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Predictors of the frequency and subjective experience of cycling near misses: Findings from the first two years of the UK Near Miss Project

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ABSTRACT

Using 2014 and 2015 data from the UK Near Miss Project, this paper examines the stability of self-report incident rates for cycling near misses across these two years. It further examines the stability of the individual-level predictors of experiencing a near miss, including what influences the scariness of an incident. The paper uses three questions asked for only in 2015, which allow further exploration of factors shaping near miss rates and impacts of incidents. Firstly, a respondent's level of cycling experience; secondly, whether an incident was perceived as deliberate; and finally, whether the respondent themselves described the incident as a 'near miss' (as opposed to only a frightening and/or annoying non-injury incident).

Using this data, we find a decline of almost a third in incident rates in 2015 compared to 2014, which we believe is likely to be largely an artefact due to differences in reporting rates. This suggests caution about interpreting small fluctuations in subjectively reported near miss rates. However, in both years near miss rates are many times more frequent than injury collisions. In both years of data collection our findings are very similar in terms of the patterning of incident types, and how frightening different incident categories are, which increases confidence in these findings. We find that new cyclists experience very high incident rates compared to other cyclists, and test a conceptual model explaining how perceived deliberateness, near-miss status, and scariness are connected. For example, incidents that are perceived to be deliberate are more likely to be experienced as very frightening, independent of their 'near miss' status.

1. Background

Successfully promoting cycling would bring considerable benefits for population health, greenhouse gas emissions, urban air pollution and congestion (Cabinet Office 2009; Maizlish et al., 2013; Woodcock et al., 2013, 2014). Cycling participation remains low, however, in the UK and many other high-income countries relative to its potential (Lovelace et al., 2016; TfL, 2010). Although multiple factors may act as barriers to cycling, the most common reason that people give for not cycling is perceived risk (Lawson et al., 2013; Horton 2007; Thornton et al., 2010). These concerns may partly reflect media over-reporting of road traffic crashes involving cyclists relative to users of other modes (Macmillan et al., 2016), but may also reflect the impact of seeing or experiencing a cycling road injury or 'near miss'.

The latter has traditionally received little research or policy attention, but this has begun to change. Sanders (2015) showed that because of the high frequency of near misses, they have stronger impact on cycling experiences, and potentially withdrawal from cycling, than do injury incidents. New mapping tools such as Collideoscope or bikemaps.org, alongside existing reporting systems run directly by police or transport authorities, have allowed people to report such incidents in real time. There is a growing recognition that non-injury incidents may form a missing link between the relatively low 'objectively measured' injury rate (even in low-cycling contexts) and the high levels of 'fear of cycling' (Aldred et al., 2016).

In the UK, near misses have started to become incorporated within policing and planning policy. For example, in October 2016 West Midlands Police began a work stream focusing on close passes, using an undercover officer to catch and educate drivers who give cyclists little room. This is justified on grounds both of safety and perceived safety. The scheme aims to educate drivers about safe passing distances and create a belief that any cyclist might be an undercover police officer. At the time of writing, 15 other UK police services are planning to introduce such a scheme; while others are introducing or stepping up recording of near miss or dangerous driving incidents (e.g. RoadSafe London).[1]

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[1] http://content.met.police.uk/Site/roadsafelondon.

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Within this growing field methods vary, and different methods lend themselves to different types of analysis. One methodological consideration is the duration of time during which participant cyclists are asked to record near misses. Real-time reporting systems recruit cyclists to report near misses for weeks or months at a time which, given the high rate of minor incidents, is likely to be onerous even for self-selecting, committed respondents.[2] Such systems may therefore only capture a minority of near-misses, perhaps the most serious incidents. This may still be useful in recording incidents of greatest concern for policy, but for assessing rates of all types of incident it may be necessary to conduct studies that use a much shorter time period such as a single day.

Definitions of 'near misses' also vary, with some highly subjective and others more objective. As with any research there is a trade-off between capturing individual experience and creating a generalizable measure of that experience. An 'objective' definition of near misses is attractive as in theory it can be independently verified. Much 'near miss' research has hence focused on close passes as these can, with on-bike equipment, be measured (e.g. Walker et al., 2014; Walker, 2007). Another definition is based on an approach often taken for studying near misses between motorised vehicles, and relates to the taking of evasive action. For example, Matsui et al. (2015) state:

> 'A near-miss incident is a situation that a car accident involving a cyclist is avoided by the attention and braking of a driver.'

Similarly, Girotto et al. (2016) defined a 'near-miss accident as the performance of an evasive manoeuver **by the driver** [our emphasis] to avoid a vehicle accident'.

By contrast, in many Near Miss Project incidents, cyclists said that they had prevented incidents by modifying their *own* behaviour. More broadly, definitions that rely on evasive action being taken (by any party: driver, pedestrian or cyclist) will not capture incidents such as close passes where neither party in fact swerved, but the experience might still have been unpleasant and intimidating.

However, a subjective definition of near misses raises the question as to whether these experiences can be generalised and reliably counted. Subjectively reported rates may differ sharply depending on how and in what order questions are asked, and how long a recall period the question covered. Sanders (2015) left the time period entirely open, Girotto et al. (2016) used a twelve-month period, while Fyhri et al. (2016) asked about a specific trip. Different survey methods might imply that a near-miss is a collision only just avoided, or that a near-miss covers a wide range of incident categories. Again, survey design should take account of this depending upon what the research seeks to capture.

One way of assessing the reliability of subjective reporting is to compare rates obtained through objective and subjective measurements, although this may only be possible for some types of near miss, and will depend on the definitions used. For example, Joshi et al. (2001) wanted to capture all incidents that caused fear or annoyance to respondents and it is hard to see how this could be directly verified by independent observation. By contrast, verifying rates of close passes is feasible, and this was done in Aldred (2016) which found rates of subjective and objective reporting roughly comparable in the UK context for that specific 'near-miss' incident type.

St Aubin et al. (2015) used automation to identify and analyse near-miss events at a roundabout, identifying evasive action taken and how soon this happened before a collision would have occurred ('time-to-event'). While a highly promising approach this currently would not capture many categories of cyclist-defined incident. Rapid development of such techniques will make it easier to objectively measure some types of non-injury incident, but we should remember that subjectively defined incidents may be important, and measurable, even if they will not easily map to something that can be (at present) objectively measured.

However, clearly it is important to ensure that where experiences are being subjectively measured, these do have some consistency and validity. Using 2014 and 2015 data from the UK Near Miss Project, this paper therefore aims to examine the consistency of incident rates for cycling near misses across these two years. It further examines the consistency of the individual-level predictors of experiencing a near miss, including what influences the scariness of an incident. This builds upon our previous work that only analysed data from the first, 2014, period of data collection (Aldred, 2016; Aldred and Crosweller, 2015).

In addition, in 2015 the Near Miss Project asked for the first time about cycling experience. This additional question was included because in 2014 we had found that incident rates declined weakly with age (Aldred, 2016; Aldred and Crosweller, 2015), a finding that might be explained by age acting as a proxy for cycling experience. Our second aim here is therefore to examine whether the incident rate is associated with how much cycling experience participant has, with a particular focus on new cyclists.

Finally, the 2015 Near Miss Project also asked participants for the first time whether they would self-define a non-injury incident as a 'near miss'. We used this to address our third aim, which was to examine what individual and incident characteristics predict perceptions of whether an incident is deliberate, whether it is a near miss, and whether it is very scary.

2. Methods

2.1. Participants

In 2014 and then again in 2015, the Near Miss project recruited a convenience sample of people who cycle. Channels for recruitment included organisational mailing lists, cycling organisations, leafleting (in the first year), traditional and social media dissemination, and re-contacting previous survey participants. Participants were informed that the study focused on cycling near misses and that it should take around 15–20 min to complete. Ethical approval for the study was granted by Westminster University.

The recruitment method could introduce bias, if people more prone to near misses sign up. However, given only 2% of trips are by cycle, using more traditional methods to recruit a national sample of cyclists would be difficult and expensive. The study sought to ensure different types of cyclist were represented by using a range of recruitment channels and messages.

Out of an initial sample of 2668 completed diaries, we removed 66 reporting many incidents (> 10) as (i) detailed information was only asked about the first 10 incidents experienced and (ii) people reporting more than 10 incidents could be seen as potential outliers, with unusually high rates of/awareness of non-injury incidents. We further excluded 16 diaries because the same individual had completed two diaries in the same year; in this case we only used the first diary that they completed in that year. This left a final sample of 2586 diaries, 1525 completed in 2014 and 1061 in 2015. 398 participants completed diaries in both 2014 and 2015.

In addition to describing their incidents, participants provided us with some information on individual characteristics. This included their gender, their age, and (in 2015 only) responses to the question "Please tell us how long you have been cycling for, in years". Participants also told us their home postcode, which we used to assign the prevalence of commuter cycling in the participant's local authority, using data from the 2011 Census. We have previously shown that this measure of commuter cycling in the Census is highly correlated, at the population level, with the total amount of cycling in an area (Goodman, 2013).

[2] There is also an issue of self-selection which affects much of this research; in very low-cycling contexts this problem cannot easily be avoided, although it can perhaps be minimised.