Using Smartphones for Cycling Safety: a Survey of Riders Preferences and Interest in New Technologies

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Abstract

Cyclists are among the most vulnerable road users. Many recent interventions have aimed at improving their safety on the road, such as the minimum overtaking distance rule introduced in Queensland in 2014. Smartphones offer excellent opportunities for technical intervention for road safety at a limited cost. Indeed, they have a lot of available processing power and many embedded sensors that allow analysing a rider's (or driver's) motion, behaviour, and environment; this is especially relevant for cyclists, as they do not have the space or power allowance that can be found in most motor vehicles. The aim of the study presented in this paper is to assess cyclists' support for a range of new smartphone-based safety technologies. The preliminary results for an online survey with cyclists recruited from Bicycle Queensland and Triathlon Queensland, with $N = 191$, are presented. A number of innovative safety systems such as automatic logging of incidents without injuries, reporting of dangerous area via a website/app, automatic notification of emergency services in case of crash or fall, and advanced navigation apps were assessed. A significant part of the survey is dedicated to GoSafeCycle, a cooperative collision prevention app based on motion tracking and Wi-Fi communications developed at CARRS-Q. Results show a marked preference toward automatic detection and notification of emergencies (62-70% positive assessment) and GoSafeCycle (61.7% positive assessment), as well as reporting apps (59.1% positive assessment). Such findings are important in the context of current promotion of active transports and highlight the need for further development of system supported by the general public.

Introduction

Cyclists are among the most vulnerable road users, representing 1 in 40 road crash fatalities and 1 in 7 serious injuries (Garrard, Greaves, & Ellison, 2010). Collision with motor vehicles is the leading cause of fatality and severe injuries in cyclists, which can be explained 60% of the time by a lack of awareness from either the cyclist or driver about each other (Australian Transport Safety Bureau, 2006). While the majority of incidents require the cyclist to take evasive action, the driver is responsible for the majority of events (87%) (Johnson, Charlton, Oxley, & Newstead, 2010). The developments of Advanced Driving Assistance Systems (ADAS) in recent decades have mostly focused on improving drivers' perception of their environment or on palliating their lack of reaction to critical events. As a result, such ADAS should improve cycling safety as a corollary effect, given the responsibility of drivers in collisions with cyclists. For example, heavy trucks blind spots present a significant danger for two-wheelers (Niewoehner & Berg, 2005); several research efforts are attempting to reduce this danger (Ahrholdt, Grubb, & Agardt, 2010; Aycard et al., 2011).

However, it has been claimed that car-centric technological advances have not improved cycling safety (Garrard, et al., 2010). Some empirical research has led support to this claim: for example, the blind-sport information system tested as part of EuroFOT showed no significant improvement of safety (Benmimoun, Pütz, Zlocki, & Eckstein, 2013; Malta et al., 2012).

As result, one may argue that technological intervention centred on cyclists, or equally involving cyclists and motorists, may better benefits riders' safety (Andreone & Wanielik, 2007). Cycling near an intersection can increase crash risk as much as twelve times if vision is impaired by buildings or vegetation (Dozza & Werneke, 2014); a system such as proposed in Thielen, Lorenz, Hannibal, Koster, and Plättner (2012) uses technology to help reduce this risk to a more acceptable level via direct cooperation between motorists and cyclists.

The ubiquitous nature of smartphones in advanced economies such as Australia—8.7 million users in 2012 (ACMA, 2013)—means that such devices are excellent candidates to extend ADAS-like technological intervention to cyclists (Du et al., 2012; Picone, Amoretti, & Zanichelli, 2012; Voigtmann, Lau, & David, 2012). The main proposed approach is to use smartphones' sensors (GPS, accelerometers) and communication capabilities (e.g. Wi-Fi) to share position and velocity data between vehicles and cyclists, allowing to predict crashes (Liebner, Klanner, & Stiller, 2013; Thielen, et al., 2012). Another approach is the detection of incidents and crashes, a form of eCall for cyclists (Candefjord et al., 2014). Additionally, smartphone-based cycling safety applications could also be used to collecte cycling naturalistic data (Dozza & Werneke, 2014), providing further indirect benefits. However, such claims should be mitigated by the risks of increased distraction using mobile devices (de Waard, Schepers, Ormel, & Brookhuis, 2010; Ichikawa & Nakahara, 2008; Stelling-Kończak, Hagenzieker, & Wee, 2015).

The goal of this study is to assess riders' interest and support for smartphone-based systems aimed at cycling safety, and to capture their willingness to use these systems and their trustworthiness. In this paper, the preliminary, principally qualitative, results of the study are presented. An online survey was conducted during the first semester of 2015, with 191 respondents recruited among the membership of cycling organisations Bicycle Queensland and Triathlon Queensland (more detailed results will be presented in a future paper).

This study can be used to evaluate the public support and demand for cycling safety technologies, as well as orient resources toward desirable technologies. Its results, and subsequent technologies development, could also have applications outside of road safety itself, as the perception of cycling as a highly risky activity is known to decrease participation (Goldsmith, 1992; Griffin & Haworth, 2015; Heesch, Sahlqvist, & Garrard, 2012). However, it should be noted that riders' perception of the improved safety provided by cycling technology may not match the actual safety benefits offered by such applications.

Method

The survey aims to capture data on both riders' current smartphone usage for cycling (e.g. for navigation) and their willingness to extend this usage to more advanced safety-orientated functions. The survey was designed online using the KeySurvey software, and consists of 80 items divided in three main parts. The survey was approved by the Queensland University of Technology Research Ethics unit under number 1400000769. A general overview of the questionnaire is given in this section; more details are laid out for each specific question addressed in the results section.

The first part consists of items specifically geared at assessing the sample exposure to (1) riding, and (2) smartphone usage in relation to riding. The questions pertaining to cycling exposure are taken from the European COST Action TU1101 survey (Bogerd et al., 2012). Some questions also assess the participants' perceived safety while riding. This part covers 50 items, not all common to all respondents: for example, respondents that used smartphones would be asked which general category of applications they use, then which specific apps in those categories (both with prompted answers and free text "others" answers). The last item in this first part asks participants about their interest (on a 7-point Likert scale) for 8 new technologies for cycling safety. Participants cannot skip this section, but can skip individual questions within it (information about skipping rate is given in the results section where relevant)

The second part, containing 19 items, is specifically focused on GoSafeCycle. GoSafeCycle is a smartphone application currently under development at CARRS-Q that aims at providing a fully decentralised safety network for cyclists and drivers through a form of peer-to-peer cooperation. Thielen, et al. (2012) have proposed a similar application, but it depends on dedicated ITS communication infrastructure, and particularly on motor vehicle-centric communication technologies that are believed to be available to consumers within 10 to 20 years only (Hammer, 2014). GoSafeCycle solves this problem by offering a fully decentralised approach where the smartphone is the only required piece of equipment. Riders and drivers run the app on their smartphone while using their vehicle and the app automatically forms a wireless ad-hoc network (Hartenstein & Laberteaux, 2009) using a derivative of Wi-Fi technology called Wi-Fi Direct (Camps-Mur, Garcia-Saavedra, & Serrano, 2013; Satish, 2014). The questions probe the respondents' interest in the app, and how trustworthy they believe it would be. A number of items also concern different preferences regarding how to parameter the app, what information it should display, and more importantly the feedback mechanism preferred in case of danger. Participants are allowed to skip this section entirely.

The third part, also made of 19 items, focuses on other advanced cycling technologies that could be developed in the future (including automatic detection of crashes or falls, blind-sport warning, and incident/road defect logging). The first item is similar to the last item of the first part, probing interest on a 7-point Likert scale in those new technologies, however the list differs slightly to focus on functionalities that have a shorter deployment timescale and could be developed entirely on smartphones. Participants are asked to rate their trust into a fall detection app that can automatically notify their families, and how using this app would influence their perceived riding safety. A few questions investigate applications to report incidents or road defects, and how likely the respondents would be to use them to send information to the appropriate stakeholders. Finally, this part concludes with a question on cycling-focused navigation apps (aimed at the Bikeway app, http://www.strc.com.au/research-portfolio-2/projects/ developed by QUT's STRC). Participants cannot skip this section.

Participants were recruited through outreaches in the publications and social media accounts operated by Triathlon Queensland and Bicycle Queensland. The present paper is based on the results collected as of May 1st, 2015, with a total of 191 participants: the confidence interval obtained for this sample size is $CI = 1/\sqrt{191} = 7.2\%$. No specific requirement was placed on the participants; it is likely to be biased toward experienced and engaged cyclists as a result of the recruitment method.

The sample is largely male (78%), aged 20-76 ($M = 47.14, SD = 11.01$). 76 (40%) have children under the age of 18. 187 participants indicated living in Queensland. 183 (96%) participants said they owned at least one smartphone; 91 (50%) have Apple handsets, 82 (45%) had Android-based handsets (brands such as HTC, Samsung, or Sony Ericsson). All participants own at least bicycle, and all have a current light vehicle driving licence. A third of the sample (85 respondents) also has a motorcycle driving licence. Respondents were relatively experienced drivers, having held on average their licence for 28.7 years ($SD = 11.57$); the oldest license was 58 years old. There was no requirement that the participants be 18 years of age at least, but no underage person took part in the survey.

Results

Participants cycling exposure

In the first part of the questionnaire, participants were asked about their cycling habits. Table 1 presents the results for the most commonly ridden type of bicycle, and the frequency of riding (190 respondents, 1 skipped). The most common bicycle type is road, and more than 60% of the respondents rode a few times a week on average, but not daily. 87% of the participants with minor children indicated that their children ride bicycles.

A very important part of this first section for our study relates to the perception of safe riding. As shown in Table 2 (5-point Likert scale with 176 respondents, 15 skipped), a majority feel moderately safe (48%) or safe (13%) while riding, overall. In a follow-up question, respondents were asked what made them feel unsafe (a list of answers was presented, with a free-text “other” option, and multiple answers possible): motorist behaviour was flagged by 95%. Table 4 (174 respondents, 17 skipped, multiple answers possible) shows the result for the next question assessing which motorists’ behaviour were unsafe, or perceived as such; most common reported are passing too closely, cutting the rider off, and entering an intersection without looking

Table 1. Bicycle use and riding frequency

Most commonly ridden bicycle	**Number of respondents**	**Percentage of respondents**	**Frequency of riding (over the last 12 months, null answers removed)**		
			Daily	A few times a week	A few times a month
Road	142	74.7%	23.2%	65.5%	11.3%
City/hybrid	21	11.1%	47.6%	38.1%	14.3%
Mountain	16	8.4%	12.5%	75.0%	12.5%
Electric	3	1.6%	66.6%	33.3%	0.0%
City-sharing scheme	0	0.0%	N/A	N/A	N/A
Other	8	4.2%	50.0%	50.0%	0.0%

Table 2. Perception of cycling safety

Overall safety rating while riding	**Response percent**
Moderately safe	48.3%
Moderately unsafe	19.9%
Neutral	17.1%
Safe	12.5%
Unsafe	2.3%

Table 3. Unsafe behaviours from motorists (or vehicle occupants)

Motorist and vehicle occupants behaviours that made riders feel unsafe (prompted answers)	**Response percent**
Passing too closely	92.5%
Cutting the rider off	73.0%
Entering an intersection without looking	64.9%
Opening a door without checking	54.6%
Nearly hitting the rider	54.0%
Honking at the rider	41.4%
Driving too fast	37.9%
The mere presence of vehicles made the rider feel unsafe	4.0%

Other	16.1%

Usage of cycling technologies and smartphones

Just over half of respondents (51%) said they were not using their phone while riding (8 skipped the question). Respondents indicated they usually have their phone in a pocket (68%) and/or in a bag (36%), only 6% said they had their phone mounted on the handlebar. The most widespread use of smartphones was for recording information related to travel and fitness (40%), using apps such as Strava (54 respondents), MapMyRide (17 respondents), or Garmin Fit (15 respondents). 16% use their phone for navigation, using predominantly Google and Apple Maps (24 and 6 respondents respectively), although many different fitness apps were also reported to be used for this purpose (16 such respondents). People were generally aware that data was being collected by those apps, and almost all said they were able to review those data later on the apps or linked websites (e.g. reviewing your trips with Strava).

A majority (64%) replied "yes" to the question "*do you feel the current technologies you are using provide for all your needs*". Respondents that said no (68 people) to the latter were asked what would they like to see improved, the answers were fairly spread around: see table 4 for details.

Table 4. Improvements in existing technologies

What could be improved for currently existing cycling technologies (prompter answers, multiple answers possible)	Response percent
Impact on battery life	57.4%
Ease of use	36.8%
Ergonomics	33.8%
Accuracy	26.5%
Availability on more devices	26.5%
Geographic coverage	20.6%
Other	32.4%

Participants were also asked (190 respondents) what other technologies than those mandated by law (lights) and smartphones they were using; most people (73%) indicated using some other technology. The majority was a non-phone-based GPS device (57%); 22% said they were using cameras.

Interest in new cycling technologies

The first question related to interest in new cycling technologies asked participants to rate their interest in a number of proposed functions from "very low" to "very high" on a 7-point Likert scale. The functions are either infrastructure-based solutions, or mobile phone ones (the question includes a brief description of the technology if its nature is not obvious). The detailed results are shown in Figure 1.

Five applications on the 8 proposed gathered more than 50% of positive responses, from 59% to 78%. The most positively received proposed function is intelligent traffic lights, i.e. lights that can dynamically change from red to green to let cyclists pass if there is no incoming traffic at an intersection; 42% of the respondent said they were very highly interested in it, and it had a total of

78% positive interest. The second function with the most "very high" interest is collision prevention with motor vehicles, although it is only the fourth most positively received application overall.

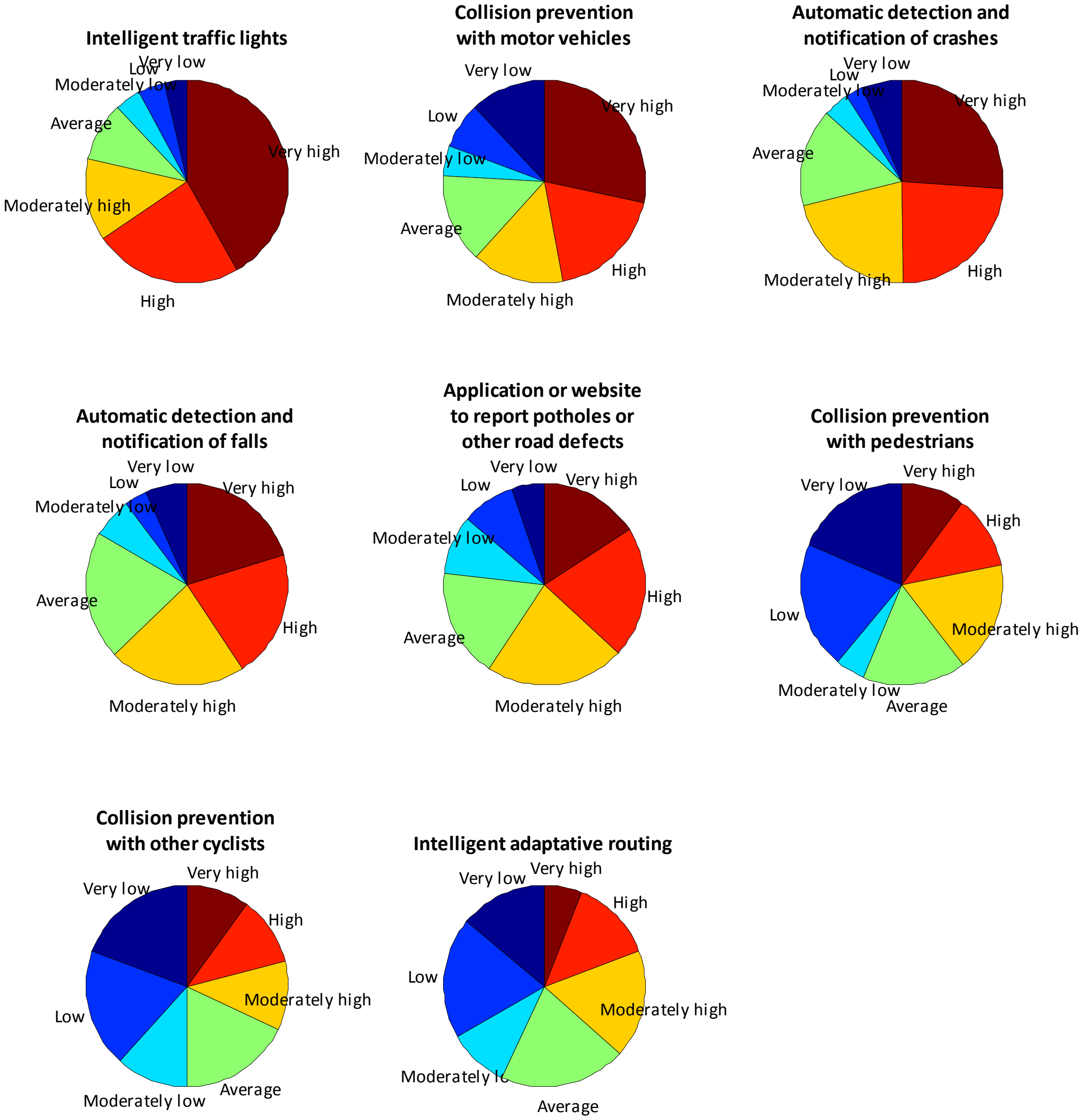

Figure 1. Interest expressed for 8 new cycling technologies

GoSafeCyle

76% of the participants accepted to answer questions about the GoSafeCycle app after they were presented with a 1-page presentation of how the app worked and what it hopes to achieve (including a screen capture of the current interface). In the rest of this subsection, percentages are given relative to those respondents (145 over the 191 total).

Table 5. Trust placed in GoSafeCycle

Trust placed in GoSafeCycle	Response percent
Average	28.3%
Low	18.6%
Very low	17.2%
Moderately low	16.6%
Moderately high	15.2%
High	3.5%

Very high	0.7%

The majority of respondents (52%) said they would have low trust in the safety function provided by GoSafeCycle; a third rated it average, and only 19% would have trusted it, see Table 5 for the 7-point Likert scale. 60 participants rated the app regarding the safety of their children: a short majority of 55% said they did not believe it would improve their children's safety.

80 respondents (55%) said they would be willing to use the app as pedestrians, when it provides no immediate benefit to them but help relay information to cyclists and motorists nearby. The majority did not believe that bundling the pedestrian version of the app with a music player would make them more likely to participate. Battery life (66%, 42 respondents) and privacy issues (41%, 26 respondents) are cited as concerns about using the pedestrian version, as well as forgetfulness (37%, 24 respondents). This question generated a lot of “other” answers (33%, 21 responses), ranging from distraction, data overload, or that the respondent was rarely walking around.

Most of the other questions concerning GoSafeCycle were aimed at gathering preferences in terms of user interface and accessible data. Table 6 summarises the results of a 5-point Likert scale rating (useless to useful) of the different possible feedbacks to warn the rider of an impending collision; for easer interpretation, they are consolidated into a 3-point scale rating (positive, neutral, and negative). Three possible types of feedback are possible: visual, sound, and haptic. Those were proposed individually, and in a variety of combinations. Respondents seem to prefer sound-based notifications, alone or in combination with any other feedback mechanism. A visual-only system was rated 65% negatively, as well as a haptic-only one. The most positively rated feedback proposal is the combination of the 3 mechanisms at once, with 70% of positive ratings. Interestingly, respondents seemed unable to decide how to rate a combination of visual and haptic feedback without sound, roughly spread a third each.

Most respondents (59%) said they would prefer their phones to be mounted on the handlebar for the app to work, although about a third also liked to be able to keep their phone in their pocket or bag and still use the app.

Table 6. Consolidated ratings for various feedback mechanisms

Proposed feedback	Positive ratings	Neutral ratings	Negative ratings
all	69.8%	16.5%	13.7%
Sound	68.6%	12.9%	18.6%
Visual and sound	67.2%	11.7%	21.2%
Sound and haptic	57.1%	20.0%	22.9%
Visual and haptic	26.1%	34.1%	39.9%
Visual	22.0%	13.5%	64.5%
Haptic	20.0%	15.7%	64.3%

A 61% majority believed that it would be preferable that the GoSafeCycle's display is only active when one interacts with the phone, rather than at all time. A shorter majority of 56% preferred the phone to be locked by the app for any potentially distraction use, providing it would not interfere with other apps being used in the background such as fitness recording apps.

In Table 7, the results for questions surrounding the information conveyed by GoSafeCycle to the riders are shown; consolidated 3-point ratings are used here too, the original questions used a 5-point Likert scale (useless to useful). The three rows highlighted in grey are safety parameters, whereas the others are information of potential convenience to the riders. It appears that displaying safety information such as the probability of collision or the Time to collision (TTC) was largely rejected, with 46-53% of negative ratings. On the other hand, displaying convenient information about the rider's trip, such as the speed and travelled distance, or integration with navigation app, were positively rated by more than 70%.

Table 7. Consolidated ratings for information to display on GoSafeCyle screen

Proposed information to display	Positive ratings	Neutral ratings	Negative ratings
Probability of collision	38.6%	14.5%	46.9%
Evasive suggestions	36.0%	16.6%	47.5%
Time to collision	32.4%	14.5%	53.1%
Current speed	76.6%	12.4%	11.0%
Travelled distance	76.6%	11.0%	12.4%
Travelled time	72.5%	14.1%	13.4%
Integration with navigation functions	70.6%	18.2%	11.2%
Nothing but safety information	11.6%	56.6%	31.8%

Respondents were 83% (121 respondents) in favour of the app's users being able to tweak the app's parameters, both for the display and the safety parameters, as long as a minimum safety level was always provided (as suggested in the question). Further details are shown in Table 8 (120 respondents, 25 skipped); same consolidated scale as in Tables 6 and 7. The most popular parameter was the risk threshold to be used by the app before triggering the alarm, basically allowing riders to set a preference level for risk-taking. Least popular parameters revolved toward the social aspect of the application, 26% having a negative opinion on the possibly to enable connection notifications, and only 52% a positive one. Other social aspects (such as being able to see if your friend use the app and are connected to you while riding) received generally neutral to slightly positive responses too.

Table 8. Consolidated ratings for proposed tweakable parameters

Proposed tweakable parameter	Positive ratings	Neutral ratings	Negative ratings
Risk threshold to trigger the alarm	80.0%	12.5%	7.5%
Information displayed on screen	76.5%	13.5%	10.1%
Amount of time before alarm	74.2%	14.2%	11.7%
Connection distance to other devices	65.3%	19.5%	15.3%
Parental tracking	60.2%	23.7%	16.1%
Connection notification	51.7%	22.5%	25.8%
Children mode (increased safety)	50.8%	30.0%	19.2%

Discussion

Firstly, it is important to note that a limitation of the current study is the nature of its sample, currently biased toward experimented cyclists from South-East Queensland; regional differences exists in the type and rate of cycling in Australia, e.g. for cycling to work (Bell, Garrard, & Swinburn, 2005). If the same survey was conducted in, for example, Melbourne, the perception on the usefulness of GoSafeCycle and related apps may vary. The same apply for more casual riders.

Several technologies had a “high” or “very high” interest rating among participants, first among them traffic light system that can allow cyclists to cross intersections if no car is present (or a related system like Traffic Eye Zurich that gives priority to cyclists at intersections: http://www.mobycon.com/page/428/traffic-eye-zurich.html). Collision prevention with motor vehicle was the second most positively received system. In this section, the focus will be on GoSafeCycle and apps for collision prevention; the other technologies proposed will be discussed in further details in another paper due to lack of space and the preliminary nature of this survey.

As expected, almost all respondents claimed that motorists’ behaviour made them feel unsafe at some point while riding. Two of the three most cited unsafe behaviours were cutting the rider off (73%) and entering intersections without looking (65%) (the other and most cited was passing too closely) A collision prevention app like GoSafeCyle or the one from Thielen, et al. (2012) would be relevant in such scenarios, especially the latter; by using it, cyclists would signal their presence to motorists approaching intersections. This was recognised by the respondents: collision prevention with motor vehicles was the second most popular application among the 8 sampled, and participants gave a positive rating 62% of the time when asked specifically about GoSafeCycle. A desire for some technological intervention appears to be present among the participants, which is also found in Cardamone, Eboli, Forciniti, and Mazzulla (2014).

However, trust in the technology’s efficiency appears to remain an issue for cyclists. Indeed, the relatively positive sentiment about the app is balanced by a majority (52%) of distrust in its efficiency among the participants, and a higher rate of very negative ratings compared to the other applications. One may argue that this lack of trust stems for the fear of unnecessary distraction (for both riders and motorists), which was noted in open text comments and also found by Cardamone, et al. (2014) in relation to mobile applications for road safety. Stelling-Kończak, et al. (2015) found that self-reported cycling risk and performance were negatively influenced by mobile phone usage while riding (including by listening to music); many other studies point out the distracting effect of mobile phone usage on cyclists (de Waard, et al., 2010; Ichikawa & Nakahara, 2008). Fear of distraction during critical events may explain why non-critical information (e.g. speed) displayed on the app’s screen were generally received positively, but not critical information (e.g. the time to collision).

An important outcome of this survey is that half of the participants reported currently not using their phone while riding and two-third of those using it believe that the current technologies already provide for all their needs. This result limits the scope of users for GoSafeCycle and related apps, at least in term of the reported usage of smartphones and the potential intention to use them. However, there is no obvious rejection of cycling technology since 73% of participants use some form of it, mostly non-phone GPS devices or cameras. This means that if trust in GoSafeCycle (or similar apps) could be improved, there is no fundamental issue with having riders adopt it in greater numbers.

Acceptability and improving trust in a collision prevention app is thus likely to improve its market penetration and, as a result, cycling safety. According to a variation of the Technology Acceptance Model developed by Kaasinen (2005), four factor will influence acceptability of mobile applications, and thus penetration: perceived value, perceived ease of use, trust, and perceived ease of adoption. Another model (Koivumaki, Ristola, & Kesti, 2006) cites usefulness, user guidance and support, and user skills.

One current limitation to the perceived value, as well as the high lack of trust, may be related to the fact that motorists are more to blame for cycling crashes (Johnson, et al., 2010). So one possibility to improve the app acceptability may lie in making it somewhat more car-centric, or at least provide increased functionality to counter distraction and lack of awareness of cyclists in motorists. For example, one could imagine the motorist version of GoSafeCyle would use passive functions to detect vulnerable road users via their phone's Bluetooth and Wi-Fi even if they are not actively using the app (Ruppe, Junghans, Haberjahn, & Troppenz, 2012); this would provide a crude mechanism to track the number of cyclists in certain areas (notably at intersections) and warn motorists that they need to increase their awareness—see also Castronovo, Endres, Del Fabro, Schnabel, and Müller (2011). GoSafeCyle's value for cyclists would thus be significantly improved.

Tailoring applications to the needs and preferences of users may affect the ease of use, user support, and, to some degree, the perceived value. The feedback mechanism used in emergency is one such aspect. The preference for sound feedback (and combinations of other mechanisms that feature sound) is similar to results obtained in Italy for motorists (Cardamone, et al., 2014). In that study, sound was preferred to other feedback because sound is "faster and safer", and visual feedback would be a source of distraction; research has shown (Scott & Gray, 2008) that sound feedback is better than visual one, but not as good as tactile (haptic), for safety critical information. However, Stelling-Kończak, et al. (2015) and De Waard, Edlinger, and Brookhuis (2011) note that auditory distraction is also possible for cyclists in relation to mobile phone usage, so the app's feedback needs to be carefully controlled.

Another finding was that that risk threshold triggering a collision alarm was the most popular tweakable parameter proposed, allowing riders to set a preference level for risk-taking, or alternatively reduce the likelihood of nuisance in case of recurrent alarms. Alarm timing was found to be a contributing factor to driver trust in a collision-warning application by Abe and Richardson (2006); this can likely be extended to cyclists. Furthermore, only a small proportion of emergencies detected by the system may result in actual emergencies (Parasuraman, Hancock, & Olofinboba, 1997). The popularity of the aforementioned parameter may stem from an underlying understanding of this issue. Finally, only 32% thought the Time to Collision (TTC) was useful information to display on the app's screen. This is in contrast to the usage of TTC as fundamental information in most car-centric ADAS (Vogel, 2003); the reasons for this lukewarm rating should be investigated.

Conclusion

The results of this preliminary study show that cyclists are generally in favour of smartphone-based application aimed at improving their safety. However, it also shows that they are not, at the moment, placing any significant trust in an app like GoSafeCycle. The reasons for that dichotomy may stem from a fear of distraction and a lack of demonstrated safety results for such apps. Riders strongly preferred to display non-safety related information on their device, and also responded positively to a system that would detect and notify crashes or solo-incidents. In a future paper, more extensive results will be presented and discussed, notably regarding the other new functionalities (e.g. automatic incident reporting) that were investigated in the online survey's last part. The sample size will be over 200 respondents, following a second recruiting campaign via the mainstream media.

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