DEANSGATE CROSSROADS STUDY – EFFECTIVENESS OF PEDESTRIAN COUNTDOWN SIGNALS

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1st September 2020

Problem Observed

Location:

Deansgate, various crossroads. Danger mainly observed at the crossroads of Deansgate, Quay St and Peter St.

Current infrastructure:

Basic Pelican crossing on timed intervals.

Problem:

Does not suit the pace of life in the city centre. Untimely delays between crossing periods. Unsafe crossing, unknown when crossing time will end, no countdown. Blind corners, turning cars. Furthermore, there is a lot of diagonal crossing, to avoid waiting to cross twice.

Suggested Intervention

A pedestrian crossing with a countdown signals which is more appropriately scheduled to give more crossing time and less waiting time.

Current Literature on Intervention effectiveness

Overall, pedestrians prefer countdown signal crossings. They feel much safer crossing at a countdown signal crossing compared to a standard crossing. However, they have not been studied enough to see if they are safer. However, it is thought that their use at busy junctions will increase safety.

- https://www.trafficchoices.co.uk/traffic-schemes/countdown-signals.shtml

Study in Florida has recommended that they may lead to some pedestrians becoming confused and crossing whilst there are a few seconds left but the signal says, 'Don't walk'.

- Huang H & Zegeer C, 'The Effects of Pedestrian Countdown Signals in Lake Buena Vista' (Nov 2000) Florida Dept of Transportation - http://bikeped.rutgers.edu/ImageFolio43_files/gallery/Bike-Ped_Facilities/Documents/FLDOT_2000_The_Effects_of_Pedestrain_Countdown_Signals_in_Lake_Buena_Vista.pdf

However, in the UK, there is no 'Don't walk' and the green man will just disappear, therefore, the countdown may actually lead to people not crossing if there is only a few seconds remaining.

A study has shown that they have significant safety benefits for long crossing on busy junctions. This will benefit the 'diagonal crossers' and the Deansgate junction is very busy.

- Supernak J, Supernak I & Verma V, 'Pedestrian countdown signals: What impact on safe crossing?' (2013) 3 Open Journal of Civil Engineering 39-45 - https://www.researchgate.net/publication/272880182_Pedestrian_Countdown_Signals_What_Impact_on_Safe_Crossing

Current literature shows that the safety benefits can be limited, but studies have only been carried out in the US. There is a clear need for research to be carried out in the UK, so its effects on the UK road and crossing systems can be observed.

Hypothesis

The observed number of safe crossings per 100 crossings will be greater at the junction where there is a pedestrian countdown signal (PCS).

Accordingly, the number of dangerous crossings per 100 crossing will be greater at the junction without the PCS.

Method of Study – Observational

- Measure time of delay in between allocated crossing periods.
- Measure duration of crossing time (green man).
- Tally the number of crossers within a 40 minute period.
- Tally the number of safe crossings. 'Safe crossings' means within the allocated crossing time (green man)
- Tally the number of dangerous crossings. 'Dangerous crossings' means outside of the allocated crossing time (green man)

This method will be carried out at the 'danger area' at the Deansgate crossroads, and the control area – the crossroads at Oxford Street and Whitworth Street, where PCS are present.

The results will then be compared and stratified into the mean number of safe crossings and dangerous crossing per 100 individual crossings.

'Safe crossing' means within the allocated crossing period (green man).

'Dangerous crossing' means outside the allocated crossing period.

Figure 1: Example data collection form

Site 1 – The crossroads at Deansgate, Quay St & Peter St

Number of safe crossings/ when green man illuminated (Tally)	Number of dangerous crossings/ when green man is not illuminated (Tally)

Figure 2:

Site 1 Diagram

Study Area

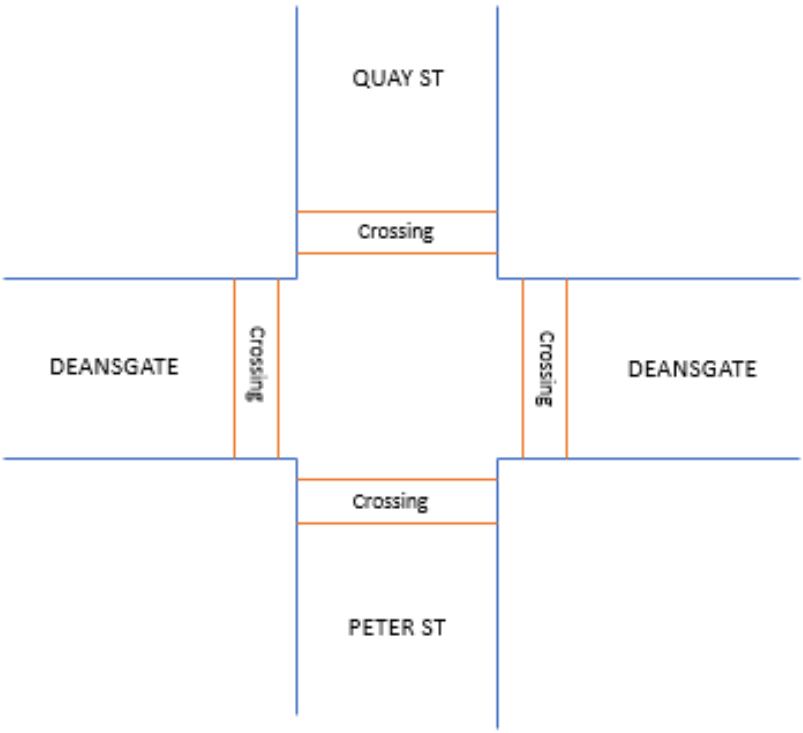
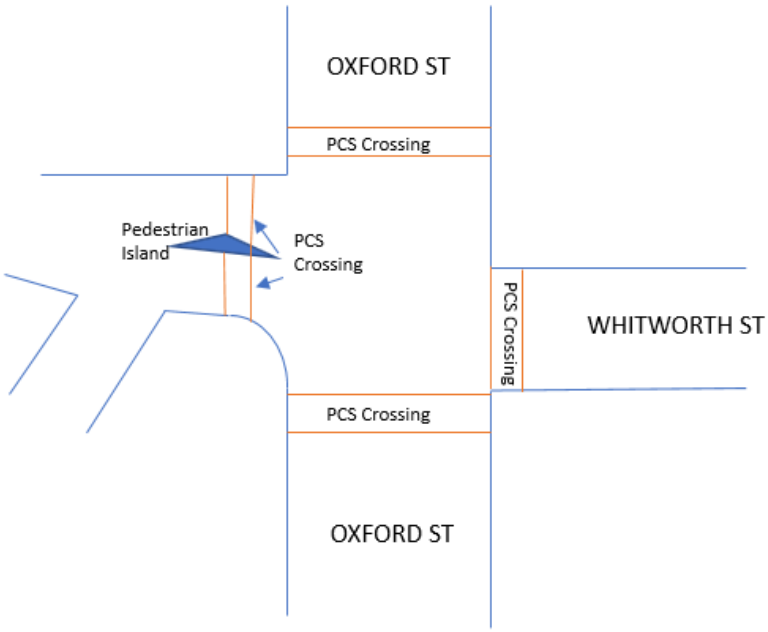


Figure 3:

Site 2 Diagram

Control Area



Ethics Committee decision on suitability of study

As this is an observational study, there are not as many ethical considerations to take place. This is better known as a 'light-touch' review, as outlined by the Economic and Social Research Council.[1] This is a quantitative study, and the data will be anonymised and not attributable to any given person.

In the rare event that any collision is witnessed the data collectors will be expected to call the emergency services and be available as a witness. The data collectors will have previously agreed to this obligation prior to the study.

Pedestrians will not be safeguarded, and not be aware of the observational study in an effort to observe their natural behaviours in the circumstances. This is not an ethical problem, as people are aware how to safely cross a street, but in situations like this do not wait until the green man is illuminated. Thus, any interference to promote health and safety by the research team will either have no effect or instead change the natural behaviours of pedestrians if they know they are being watched.

Due to the current Covid-19 situation, and at the moment this advice was delivered, the stricter lockdowns throughout Greater Manchester, social distancing must be adhered to from the other data collectors and they must not create an obstruction which could cause them to come within 2 metres from any pedestrians.

Otherwise the observational study should go ahead as planned.

[1] ESRC, 'Our expectations of ethics review' - https://esrc.ukri.org/funding/guidance-for-applicants/research-ethics/our-expectations-of-ethics-review/#:~:text=All%20ESRC%2Dfunded%20research%20must,harm%20that%20the%20research%20imposes.

Results

The research team was composed of 3 data collectors. The mean average of their findings will be recorded to account for human error or lack of efficiency.

Site 1: The crossroads at Deansgate, Quay St & Peter St

RAW DATASET

	Data Collector 1	Data Collector 2	Data Collector 3
No. safe crossings	147	305	110
No. dangerous crossings	99	192	70
Total crossings	246	497	180

MEAN DATA

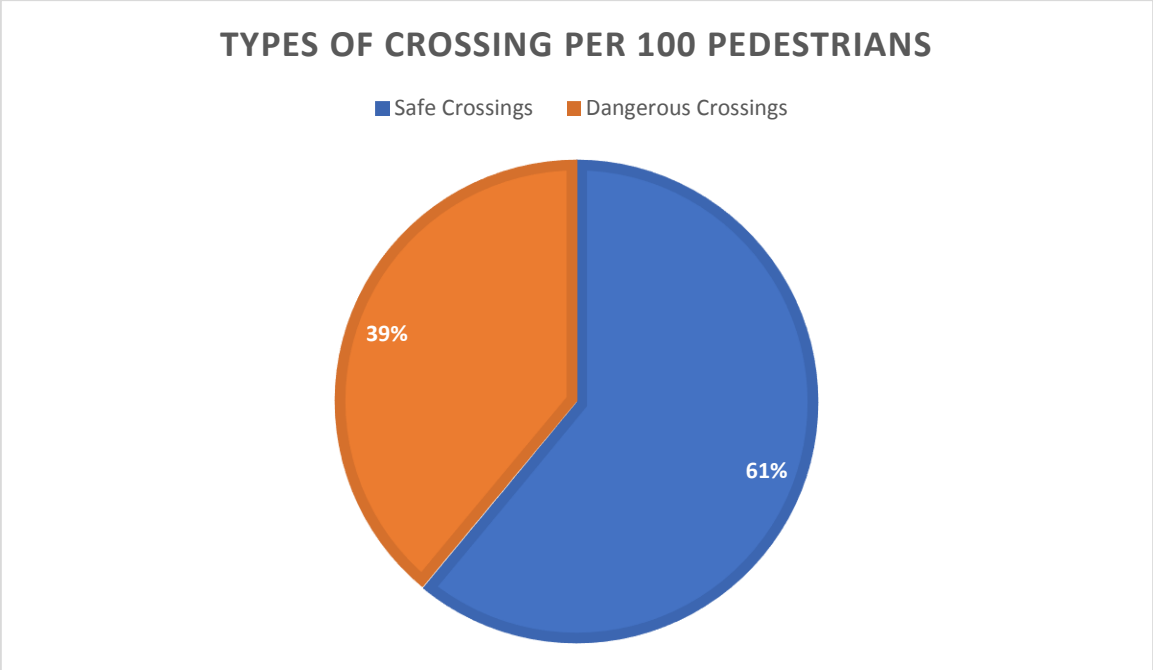
Safe crossing duration (green man illuminated)/ secs	7 secs
Interval between safe crossings / secs	1 minute 46 secs

Number of safe crossings/ when green man illuminated (Mean average)	Number of dangerous crossings/ when green man is not illuminated (Mean average)
187	120

Total number of crossings (mean average): 308

MEAN NUMBER OF CROSSINGS PER 100 PEDESTRIANS

Type of Crossing	**No. per 100 pedestrians (rounded to nearest integer)**
Safe	61
Dangerous	39



<u>Site 2 – Control Area - The crossroads at Oxford Street and Whitworth Street</u>

RAW DATASET

	Data Collector 1	Data Collector 2	Data Collector 3
No. safe crossings	49	129	75
No. dangerous crossings	109	165	125
Total crossings	158	294	200

MEAN DATA

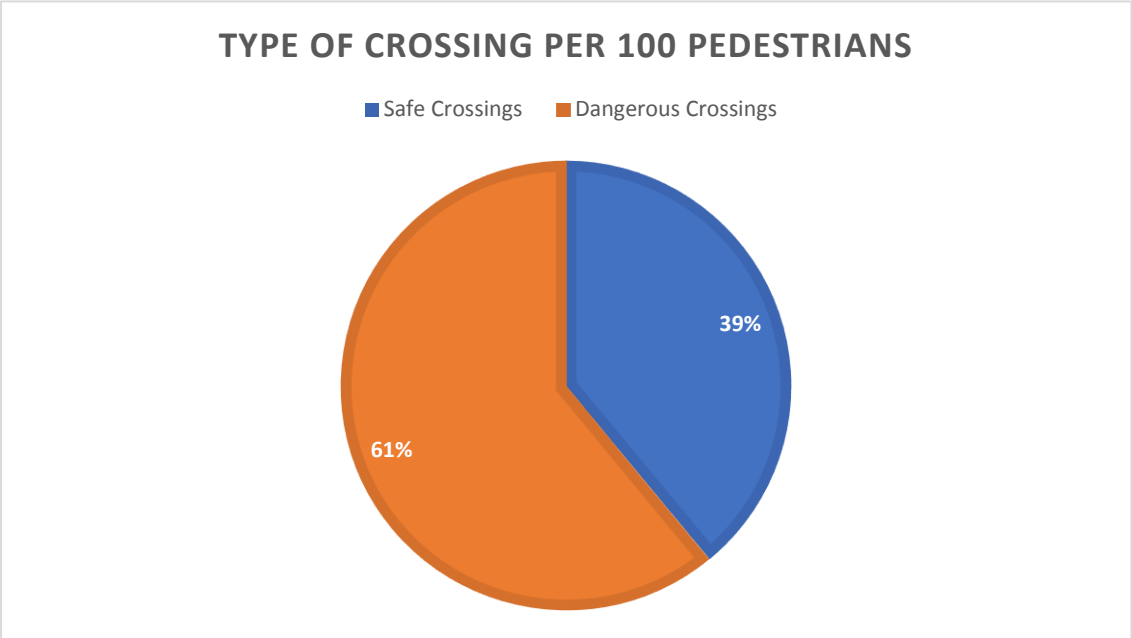
Safe crossing duration (green man illuminated)/ secs	18 secs
Interval between safe crossings / secs	53 secs

Number of safe crossings/ when green man illuminated (Mean average)	**Number of dangerous crossings/ when green man is not illuminated (Mean average)**
84	133

Total number of crossings (mean average): 217

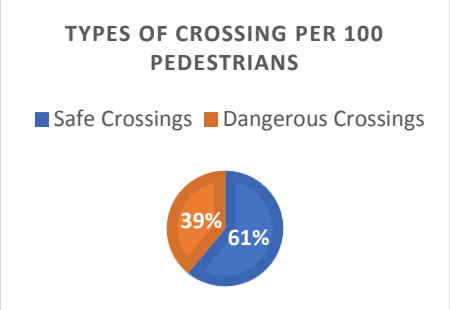
MEAN NUMBER OF CROSSINGS PER 100 PEDESTRIANS

Type of Crossing	**No. per 100 pedestrians (rounded to nearest integer)**
Safe	39
Dangerous	61

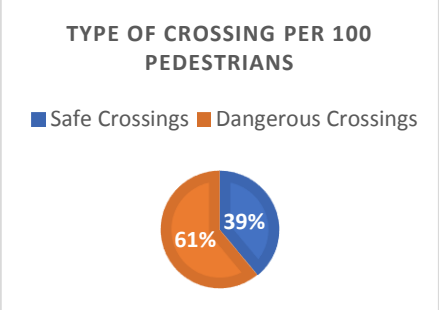


Comparison

Site 1 (Test Area)



Site 2 (Control Area)



Evaluation

Reproducibility

In terms of reproducibility, this study was very successful. It could be reproduced very easily by anybody reading the instructions. Minimal equipment is required, a data sheet and pen. It is just an observational study and thus if it was re-performed at a similar time of day, the results would most probably be similar.

What went well

The study went well, the data collectors had a good view of the crossroads. The tally chart was an effective method of recording this quantitative study. The time spent at each site (40 minutes) was optimal, as any longer and the concentration of the data collectors would have been compromised.

What did not go well

There must have been some human error in counting every single pedestrian accurately. This is reflected in that each data collector has counted different amounts of people. This is why a mean average has been taken from their results to counteract any error as much as possible. There were also some uncontrollable variables which may have impacted the results to be described below.

What could be improved

Maybe a camera with a clear view could be set up and record the crossings, this would then be watched retrospectively and used to collect the data to avoid distraction of the data collectors and human error as much as possible. However, this may have some data protection implications, and would have to be looked into further.

Furthermore, to avoid variables such as the time of day (frequency of footfall), it could be necessary to send two separate teams to the two locations and perform the study at the exact same time.

Maybe a better control area would be on the junction further up Oxford St, on the crossroads at Oxford St, Portland St and Chepstow St, where there are PCS but also more traffic and perhaps a more similar road layout to Deansgate.

What do the results tell us

- The results actually prove contrary to our hypothesis. The study has actually shown that more unsafe crossings occur at the control area with the pedestrian countdown signals (PCS) present. However, the research team believes there may be variables for this. However, it shows that **the PCS in its current location proves ineffective.**

- Nevertheless, at the danger area in Deansgate, 39% of all crossings per 100 remain dangerous. **This means that just short of two-fifths of all pedestrians crossing here are putting themselves at risk – this is 4 in 10 pedestrians.**

- The research team remain concerned with this, as although the control area observed even more (61%) dangerous crossings, **Deansgate has less visibility and heavier traffic**, meaning that the 39% exposure to risk is more likely to materialise into a collision.

- Furthermore, with the amount of 'diagonal crossings', and longer distances to cross the roads, as well as the slightly more conventional layout of the roads at Deansgate, it was agreed by researchers that a PCS may have a better effect here, as suggested by the existing research (Supernak J, Supernak I & Verma V, 'Pedestrian countdown signals: What impact on safe crossing?' (2013) 3 Open Journal of Civil Engineering 39-45 - https://www.researchgate.net/publication/272880182_Pedestrian_Countdown_Signals_What_Impact_on_Safe_Crossing).

- The study conducted here **approves the findings of the above study that PCS do not lead to an increase in safe crossings.**

- The **interval length** between safe crossings is much longer at Deansgate, 1 minute 46 secs, and only 7 seconds of safe crossing time. **This is a factor behind the dangerous crossings**, pedestrians will simply not wait this long, and sometimes there is not even enough time to cross the road – these delays also encourage diagonal crossing.

Possible uncontrollable variables

There are some uncontrollable variables that should be considered in the evaluation of these results:

- **Traffic -** Oxford St (PCS area) had noticeably less traffic and footfall, less traffic may have influenced pedestrian decisions to cross when the green man is not illuminated.
- **Visibility** - There was more visibility of oncoming vehicles in the control area with PCS, with softer street corners, meaning pedestrians had better view of oncoming vehicles – they would cross if they saw that the road was empty.
- **Weather changes** - When the researchers arrived at the control area, heavy rainfall had just begun, this could have changed pedestrian behaviour into being more rushed to find shelter, possibly taking more risk when crossing.
- **Infrastructure** – as seen in figure 3 on page 3, Oxford St had a pedestrian refuge island, meaning some pedestrians would cross at unsafe times in a staggered manner, using the island to stop. In all, the infrastructure of the control area was safer and accordingly pedestrians may have felt safer to take the risk.
- **Layout/ Distances** – the control area had seemingly shorter crossing distances, which existing research has already proven renders PCS less effective. This is compounded with the use of the island etc. Deansgate had longer distances for pedestrians to cross, making them hesitate more before crossing. Thus, a PCS may still prove effective here.

Conclusion

To conclude, whilst the results of the research study did not prove the hypothesis, having considered the variables, there is still a **pressing need** to upgrade the crossing infrastructure on the Deansgate crossroads.

The layout and characteristics of the road in Deansgate indicate that it is more suited than the control area to Pedestrian Crossing Signals and would benefit more from their implementation. Furthermore, the duration between safe crossing intervals at Deansgate is **far too long** and this

should be reduced. Furthermore, 7 seconds to cross the roads are not enough time for pedestrians and puts them at risk, it must be increased.

EXTRA RESOURCES

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Site 1 – The crossroads at Deansgate, Quay St & Peter St

Safe crossing duration (green man illuminated)/ secs	secs
Interval between safe crossings / secs	secs

Number of safe crossings/ when green man illuminated (Tally)	Number of dangerous crossings/ when green man is not illuminated (Tally)

Overall No. crossings:

No. safe crossings:

No. dangerous crossings:

Site 2 – Control Area – The crossroads at Oxford Street and Whitworth Street

Safe crossing duration (green man illuminated)/ secs	secs
Interval between safe crossings / secs	secs

Number of safe crossings/ when green man illuminated (Tally)	Number of dangerous crossings/ when green man is not illuminated (Tally)

Overall No. crossings:

No. safe crossings:

No. dangerous crossings:

Site 1 – The crossroads at Deansgate, Quay St & Peter St

Safe crossing duration (green man illuminated)/ secs	secs
Interval between safe crossings / secs	secs

Number of safe crossings/ when green man illuminated (Tally)	Number of dangerous crossings/ when green man is not illuminated (Tally)

Overall No. crossings:

No. safe crossings:

No. dangerous crossings:

Site 2 – Control Area – The crossroads at Oxford Street and Whitworth Street

Safe crossing duration (green man illuminated)/ secs	13 secs
Interval between safe crossings / secs	53 secs

Number of safe crossings/ when green man illuminated (Tally)	Number of dangerous crossings/ when green man is not illuminated (Tally)

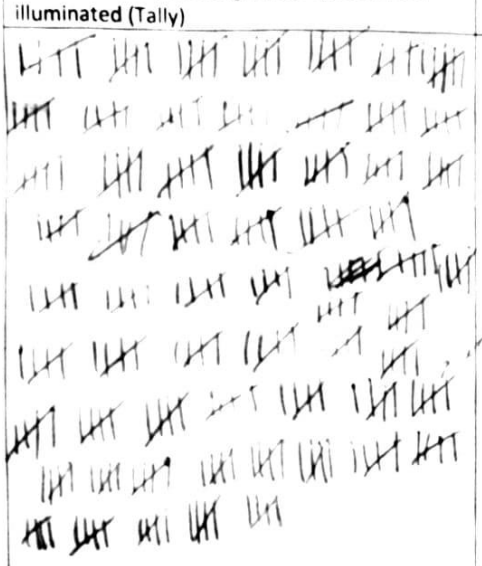
Overall No. crossings:

No. safe crossings:

No. dangerous crossings:

Site 1 – The crossroads at Deansgate, Quay St & Peter St

Safe crossing duration (green man illuminated)/ secs	secs 7
Interval between safe crossings / secs	1 minute secs 46

Number of safe crossings/ when green man illuminated (Tally)	Number of dangerous crossings/ when green man is not illuminated (Tally)
	

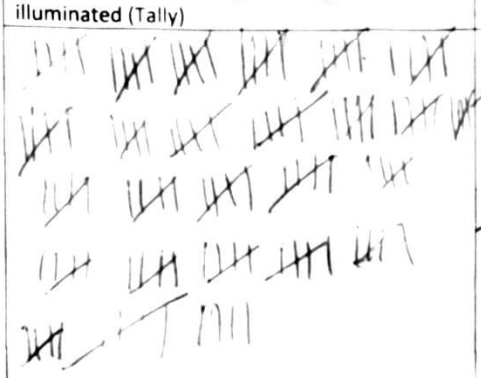
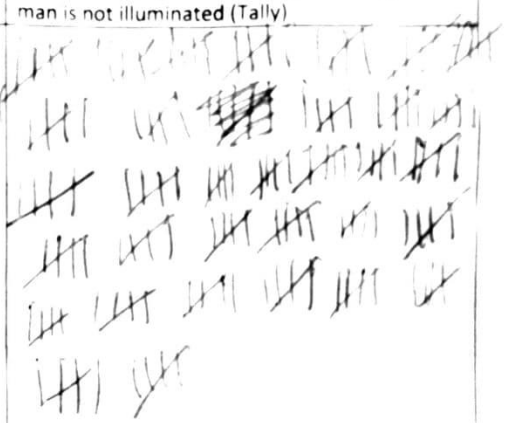
Overall No. crossings: Allot

No. safe crossings: Some more

No. dangerous crossings: Some

Site 2 – Control Area – The crossroads at Oxford Street and Whitworth Street

Safe crossing duration (green man illuminated)/ secs	secs 18
Interval between safe crossings / secs	secs 53

Number of safe crossings/ when green man illuminated (Tally)	Number of dangerous crossings/ when green man is not illuminated (Tally)
	

Overall No. crossings: Quite a bit

No. safe crossings: Several

No. dangerous crossings: A few

Site 1 – The crossroads at Deansgate, Quay St & Peter St

Safe crossing duration (green man illuminated)/ secs	secs
Interval between safe crossings / secs	secs

Number of safe crossings/ when green man illuminated (Tally)	Number of dangerous crossings/ when green man is not illuminated (Tally)
	

Overall No. crossings:

No. safe crossings:

No. dangerous crossings:

Site 2 – Control Area – The crossroads at Oxford Street and Whitworth Street

Safe crossing duration (green man illuminated)/ secs	secs
Interval between safe crossings / secs	secs

Number of safe crossings/ when green man illuminated (Tally)	Number of dangerous crossings/ when green man is not illuminated (Tally)
	

Overall No. crossings:

No. safe crossings:

No. dangerous crossings:

VZYC Ethical Review Procedure

for Research, Teaching, and Learning

Research Information Sheet

We are currently conducting a study as part of a research project. It is important to understand why the research is being conducted and what the project will involve in terms of ethics and moralities. Please read the following information with due care and attention and discuss it with our present members if you wish to do so. Please ensure to ask about any vague or misleading information and discuss those topics with our research team.

Thank you for reading this.

Who will conduct the research?

Our Ethics and Research Team are in charge of conducting our research. The people involved are as follows:

- Alexandra Hughes
- James Brown
- Richard Walmsley
- Jacob Proffitt

Title of the Research

Deansgate Crossroads Study: Effectiveness of Pedestrian Countdown Signals

What is the aim of the research?

The various crossroads along Deansgate are well known for dangerous crossing. Pedestrians in this busy city cross at dangerous times and face near misses due to untimely delays in the crossing mechanism. Our researchers have noticed a tendency for pedestrians to hesitate and ponder on whether they should risk crossing as they are running late for work. This hesitation is due to uncertainty and many will even cross late as the green man disappears.
Meanwhile, in Oxford Road at various junctions, pedestrians enjoy New York style countdown signals. Giving them the time they have left to cross. Our researchers believe this will be a great solution to stop uncertainty and dangerous crossing at the Deansgate junctions and protect pedestrians from possible road traffic injuries.

What happens to the data collected?

The data will be collected by our team in the form of a tally chart. We will be taking note of how many pedestrians cross at the crossing, and of those, which were safe crossings, and which were dangerous crossings.

Safe Crossings is defined by our team as meaning a crossing within the allocated time given by the traffic lights (green man). And a dangerous crossing is defined as being outside of that allocated time.

How is confidentiality maintained?

Since this is a quantitative, confidential study, the research team will not be required to engage with or take information from pedestrians. Therefore, there is a negligible amount of ethical risk and pedestrians will not be required to sign an ethics form. Our research team, however, will be required to be present as witnesses and contact emergency services, should an incident occur on the roads.

What is the duration of the research?

The study will be conducted in two 40-minute sessions, with one session at the 'danger area' at the Deansgate crossroads, and another at the control area at the crossroads at Oxford Street and Whitworth Street, where PCS are present. *PCS being the Pedestrian Countdown System.*

Where will the research be conducted?

Manchester City Centre. At the Deansgate Crossroads and the Crossroads at Oxford and Whitworth Street.

Will the outcomes of the research be published?

The outcomes and discussions from the research will be published in a paper affiliated with VZYC Manchester and will be available for public access on the VZYC Manchester website.

Contact for further information:

vzyc.uk@gmail.com