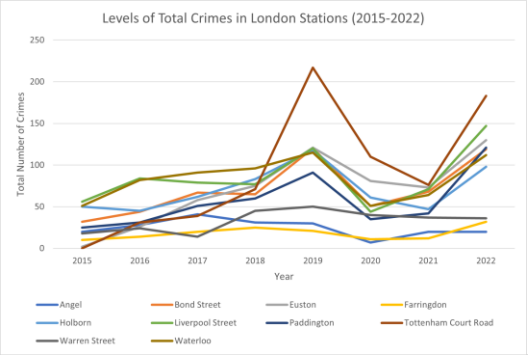

Fig 5

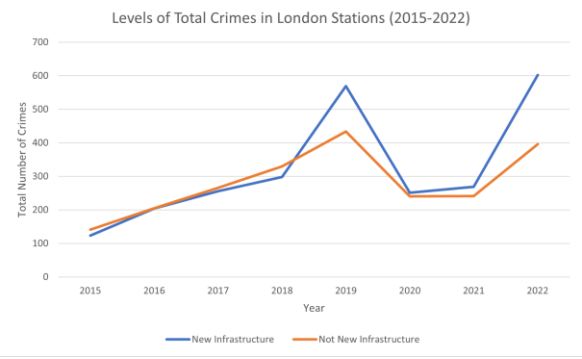

Fig 6

Findings

From the regressions we have performed, our study seeks to examine the relationships between our independent variables of hypothesis, and the wider contextual variables that we identified and collected from the literature.

Examining the regression on the average worry of falling victim to crime in stations of most use, we identify some common features between both stations with new infrastructure and stations without. The average attitudes on the impact of infrastructure improvements was significant for both regressions, until variables about prior experiences (namely, having been a victim to crime or having witnessed a crime) were introduced. This shows the common difference in the importance of affective influences over cognitive influences using the ABC theoretical framework (Jackson & Gouseti 2012), particularly for an affective measure of perception of crime. Since the worry of falling victim to crime is an affective measure of perception of crime (Jackson & Gouseti 2012), we would assume that affective influences would have the most significant impact. This holds true as our findings show prior experiences, which are indicators of direct and affective influences, have more significance than attitudes towards the impacts of infrastructure, the latter of which is a cognitive influence because it highlights logical conceptions about the built environment.

However, when observing differences between the regressions for stations with and without new infrastructure, we identified impacts of the wider environmental context of the station. For stations with new infrastructure, a beta coefficient of -0.370 indicates that a higher agreement with Transport for London's (TFL) actions for improving safety led to a lower average worry of falling victim to crime. This is consistent with the literature which finds that public awareness of situational improvements in transport settings improves perceptions of crime (Sundling & Ceccato 2022). Furthermore, this result was statistically significant, which indicates the importance of TFL's work on infrastructure improvements. This is a particularly important finding, as support for TFL's implementation of infrastructure improvements correlated with lower fears of falling victim to crime **only** in new stations.

The next set of regressions that we examine looked at the perceived likelihoods of falling victim to crime in stations of most use. For these, the average attitudes towards the impacts of infrastructure improvements was significant until prior experiences (namely, witnessing a crime and being a victim of crime) were introduced. As with the regressions on the average worry of falling victim to crime, this shows us that the affective influences have a higher importance that the cognitive influences. However, since perceived likelihood of falling victim to crime is a cognitive measure of perception of crime, this finding shows that affective influences hold more importance over cognitive influences, regardless of the measure of perception of crime. This is furthered by apparent similarities in the attitudes towards infrastructure improvements, as seen in Figure 7.

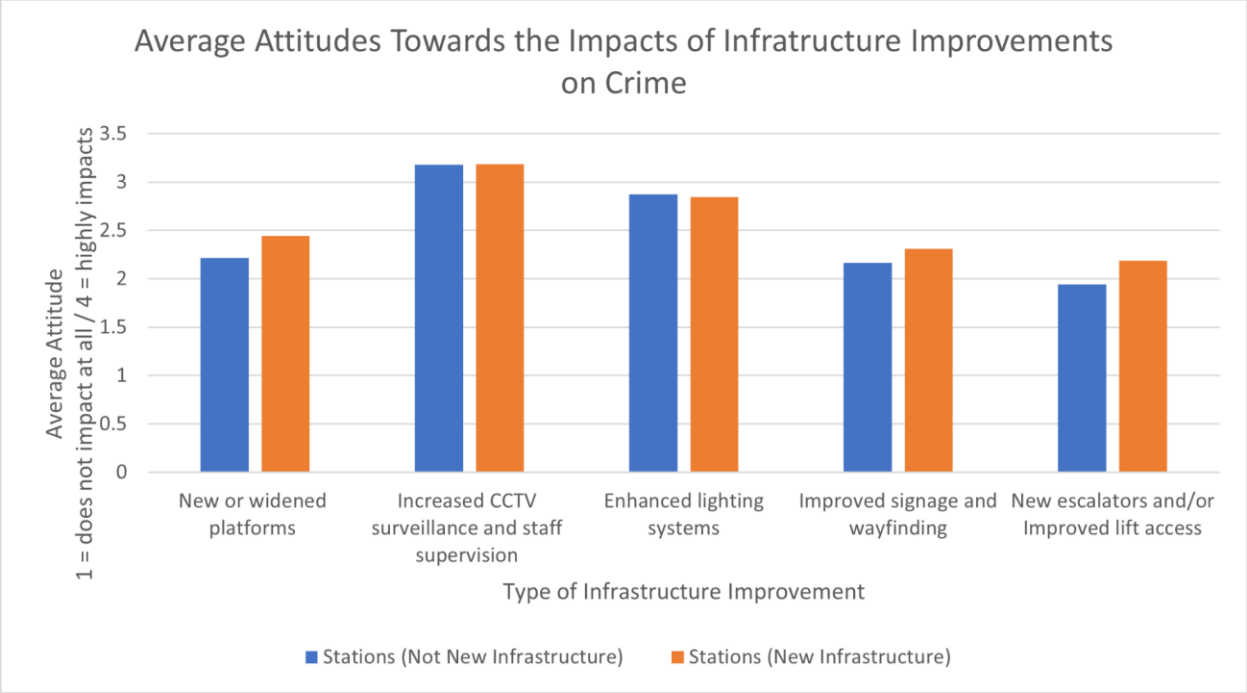

Fig 7

When looking at the variations, for stations with new infrastructure, a beta coefficient of 0.745 indicates that experiencing a crime correlates with a higher perceived likelihood of falling victim to crime. This statistically significant result indicates that, even for perceived likelihood of falling victim (which is a cognitive measure of perception of crime), the affective influence (witnessing a crime, in this case) has high explanatory importance.

The final set of regressions looked at the number of preventative measures taken by individuals. For these, gender had a statistically significant impact on this behavioural measure of perception of crime - a feature that is also highlighted in the survey data distribution, as shown in Figure 8. This is also consistent with the fear of crime literature, which posits that there are clear gender based differences in perception of crime (Smith 2008; Peters 2013; Spicer & Song 2017). For stations without new infrastructure, a beta coefficient of -0.377 means that women are more likely to take preventive measures whilst, for stations with new infrastructure, a beta coefficient of -1.076 means that women are much more likely to take preventative measures. The difference in coefficient size indicates that, in stations with new infrastructure improvements, women are more likely to take preventative measures. This latter finding is supported by the literature, including Ceccato's (2013) analysis of fear of crime in the context of Stockholm's subway system. This study indicates that smaller stations with fewer platforms and exits were considered to be safer than larger stations (Ceccato 2013) - a characteristic supported by the survey data distributions, shown in Figure 9 below.

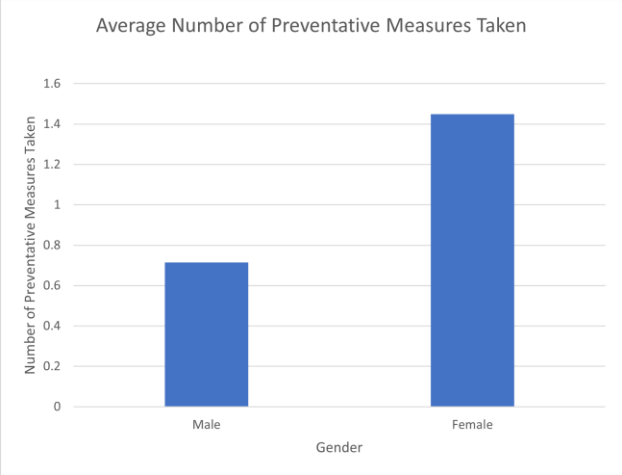
Average Number of Preventative Measures Taken
Number of Preventative Measures Taken
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Male
Female
Gender

Fig 8

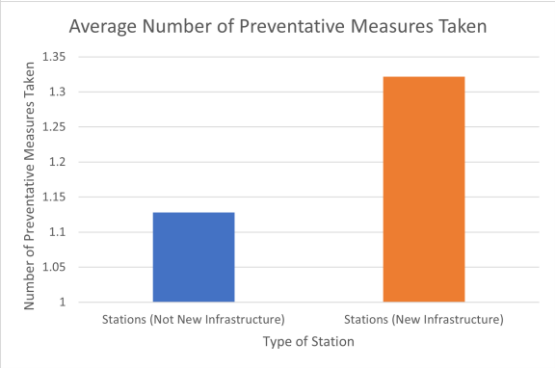
Average Number of Preventative Measures Taken
Number of Preventative Measures Taken
1.35
1.3
1.25
1.2
1.15
1.1
1.05
1
Stations (Not New Infrastructure)
Stations (New Infrastructure)
Type of Station

Fig 9

Reflections

While every effort was made to maintain the standard of this research, there are certain limitations that must be acknowledged.

As a group of 6 LSE students, we recognised that our capacity for best results would mean a need to distribute our survey to our own personal networks. The consequence of this is a primary respondent demographic of LSE students and staff. The use of personal networks for distribution indicates a non-probability method of survey distribution which, inherently, introduces a level of bias into the collection of this data. We tried to navigate this effect by changing the focus of our topic of research towards the perspective of the LSE community. Given more time and reach, we would have attempted to use a probability method of distribution to collect a wider representation of results. The benefit of this would have been the ability for us to apply the findings to the general population, rather than just to a specific community demographic.

Secondly, in the results from the survey we can notice that there is an overrepresentation of Holborn. This is because of its proximity to the LSE campus. This overrepresentation may lead to the survey results being biased as it focuses on the perspectives of those who use Holborn as their most frequently used station. While this bias cannot be eliminated, it would have been preferable to receive a more evenly scaled distribution for the station of most frequent use.

Furthermore, it is likely that the secondary data on crimes in stations is not accurate as many crimes are unreported. As a result, the data on reported crime is expected to be diminished when compared to the actual crime taking place in stations. However, we use the data on reported crime as it is beyond the scope of this study to modify the reported crime statistics in an attempt to make it more realistic. Therefore, the secondary data on crime in stations is assumed to be accurate.

Lastly, when we were running the regressions, we assumed that the respondents were aware of the infrastructure developments in their station of frequent use. However, it is important this is a strong assumption as many respondents may not or wrongly be aware of the infrastructure development in their station. Resultantly, when we analyse their perception of crime in the station we do so in accordance with the actual difference of the stations leading to the possibility of error.

Conclusion

This paper examines the perceptions and experiences of crime in the London Underground within the LSE community. By conducting an online survey and analysing statistical crime data, we aimed to understand the impact of infrastructure developments on crime perceptions. Our findings suggest that the LSE community holds more negative perceptions of crime when new infrastructure developments are implemented in underground stations, which aligns with the current literature (Spicer & Song 2017). However, we recognise that this research has several limitations, which range from time constraints to station location selection.

The study contributes to the existing literature on the fear of crime in transport settings by examining the specific context of the London Underground, an underexplored area within the literature. It highlights the significance of physical characteristics of underground stations, such as infrastructure improvements, in shaping perceptions of crime. The installation of surveillance cameras, enhanced lighting systems, and improved signage and wayfinding have been found to influence crime perceptions in previous studies (Sundling & Ceccato 2022).

Moreover, individual differences, particularly gender and previous victimisation, play a role in shaping perceptions of crime in our sample. Women tend to express higher levels of fear of crime, measured through worry about victimisation as well as perceived likelihood of victimisation. Pastvictimization experiences also contribute to worry about victimisation. Understanding these individual and contextual factors is crucial for designing effective policies and interventions to enhance safety in public transportation systems.

Based on our findings, it is evident that negative perceptions of crime can impact the connecting nature of the London Underground within the LSE community. These perceptions may discourage people from using public transportation, undermining the potential benefits of a well-connected transport system. Future research could further investigate the relationship between infrastructure developments, actual crime rates, and perceptions of crime in the London Underground. Including a more diverse range of stations and examining longitudinal data could provide a more comprehensive understanding of the dynamics at play. Additionally, exploring strategies to address and alleviate fear of crime, such as targeted interventions and improvements in safety measures, could contribute to creating a safer and more inclusive public transportation environment for all users.

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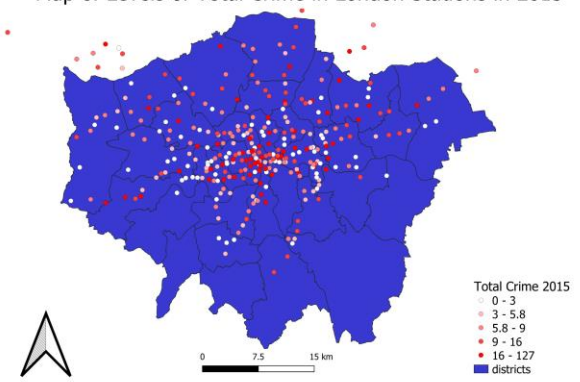
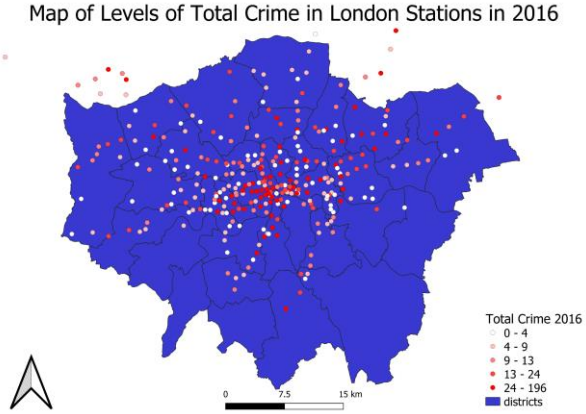
Appendix

Appendix 1

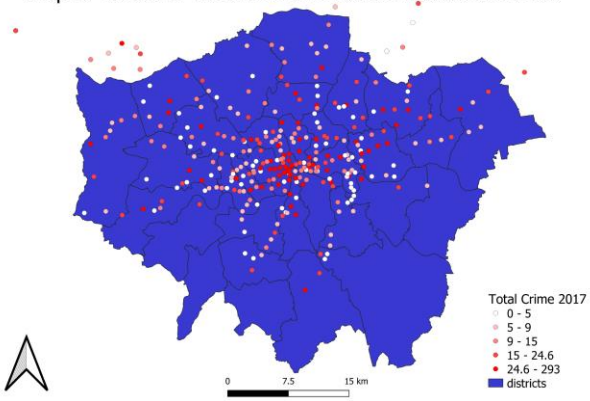
Map of Levels of Total Crime in London Stations in 2015



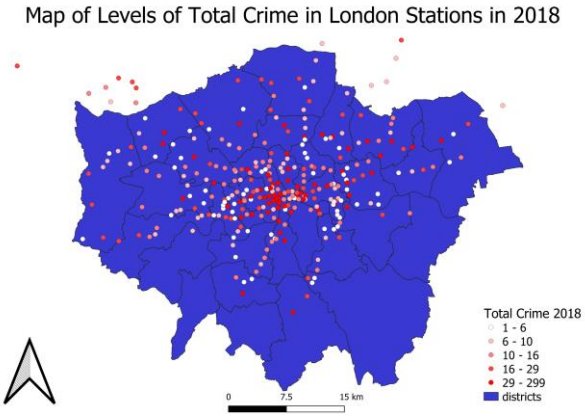
Map of Levels of Total Crime in London Stations in 2016



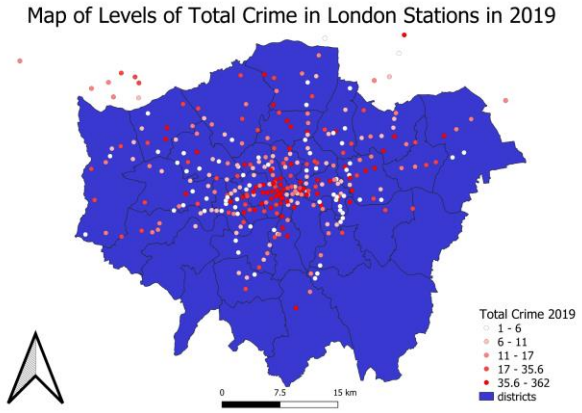
Map of Levels of Total Crime in London Stations in 2017



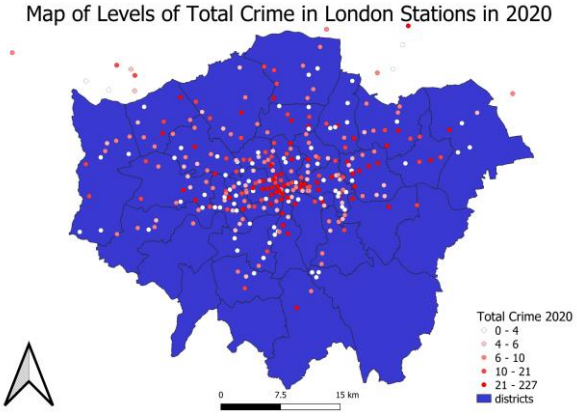
Map of Levels of Total Crime in London Stations in 2018

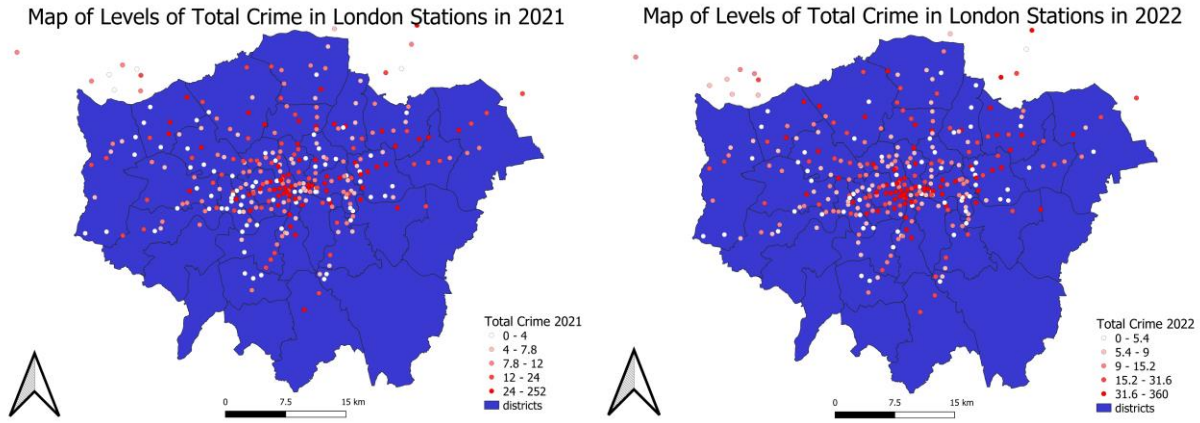


Map of Levels of Total Crime in London Stations in 2019



Map of Levels of Total Crime in London Stations in 2020





Appendix 2

Variable name	Regression (dependent varia	New/old?	beta	t-stat	p-value
tfl_support	worry_falling_victim	New	-0.37	-2.53	0.022
infrastructure_attitudes	worry_falling_victim	new	-0.0501	-0.4	0.696
witness_of_crime	likelihood_falling_victim	new	0.745	2.02	0.059
gender	likelihood_falling_victim	new	-0.488	-1.62	0.123
gender	preventative_measures	new	-1.076	-2.09	0.052
infrastructure_attitudes	worry_falling_victim	old	-0.0299	-0.4	0.691
gender	worry_falling_victim	old	0.153	1.36	0.177
infrastructure_attitudes	likelihood_falling_victim	old	0.11	1.32	0.189
gender	preventative_measures	old	-0.377	-2.36	0.02
victim_of_crime	preventative_measures	old	0.388	2.34	0.021