IATSS Research 37 (2013) 30–38

Contents lists available at SciVerse ScienceDirect

IATSS Research

Drivers' perceptions regarding speeding and driving on urban residential streets with a 30 km/h speed limit

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ARTICLE INFO

Article history:
Received 3 July 2012
Received in revised form 6 December 2012
Accepted 11 December 2012

Keywords:
Speeding perception
Driving perception
Residential street
30 km/h speed limit

ABSTRACT

Previous studies have shown very little information regarding drivers' opinions, attitudes and behaviours with respect to speeding and driving on urban residential streets with a 30 km/h speed limit. The present research aims to address this issue by conducting a questionnaire study with a sample of 367 Japanese drivers. The results showed that drivers tended to have positive beliefs about complying with the 30 km/h speed limit and understand the negative consequences of speeding; however, a majority of the drivers considered breaking the speed limit as a way to reduce their travel time. While the extent of speeding was found to be very serious, a number of drivers still supported the use of a 30 km/h speed limit on residential streets and favoured protecting the right of vulnerable street users. The logistic regression models developed in this study identified that the drivers who did not support the 30 km/h speed limit were associated with those who had committed traffic-law violations, who had negative beliefs about complying with the speed limit, who did not consider residents' opinions, who believed it is acceptable for them to drive at a high speed, and who felt it difficult to refrain from speeding. With regard to anti-speeding countermeasures, under drivers' point of view, streets should be designed to make the 30 km/h speed limit more credible, although this study also showed evidence supporting the application of public awareness programmes and social campaigns as speeding interventions. In addition, this research investigated drivers' speed choices in various specific driving circumstances, and six underlying factors affecting drivers' speed choices were determined. On the basic of the findings, the implications and suggestions for speeding interventions were also discussed.

1. Introduction

A speed limit of 30 km/h has been introduced in many countries such as Japan to ensure traffic safety and allow urban residential streets to fulfil other intended functions. Abundant evidence in previous studies has demonstrated the safety benefits to be gained from the application of this speed limit. For example, OECD/ECMT in 2006 [1] reported that 90% of pedestrians hit by a car travelling at 30 km/h survived; whereas only 20% of pedestrians hit by a car travelling at 50 km/h survived. Similarly, in a study by Rosén and Sander in 2009 [2], the pedestrian fatality risk at 50 km/h was more than twice as high as the risk at 40 km/h and more than five times the risk at 30 km/h. Other studies found significant reductions in accident frequency and severity on neighbourhood streets after 30 km/h speed limits were implemented [3,4].

Despite the many benefits, the application of the 30 km/h speed limit on urban residential streets is unlikely to be well understood by all drivers. In fact, excessive speeds on these roads are very common. OECD/ECMT in 2006 [1] reported that 77% of drivers in Austria exceeded the 30 km/h speed limit compared to 51% speeding on 50 km/h urban streets and 18% speeding on 100 km/h roads. Similarly, a survey in Japan showed that only a few people drove at or below the 30 km/h speed limit and nearly half of the speed-recorded vehicles ran at speeds of 40 km/h or more on streets with a 30 km/h speed limit [5].

Drivers seem to not find it easy to drive at low speeds. In a survey by Stradling et al. in 2003 [6], most drivers agreed that it is difficult to manoeuvre modern cars at speeds below 56 km/h (35 mph). It is also conceivable that driving on residential streets with a 30 km/h speed limit differs in some circumstances from driving on streets with higher speed limits. In addition to the primary function of providing access to adjacent buildings and land-lots for all street users, many residents' daily-life activities occur on these residential streets, unlike other urban streets. In Japan, pedestrians and cyclists often have to share the roadways of these residential streets with motorised vehicles, putting them at high risks for accidents. In these situations,

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Peer review under responsibility of International Association of Traffic and Safety Sciences.

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http://dx.doi.org/10.1016/j.iatssr.2012.12.001

drivers are forced to give priority to vulnerable street users anywhere they are encountered. Given such special driving conditions, differences between drivers' perceptions regarding speeding and driving on residential streets with a 30 km/h speed limit and those on other types of streets are expected.

To cope with speeding issues in urban neighbourhoods as well as making the 30 km/h speed limit more credible to drivers, it is necessary to discover drivers' perceptions regarding speeding and driving on urban residential streets with a 30 km/h speed limit. To date, a number of studies have been conducted to explore drivers' opinions, attitudes, and behaviours with respect to speeding and driving-related matters. However, all previous studies targeted driving on general roads or general urban streets; there has been very little information published specifically about speeding and driving on 30 km/h residential streets. This lack of this knowledge is an obstacle in forming effective policies for introducing this speed limit as a means for dealing with local traffic safety issues.

2. Literature review

Previous research suggested that not all drivers were able to correctly recognise the speed limit of a given road, which may have therefore led to unintentional speeding. Stradling et al. in 2003 [6] showed that the rate of Scottish drivers who could exactly state the speed limit of a given road from photographs ranged from 49% to 88% because of different driving situations. In another study by Lahausse et al. in 2010 [7], only 8% of the respondents correctly identified the current speed limits on all of the four study roads from pictures of the roads. From this finding, the researchers suggested that the public's knowledge about speed limits and their purposes could be improved to gain more desirable driving behaviours.

A number of previous studies showed that drivers often speed across entire road network. For example, OECD/ECMT in 2006 [1] reported that more than half of European drivers exceeded the posted speed limit, although the extent of speeding varied with country and road type. A survey in USA similarly indicated that only approximately 5% of drivers travelled at the 88 km/h (55 mph) speed limit on interstate highway segments and that 23% of drivers travelled at or below the posted speed limit on non-freeway roads [8].

There was evidence that drivers tended to overestimate the speed of other drivers. Walton and Bathhurst in 1998 [9] found that more than 85% of drivers claimed their driving speed was lower than that of other drivers on average. In a study by Åberg et al. in 1997 [10], respondents stated that more than 50% of other people drove faster than 60 km/h on 50 km/h roads while the corresponding observed figures ranged between 16% and 25%. In that same study, drivers on average estimated the other drivers' speeds to be 8–10 km/h higher than their actual speeds. As noted by Haglund and Åberg in 2000 [11], because the perceived behaviour of others significantly influenced an individual's speeding behaviour, inaccurate estimation about others' speeds likely contributed to an individual's own speeding violations.

Previous research has shown evidence about the effect of social norms regarding vulnerable road users on drivers' speed choices. As illustrated by Wallén Warner and Åberg in 2008 [12], social pressure from "people along the streets (i.e., pedestrians, cyclists, and residents)" was the only significant predictor of both a direct measure of a subjective norm and intention to exceed the speed limit in an urban street environment.

Prior studies have made efforts to discover drivers' speeding motivations. In a study by EKOS Research Associates in 2005 [13], the most important reason used by drivers to justify their excessive speeds was "do not want to be late" (stated by 57% of respondents), followed by beliefs that "speed limits are set too low" (51%) and "they are not paying attention to (the) speed at which they are driving" (51%). Although only 20% of drivers considered "enjoying the feeling of driving fast" as a reason for speeding, both the qualitative results and the regression analysis in the same study indicated that this factor was linked to the more extreme instances of speeding. Another study by Kanellaidis et al. in 1995 [14] found that "do not consider the speed limit signs as reliable" was the primary reason for speeding violations. The study also showed that, in general, drivers who believed that complying with speed limits could reduce accidents were much more likely to observe speed regulations.

Drivers' speeding has been studied by a number of researchers by using the framework of the Theory of Planned Behaviour. For example, Wallén Warner and Åberg in 2008 [12] found that the intention to exceed the speed limits in both urban and rural environments can be predicted with reasonable accuracy by drivers' attitudes, subjective norms, and perceived behavioural control.

The negative consequences of speeding have been perceived by some drivers. The survey by EKOS Research Associates in 2005 [13] found that 54% of respondents indicated a higher collision risk as a disadvantage of speeding, while 35% identified a risk of a ticket, and 31% indicated a high risk of injury from a collision.

Stradling in 2007 [15] suggested that drivers' speed choices resulted from the interactions of opportunities, obligations and inclinations. In that study, drivers were asked to indicate whether they would drive slower, the same, or faster than their normal speeds in various driving situations. The results from a principle component analysis identified three underlying factors affecting drivers' speed choices, namely adverse driving conditions, responsibilities to others, and arousal. In a study by Gabany et al. in 1997 [16], a perceptual inventory was developed to examine the factors that predispose, enable, and reinforce drivers' speeding behaviours. As a result, five predisposing, enabling and reinforcing constructs were identified to represent drivers' perceptions and attitudes toward speeding, including ego gratification; risk-taking; time pressures; disdain of driving; and inattention.

There have also been studies that looked at drivers' perceptions about speeding countermeasures. In a study by Stradling et al. in 2003 [6], most drivers stated that physical barriers were effective at making them reduce their speeds. In addition, other measures such as electronic road signs indicating speeding behaviour (e.g., automatic speed cameras), increased police enforcement, in-vehicle driver information systems, black box collision reporting of speeding, and publicity and information campaigns were also considered by drivers to be good ideas for addressing speeding issues [9]. Other studies [17,18] demonstrated significant reductions in average speeds and the number of drivers exceeding the speed limit after the introduction of an increased level of traffic-law enforcement.

Although speeding is very common, many drivers seem to agree with the current speed limits. A survey by NHTSA in 2003 [19] showed that, while approximately 75% of drivers in America admitted to speeding on all road types, the existing speed limits were still considered to be appropriate by most people, ranging from 61% for multi-lane interstate highways to 83% for city, town and neighbourhood roads. Similarly, 87% of respondents in a study conducted by the Ministry of Transport in 2007 [20] in New Zealand said that the speed limits on the roads they normally drove on were about right. In the study, only 8% of people favoured raising the speed limit for 50 km/h urban roads, while the corresponding figure for rural roads with a 100 km/h speed limit was 17%. However, support for lowering speed limits is often lower than support for current speed limits, depending on the specific context. Lahausse et al. in 2010 [7] found that, while a significant number of drivers favoured proposed lower speed limits on 100 km/h two-lane undivided rural roads and rural gravel roads, speed limit reductions in urban areas were only supported by approximately one-third of surveyed drivers. Only 3% of respondents in a study by the Australian Transport Safety Bureau in 2005 [21] were in favour of reduced speed limits because they thought that the current 50 km/h speed limit on residential streets was too high.

Several demographic and driving factors have been found to influence speeding behaviour. The groups of people who are most likely