Determinants of Personal Protective Equipment (PPE) use in UK motorcyclists: exploratory research applying an extended Theory of Planned Behaviour

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Abstract

Despite evident protective value of motorcycle personal protective equipment (PPE), no research has assessed considerations behind its uptake in UK riders. A cross-sectional online questionnaire design was employed, with riders (n=268) recruited from online motorcycle forums. Principal component analysis found four PPE behavioural outcomes. Theoretical factors of intentions, attitudes, injunctive and descriptive subjective norms, risk perceptions, anticipated regret, benefits and habit were also identified for further analysis. High motorcycle jacket, trousers and boots wear, middling high-visibility wear and low non-Personal Protective Equipment wear were found. Greater intentions, anticipated regret and perceived benefits were significantly associated with increased motorcycle jacket, trousers and boots wear, with habit presence and scooter use significantly associated with increased high-visibility wear. Lower intentions, anticipated regret and risk perceptions, being female, not holding a car licence and urban riding were significantly associated with increased non-PPE wear. A need for freedom of choice and mixed attitudes towards PPE use were evident in additional comments. PPE determinants in this sample provide a

preliminary basis for future uptake interventions. Larger scale and qualitative research is needed to further investigate relevant constructs.

Keywords

Personal Protective Equipment, motorcyclists, Theory of Reasoned Action, habit, anticipated regret

1.0 Introduction

Motorcyclists account for 1% of UK road users but are 57% more likely to be killed or seriously injured (KSI) than car drivers (Department for Transport (DfT), 2012; Think! 2011).

Currently, British or European Economic Area Standard approved helmets are the only mandatory protection required by UK riders (The Secretary of State for the Environment, Transport and the Regions, 1998). Although these hold well-validated protective value (Liu et al. 2008), much un-legislated but formally standardised Personal Protective Equipment (PPE) is additionally available (Think! 2010). Use of protective jackets and trousers in particular make riders significantly less likely to be admitted to hospital following a crash (De Rome et al. 2011a; Think!, 2010). Although PPE often cannot prevent major injuries in high impact crashes; it can reduce torn ligaments, broken bones and gravel rash following minor crashes (De Rome & Stanford, 2006; De Rome et al. 2004). Additionally, the use of bright and fluorescent clothing can help increase rider conspicuity: aiding crash prevention (Wells et al. 2004).

Despite the evident protective value of motorcycle PPE, there is currently a lack of research surrounding its uptake and related reasoning. The Theory of Planned Behaviour (TPB; Ajzen, 1991; Fishbein & Ajzen, 2010) has been used to predict a vast array of health behaviours (Armitage & Connor, 2001), including related motorcycle helmet use (Ali et al. 2011).

An extension of the Theory of Reasoned Action (TRA; Fishbein and Azjen, 1975; Figure 1); both theories propose the primary antecedent of behaviour to be the individual's intention to perform the action. Both models describe intentions as partly determined by attitudes (positive or negative evaluations towards the

behaviour) and subjective norms (perceived social pressure from significant others towards the behaviour). The additional TPB component of perceived behavioural control (PBC; perceived ease or difficulty of behaviour) is suggested to hold both direct and indirect influence on behavioural outcomes (Ajzen & Fishbein, 2005; Figure 2).

Significant explanatory value in TPB is frequently found by adding additional constructs (Conner & Armitage, 1998), with this evident in related research investigating drink-driving (Chan et al. 2010; Rivis et al. 2011) and speeding behaviours (Elliot, 2010; Elliot & Armitage, 2009). This study employed an extended TPB to capture maximal potential determinants of motorcycle PPE use.

Subjective norm was expanded into injunctive subjective norm (ISN; representing the original component; Ajzen, 1991) and descriptive subjective norm (DSN; perceived behaviour of significant others; Cialdini et al. 1991) to improve explanatory value (Rivis & Sheeran, 2003). PBC was expanded with self-efficacy (perceived success in achieving target behaviour; Schwarzer, 1992): found to hold double the explanatory value of PBC (Armitage & Connor, 2001). Additionally, attitude measures were expanded with typically highly-predictive benefit and barrier items (Carpenter, 2010) to fully capture PPE opinions identified during preliminary belief elicitation.

TPB is argued to hold an overly motivational-focus (Conner & Armitage, 1998). Hence, examination of habits was added here to assess the effect of past behaviour on PPE use. Describing behaviours arising as routine responses to situational cues (Verplanken & Aarts, 1999; Verplanken & Orbell, 2003), habits may exist in riders using PPE when riding regularly.

To further examine affective processes behind PPE use, anticipated regret (AR) was also used. This describes negative emotions experienced if an individual

perceives they could prevent a harmful future event (Abraham & Sheeran, 2003). AR adds around 7% of explanatory value to standard TPB factors (Sandberg & Connor, 2008) and has been successfully used to examine PPE-related speeding behaviour (Conner et al. 2007; Parker et al. 1996).

Risk perceptions of dangerous situations surrounding non-PPE use were also explored (Kobbeltvedt & Wolff, 2009). Response efficacy (RE) items prompted individuals to consider the true protective value of motorcycle PPE (Germeni et al. 2009). “Risk as feelings‟ (RAF) items prompted consideration of emotional influences on PPE behaviour (Finucane et al. 2000a; Loewentstein et al. 2001). With males as the primary population of UK riders found to demonstrate less risk aversion than females (DfT 2010; Finucane et al. 2000b), exploration of motorcyclist-specific risk perceptions seems appropriate here.

Previous TPB research has examined predictors of unlegislated motorcycle helmet use (Ali et al. 2011) and safety wear in other vulnerable activities, including cycling (Ross et al. 2010; Rutter & Vance, 2011), snow-sports (Cundy et al, 2010) and in-line skating (Deroch et al. 2009). In these contexts PPE usage is typically low, with users commonly found to possess more positive attitudes, repeated past behaviour and fewer past accidents than non-users (O‟Callaghan & Nausbaum, 2006). Selected UK research has assessed prevalence (Sexton et al. 2004) and general attitudes towards PPE (Christmas et al. 2009), both as part of wider motorcycling research commissioned by the Department for Transport. However, only limited Australian research has attempted to apply psychological theory in examining motorcycle PPE determinants (De Rome et al, 2011b). Original TPB factors of negative attitudes and low ISN, with demographic factors of lower age and scooter riding were found to determine non-PPE use (De Rome et al, 2011b). Although providing tentative evidence of perceptions in hotter climates, no previous research has examined psychological motorcycle PPE

determinants in the UK or using an extended theoretical model.

This study aimed to investigate psychological associations with UK motorcycle PPE and non-PPE use, using an extended TPB and belief elicitation. With this preliminary research seeking to explore relevant determinants; only brief, general hypotheses based on aforementioned theoretical and PPE research were formulated:

1) There will be differences in reported PPE use and perceptions between different riding demographics.

2) An extended TPB will explain significantly more PPE use than standard TPB alone.

2. Method

2.1 Design and Procedure

A cross-sectional online questionnaire was designed to investigate psychological determinants of PPE use in UK motorcyclists. Informed consent was required at questionnaire onset following study approval by a London (UK) University Ethics Committee. A filter question ensured responders met the inclusion criteria of being UK residents: with British riders being the target demographic of this research.

2.2 Participants

Participants were recruited from March to May 2012 via various UK online motorcycle forums. Standardised invitation wording and a link to the developed SurveyMonkey questionnaire website were provided (www.motorcyclesafetywear.co.uk). A range of forums were selected to appeal to as broad a range of riders as possible: including general, scooter and female sites. *A priori* G-Power analysis (Faul et al. 2007) indicated a sample of 123 was required to detect a medium effect size in a regression analysis with a maximum of 11 predictor variables and with 80% power.

A total of 413 responses were received, with 23 respondents excluded for not meeting residency inclusion criteria. Responses with no usable outcome data or missing constructs were removed. Pairwise deletion of missing cases was then used to retain maximal data (Tabachnick & Fidell, 2001). The final number of responses included in analysis was reduced to 268 (64.9% of original total; Figure 3) following typical high rates of online questionnaire attrition (Fjeldsoe et al. 2009).

2.3 Measures

Key demographics of gender, age, motorbike type and size were assessed at the study‟s outset. Additional questions were provided after theoretical questions, assessing ethnicity, local area type, educational level, owned vehicle licences, motorcycle organisation membership and accident history.

Due to the novel nature of this research, no specific questionnaire existed to assess safety wear use in this sample. As such, constructs were identified for consideration through (i) examination of the few aforementioned related studies (ii) a literature review of health psychology models (iii) preliminary belief elicitation with three UK riders (Fishbein & Ajzen, 2010). The resultant questionnaire consisted of eighty-four items measuring demographic information, use of PPE and theoretical constructs assessing its use. Constructs of the Theory of Planned Behaviour (TPB; Ajzen 1991) were extended with aforementioned additional constructs to examine determinants of PPE. All theoretical items were presented as 7-point Likert scales (Weinstein et al. 2007), with these counterbalanced throughout to prevent response order effects (Oppenheim, 2000).

Intention

Intention was assessed with seven items assessing likelihood of wearing PPE from *definitely do* to *definitely do not* in varying contexts, such as “I intend to wear full Personal Protective Equipment on a cold day‟.

Attitudes

Attitudes identified during pre-questionnaire literature review and belief elicitation (Ajzen & Fishbein, 2005) were assessed with four semantic differentials, such as “Wearing full Personal Protective Equipment whilst riding is: *unpleasant* to *pleasant”.*

Social norms

Injunctive and descriptive social norms in relation to PPE were assessed with two items respectively. Responses indicated agreement from *strongly agree* to *strongly disagree* for items such as: "Riders I most respect wear full Personal Protective Equipment".

PBC and Self-efficacy

Perceived behavioural control and self-efficacy of PPE use was assessed with three items in total, with responses indicating agreement from *strongly agree* to *strongly disagree* or *no control* to *complete control*. For example, one PBC item asked: "How much control do you have over whether or not you wear full motorcycle safety clothing whilst riding?"

Benefits

Benefits identified during pre-questionnaire belief elicitation were assessed in relation to PPE with four semantic differentials, such as "Full Personal Protective Equipment makes me feel: *warm* to *cold".*

Anticipated regret

Perceived anticipated regret of being injured as a result of not wearing PPE was assessed with three semantic differential items, such as "How would you feel if you were injured as a result of not wearing full motorcycle safety clothing?: *worried* to *calm"*.

Risk perceptions

Perceptions of risk surrounding riding were assessed with two "risk as feelings" items (Loewenstein et al. 2001), with responses indicating agreement from *strongly agree* to *strongly disagree*. For example, "Without motorcycle safety clothing, I would feel that I would have a serious accident".

Response efficacy

Perceived effectiveness of PPE at protecting against injury was assessed with two items; with responses indicating agreement from *strongly agree* to *strongly disagree*. For example: "Wearing full motorcycle safety clothing whilst riding would make me feel safer".

Self-Report Habit Index (SRHI)

The original SRHI (Verplanken & Orbell, 2003) was used in this study to measure habit strength in motorcycle Personal Protective Equipment use. The scale has been found to hold high explanatory value, accounting for 65% of travel-related behaviours (Gardner et al. 2011). Responses are indicated on a 12 item, 7 point Likert from *strongly agree* to *strongly disagree.* A cut off score of 21 was used, with higher scores indicating habit presence (Lally et al. 2010).

PPE use outcomes

The primary outcome of PPE use was measured in a similar style to related research (De Rome et al, 2011b; Sexton et al. 2004). 5 point Likert scales were used with the phrasing "When riding in (summer/winter) conditions, how often do you…?". Distinction was drawn between the two diverse seasons to capture PPE use across variant riding conditions (De Rome et al, 2011b; DfT, 2009). Following examination of existing advice publications (Think! 2010; Think! 2011), 15 items for each season were provided, ranging from protective leather one-piece suits to no safety wear.

Belief elicitation

To extend the belief elicitation attained prior to questionnaire design (Fishbein & Ajzen, 2010), participants were requested to provide additional PPE comments

following all other questions.

2.4 Data Analysis

Principal Components Analysis (PCA) was used to explore the underlying structure of all variables in this sample, using SPSS Version 19 for Windows. Direct Oblimin rotation was used to allow for inter-correlations among factors. The number of factors generated was not constrained to allow full exploration of this novel data. Pattern matrix values were used to examine unique contributions of items to factors, although structure matrix values are also reported (Graham et al. 2003). Factors with eigenvalues over 1.0 were selected (Kaiser, 1960), with only item factor loadings larger than 0.4 considered (Stevens, 1996).

Cronbach"s *a* was calculated to assess internal reliability of all identified constructs and the SRHI, with items deleted if improvements were possible (0.7-0.8: "acceptable", 0.8-0.9: "good", 0.9-1: "excellent" (Kilne, 1999)). Parametric group differences were assessed with t-tests or ANOVAs, with Mann Whitney U or Kruskal Wallis tests used if data was not normally distributed.

Multiple regressions were performed for all PPE outcome variables, with dummy coding used for categorical variables such as age and bike size (Hardy, 1993). Initial forced entry regression of all independent variables identified statistically significant coefficients. Hierarchical regression analysis was then performed, excluding statistically redundant variables (Field, 2009). Intention was added first as the primary behavioural determinant in both TPB and TRA (Ajzen, 1991), followed by significantly predictive TRA factors. Significant demographics were then added to test Hypothesis 1 and additional theoretical variables added to test Hypothesis 2. Demographics were included in multiple regression analysis as TPB and associated models typically do not mediate the effects of demographic variables (Armitage et al. 2002). Examination of residual histograms and p-plots

indicated normal distribution of regression errors (Field, 2009), with all regressions surpassing the recommended 10:1 participant-to-variable ratio (Oppenheim, 2000).

Content analysis was used to analyse additional comments. Statements were read and re-read, with margins annotated with emerging themes before being clustered into related concepts (Joffe & Yardley, 2003). All comments were subject to inter-rater reliability by the project supervisor (LM).

3. Results

3.1 Assessing questionnaire factor structure

Although summer and winter PPE were assessed separately, Spearman‟s correlation coefficients found significant relationships between both outcome sets (Table 1). Subsequent PCA hence examined these outcomes collectively. Initial analysis identified ten outcome factors, clearly clustered into PPE and non-PPE groups. Separate analysis of these found three PPE factors and two non-PPE factors. PPE was further reduced to two factors due to highly skewed responses for leather suit wear: with 82.6% of respondents never wearing these across seasons.

This provided two PPE factors: “protective” PPE including five items assessing motorcycling jackets, trousers and boots (PPE1), and “preventative‟ PPE including four items assessing hi-visibility wear (PPE2). Two Non-PPE factors included four items assessing use of non-biking jeans and trainers (Non-PPE1), and five items assessing shorts, sandals and no safety wear (Non-PPE2) (Table 2). Scores for identified factors were calculated by summing the individual item scores and dividing this by the number of items in each scale. Significant correlations were found between PPE and Non-PPE scales respectively (Table 3). KS Lilliefors tests found no outcomes to be normally distributed ($p<0.001$). Protective PPE (PPE1) held positive skewness and kurtosis towards PPE use, whereas both non-PPE scales were negatively skewed towards non-use.

Separate PCA for theoretical independent variables identified seven constructs to add to the pre-validated SRHI scale (Table 4). The TPB concept of PBC and related SE did not load well onto any factors, with both removed from further analysis (Trafimow et al. 2002). Hence, the model analysed and extended hereafter was the Theory of Reasoned Action (TRA).

Although DSN items loaded well onto a scale with RE and RAF items, the items did not cumulatively hold face validity (Oppenheim, 2000). DSN was hence separated from the subsequently labelled "Risk Perceptions" factor, into its own scale to maintain clarity in further analysis (Table 4). Despite holding uncertain reliability, the benefits scale (*a*=0.64; Table 5) was maintained in subsequent analysis as related topics appeared frequently in both pre- and post-belief elicitation (Figure 4). Significant Spearman's correlation coefficients were identified across identified constructs (Table 6). KS Lilliefors tests found risk perceptions, intentions, ISN and habits to all be positively skewed ($p<0.001$). KMO statistics of over .6 for both independent and outcome variable PCA indicated good sampling adequacy (Hutcheson & Sofroniou, 1999).

3.2 Sample characteristics

Of the two hundred and sixty eight included participants, 86.6% (n=232) were male with a mean group age of 30-39. 89.9% (n=241) rode a motorcycle as opposed to a scooter and 97.2% (n=246) identified themselves as white. With only 7 participants describing themselves as of black or asian ethnicities, this demographic data was removed from subsequent analysis to avoid biasing results (Field, 2009). Participants held a mean riding experience of 9.2 years, with 45.9% having three years or less. 68.6% (n=179) of participants reported holding full, unrestricted motorcycle licences, 74.8% (n=196) as holding car licences and 64.9% (n=170) as riding primarily in urban locations (Table 7).

3.3 PPE use

Frequent reported wear of motorcycle trousers, jacket and boots was found in the sample (Mean=4.39 out of 5; PPE1, Table 8). 81.4% indicated often or always wearing these items, with wear significantly greater in motorcycle than scooter

riders ($p<0.001$). Middling usage was evident for high-visibility items (Mean=2.62; PPE2), with 19.4% indicating frequent wear.

Uncommon reported usage of non-motorcycle jeans and trainers was evident (Mean=1.79; Non-PPE1), with these items never worn by 42.5% of respondents. Wear was significantly greater in urban riders ($p<0.01$) and those not holding a car licence ($p<0.001$). Shorts, sandals and no safety wear (Mean=1.15; Non-PPE2) were described as never worn by 79.5% of respondents, and were worn significantly more by women ($p=0.005$) and respondents not holding car licences (<0.01) (Table 7).

3.4 Theoretical variables

High intentions to use PPE (Mean=6.26) were identified in this sample. Similar high agreement was also found for injunctive subjective norm (Mean=6.32), descriptive subjective norm (Mean=5.32) and risk perception items (Mean=5.41). Moderate positive attitudes (Mean=4.71), anticipated regret (Mean=5.02) and benefits (Mean=5.20) surrounding PPE were found (Table 8). Habit was present in 98.9% of respondents.

3.5 Regression analysis

Except for attitudes surrounding PPE2 (high-visibility wear); all TRA constructs correlated significantly to the outcome in question, and were hence included in subsequent hierarchical multiple regression analysis. TRA constructs explained 37% of behavioural variance of PPE1 (Table 9), 7% of PPE2 (Table 10), 23% of Non-PPE1 (Table 11) and 25% of Non-PPE2 (Table 12). Intentions were significantly predictive in all outcome regressions, contributing 33% of behavioural variance to PPE1, 5% to PPE2, 21% to Non-PPE1 and 22% to Non-PPE2 (Tables 9-12).

The addition of significant rider demographics to TRA variables produced an additional 9% of behavioural variance to PPE1, 1% to PPE2, 11% to Non-PPE1 and 4% to Non-PPE2 (Tables 9-12). Hypothesis 1 is hereby supported as different rider demographics significantly predicted different PPE outcomes.

Extended Theories of Reasoned Action were found to account for more behavioural variance than TRA alone in all four outcomes. Adding significantly correlated constructs to the TRA and rider demographics added 4% variance for PPE1, 2% for PPE2, 2% for Non-PPE1 and 1% for Non-PPE2 (Tables 9-12). As TPB was not tested following PCA exclusion of perceived behavioural control, hypothesis 2 is not supported. However, an extended TRA did predict greater outcome variability than original TRA variables alone.

Factors significantly associated with motorcycle jacket, trousers and boots use (PPE1) were greater intentions ($p<0.001$), anticipated regret ($p<0.001$), perceived benefits of PPE use ($p<0.05$) and riding 3001-6000 miles per year ($p<0.05$; Table 9). Factors significantly associated with high-visibility wear (PPE2) were greater intentions ($p<0.05$) and anticipated regret ($p<0.05$), habit presence ($p<0.05$) and scooter riding ($p<0.05$; Table 10). Factors significantly associated with non-motorcycle jeans and trainers use (Non-PPE1) were lower intentions ($p<0.001$) and anticipated regret ($p<0.05$), being an urban rider ($p<0.02$), riding 3001-6000 miles per year ($p<0.05$) and not holding a car licence ($p<0.05$; Table 11). Factors significantly associated with sandals, shorts and no Personal Protective Equipment use (Non-PPE2) were lower intentions ($p<0.001$) and risk perceptions ($p<0.05$), being female ($p<0.005$) and not holding a car licence ($p<0.05$; Table 12).

3.6 Content analysis

Eighty two participants chose to write additional comments related to PPE use (30.6% of sample). This respondent sub-set were significantly older ($F(1,267) = 4.02$, $p<.05$), owned larger power bikes ($F(1,267) = 5.01$, $p<0.05$), held lower risk perceptions ($F(1,267) = 10.47$, $p=.001$), lower anticipated regret ($F(1,264) = 4.94$, $p<.05$), lower DSN ($F(1,266) = 10.95$, $p=.001$) and more years of riding experience ($F(1,258) = 6.70$, $p=.01$).

Ten themes emerged from the data, with these clustered into four concepts (Table 13). Diverse attitudes surrounding PPE importance were evident. Some respondents stressed PPE as essential, whereas others de-emphasised its value: alternatively stressing the importance of riding skills in crash prevention. A need for freedom of choice in PPE use was common, whether respondents stressed its importance or not. Deterring high costs and lack of PPE range were frequently mentioned, along with use being highly dependent on riding situations, such as seasonal weather and journey length.

4. Discussion

This study aimed to explore determinants of motorcyclists' PPE use using an extended Theory of Planned Behaviour. To the author's knowledge, it is the first study to investigate this behaviour primarily through theoretical constructs and in UK riders.

The sample majority reported never wearing leather motorcycle suits (82.6%) and reported wearing motorcycle jackets, trousers and boots often or always (81.4%, similar to ACEM, 2004; Christmas et al. 2009). Similarly, the majority of this sample reported not wearing non-safety wear such as jeans and trainers, unlike other previous research (De Rome et al. 2011b). Although these findings seem encouraging, the context of this questionnaire must be considered. Given that mandatory EU motorcycle PPE legislation is being considered (EUROPA, 2010), responding riders may have over-stated their actual use to demonstrate such legislation as unwarranted.

82.6% reported never wearing leather suits. With these typically marketed around motorcycle racing, such advertising may not appeal to typical riders in terms of convenience, cost or style (De Rome & Stanford, 2006). Middling usage was found for high-visibility wear (as in Christmas et al. 2009; Reeder et al. 1996). Belief elicitation showed dubious attitudes towards high-visibility wear benefits, with respondents viewing car-driver awareness as not improved by its use (as in Blackman & Haworth, 2010). Research has found high-visibility wear to be effective in crash prevention (Lin & Kraus, 2009), yet this does not seem to be reflected in rider experience.

Principal components analysis found PBC and related self-efficacy to not load well onto any predictors of PPE use. Hence contrary to hypothesis 2, an

extended Theory of Reasoned Action was subsequently examined. With PBC presumed to be predictive of behaviours not under an individual‟s conscious control (Ajzen, 1991); it may be inappropriate in the context of volitional PPE use. Strong agreement with PBC items of 74.3% and 76.8% suggests ceiling effects may have prompted a lack of variability explanation (Trafimow et al. 2002). With a lack of PBC effect also evident in previous Australian motorcycle (De Rome et al. 2011b) and skating PPE research (Deroche et al. 2009); it appears adoption may be unrestricted by practical implications. This is in contrast to more impulsive, risky driving behaviours such as drink driving (Parker et al. 1992) and speeding (Elliot, 2010), finding PBC to increase intention explanation.

TRA variables explained most of the total identified variability in all four PPE outcomes. Concurring with meta-analytic findings (Armitage & Connor, 2001), intentions were the central predictor for all outcomes. With wear physically dependent on possessing PPE, it seems logical that intentions before point-of-purchase may be key for resultant behaviour. No other TRA variables were significantly predictive of any outcomes. Strong positive and negative attitudes were evident in additional comments, suggesting initial belief elicitation to construct the questionnaire may have omitted key ideas (Fishbein & Ajzen, 2010). A lack of subjective norm explanation is also evident in motorcycling speeding (Elliot, 2010) and limited PPE research (De Rome et al. 2011b). Although a motorcyclist group identity and social context have been found in previous research (Jamson & Chorlton, 2009; Tunnicliff et al. 2011), social influences are not associated with PPE use in this sample.

Selected constructs extending the TRA were significantly correlated to outcomes. Anticipated regret was both significantly positively associated with PPE outcomes, and negatively associated with non-PPE outcomes. AR is commonly experienced when individuals are personally responsible for an irreversible

behaviour (Abraham & Sheeran, 2003). This appears highly relevant in this context, given that PPE is a personal choice and crash occurrence and injury are irreversible.

Risk perceptions assessing individual vulnerability and PPE effectiveness significantly predicted Non-PPE use only. Common male traits of sensation-seeking riding and skill confidence (Finucane et al. 2000b; Wong et al. 2010) may lower risk perceptions, contributing to this lack of PPE effect in a predominantly male sample. Benefits identified in pre-questionnaire belief elicitation were associated with jacket and trousers PPE use; with warmth and safety values predictive as in previous research (Tunnicliff et al. 2011). PPE habit was only associated with uncommonly used high-visibility wear, possibly due to an extremely high ceiling effect of 98.9% of this sample (Austin & Brunner, 2003).

Additional demographics were associated with PPE outcomes, supporting hypothesis 1. Scooter users were significantly associated with increased high-visibility wear, contrary to previous research finding less PPE use compared to motorcyclists (Christmas et al. 2009; De Rome et al. 2011b). With only 10.1% of respondents identifying themselves as scooter riders, a more diverse population would be required to determine any firm comparisons. Larger PPE uptake in this sample may be indicative of high visibility wear availability for the scooter market (De Rome & Stanford, 2006), accompanied by more negative motorcyclist views towards its use. Additionally, riding the sample's average mileage per annum of 3001-6000 miles was associated with increased PPE uptake. Previous research has found this mileage as average for UK riders (Sexton et al. 2004), suggesting that the general population riding majority may actually hold high PPE uptake.

Holding a car licence was significantly associated with lower Non-PPE use,

although reported use was still relatively low. Dual-modal drivers have been found to elicit the safest responses at junctions (Crundall et al. 2012), possibly reflected here in their reduced risky clothing choices. Urban riding was also significantly associated with Non-PPE jeans and trainers use. With rural accidents being 1.5 times more serious (DfT, 2004), non-PPE may not be adopted as a precautionary measure by such riders. Females were significantly associated with sandals, shorts and no PPE use. Although this may be attributable to a small female sample size, content analysis revealed a perceived lack of PPE choice for women. Limited manufactured female PPE seemingly reflects women as minority riders (Roster, 2007), with British males making 7x more motorcycle journeys than women (DfT, 2004).

Although previous PPE prevalence research found younger riders to wear less PPE (Christmas et al. 2009); age was not a significant predictor of use in this study. Responses were positively skewed towards older ages which may have contributed to this absent effect, unlike previous research purposefully focusing on younger, novice riders (De Rome et al. 2011b). Additionally, years of riding experience and motorcycle organisation membership did not significantly predict PPE use. Hence, contrary to previous research (De Rome et al. 2011b; De Rome & Stanford, 2006), more experience and peer rider contact did not equate to increased PPE use in this sample.

Additional comments provided insightful attitudes towards PPE use, producing new themes not included in the preliminary questionnaire. Despite evidently high usage, many respondents emphasised anger at currently debated EU PPE legalisation (EUROPA, 2010). Commenters stressed the need for freedom of choice in its use, disagreeing with restrictions for motorcycling as a liberated activity (Jamson & Chorlton, 2009; Roster, 2007). Selected riders also de-emphasised PPE use in favour of the preventative and protective value of riding skills (as in Blackman & Haworth, 2010; Lin & Kraus, 2009). Comments also

indicated costs in time, money and convenience as barriers to PPE use (as in Blackman & Haworth, 2010). Although such points were addressed in the study as suggested by pre-questionnaire belief elicitation, they did not load well onto any factors during principal components analysis and were subsequently dropped. The arising theme of PPE situation-dependency including weather considerations supported our separation of seasonal wear (as in de Rome et al. 2011b). A lack of PPE standard clarity was also identified, suggesting a need for objective advice and consumer education (De Rome et al. 2011a). Although UK PPE advice does exist (Think! 2010), it appears this is not specific or publicised enough to sufficiently inform riders in this sample.

4.1 Limitations

Although respondents may indicate safety wear use, it may not be sufficiently protective. With potentially poorly protective second-hand wear easily available (Think! 2010), this research cannot quantify quality of clothing reportedly used. There is an evident need to revise this questionnaire in subsequent research. Various attitudes indicated during pre-questionnaire belief elicitation did not attain suitable results for post-PCA analysis, despite being commonly mentioned in later comments. Accordingly, face validity confirmation by a target-population pilot group may have assisted with questionnaire and construct refinement (Fishbein & Ajzen, 2010). Also, selected constructs such as PBC were measured with minimal items to reduce questionnaire length, potentially contributing to their exclusion in later analysis (Field, 2009). The use of participant self-sampling via online motorcycle forums may have attracted riders with strong views on the topic (Wantland et al. 2004). Inclusion of an arguably passionate motorcycling community may have contributed to skewed results towards PPE use. Findings cannot be generalised to the wider population due to heterogeneous demographics and a relatively modest sample size. However, the use of an online questionnaire method enabled reach of a diverse sample population for this exploratory research (Wright, 2005).

5.0 Conclusions

This preliminary research in UK riders found encouragingly high levels of PPE use, identifying explanatory theoretical variables and a disapproval of related legislation proposals. The TPB concept of PBC was removed following factor analysis. Subsequent extended Theories of Reasoned Action explained greater behavioural variance than the traditional theory alone, suggesting the importance of additional factors. Selected demographics including being female, not holding a car licence and urban riding were only significantly associated with increased non-PPE wear.

Although providing a provisional research basis, confirmatory studies should now be performed to provide larger-scale evidence for future targeted uptake interventions. Qualitative research in riders of various demographics would provide more detail into the PPE attitudes and experiences of riders themselves: extending insightful comments found here. Subsequent extensive research using different recruitment techniques will enable behaviour modelling from a wider sample.

Results of this study and future research should be used to tailor available PPE information around the attitudes and concerns of the riding population. By providing more relevant information materials, riders can make more informed choices regarding PPE use and related injury protection.

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Figure 1. Theory of Reasoned Action; Fishbein and Azjen, 1975

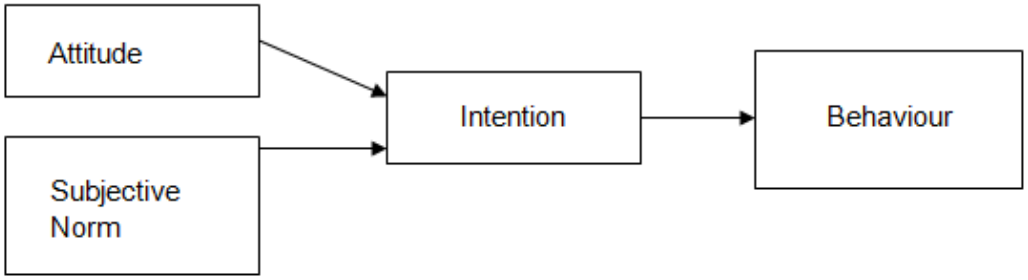

Figure 2. Theory of Planned Behaviour

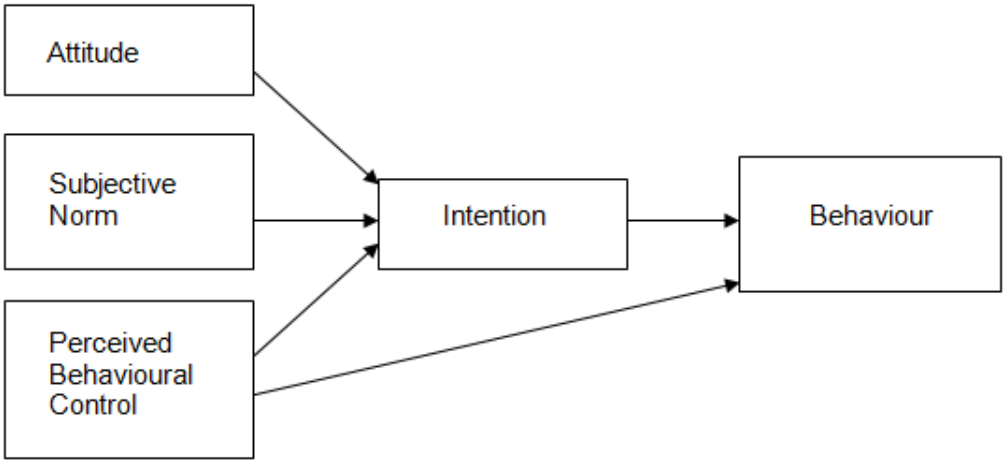

Figure 3. Participant online questionnaire attrition

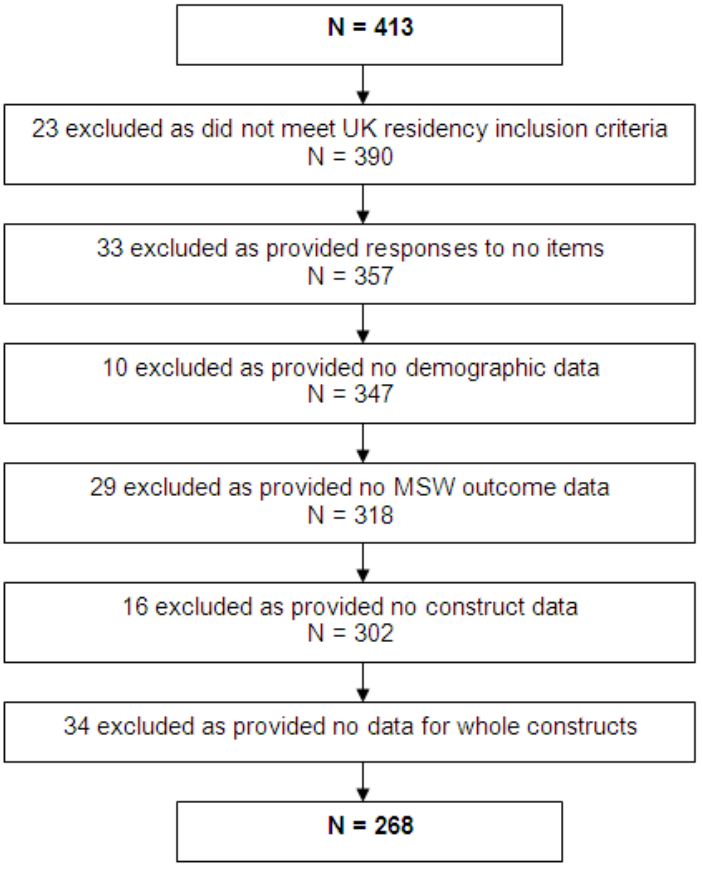

Figure 4. Extended Theory of Reasoned Action (TRA) used following principal components analysis

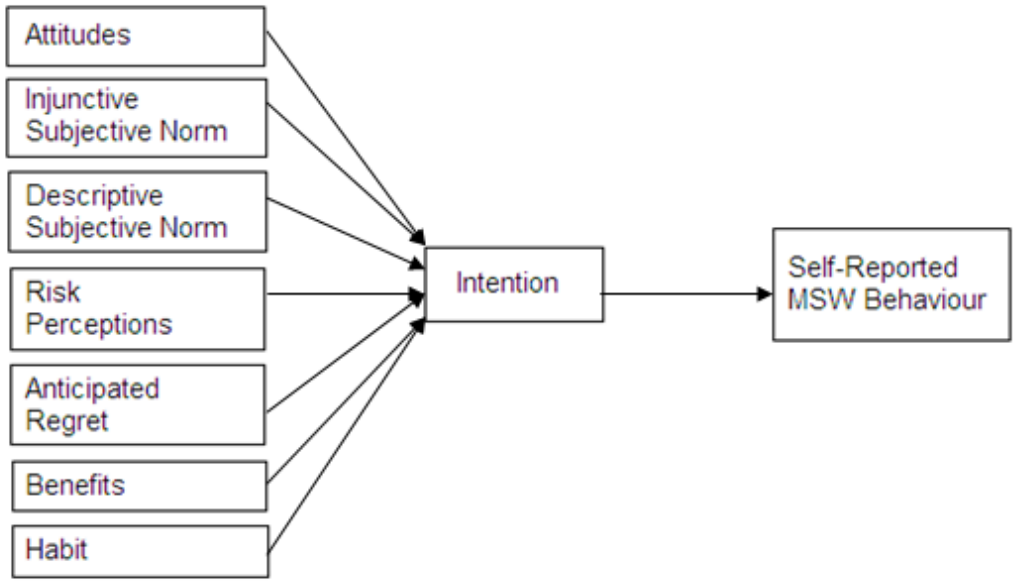

Table 1. Spearman‟s correlation coefficients between winter and summer outcomes

	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15
S1	.77 **														
S2		.57**													
S3			.75**												
S4				.73**											
S5					.82**										
S6						.51**									
S7							.83**								
S8								.82**							
S9									.85**						
S10										.77**					
S11											.56**				
S12												.47**			
S13													.85**		
S14														.87**	
S15															.67**

Note: ** p< 0.01; „W‟ items indicate clothing worn in winter conditions; „S‟ items indicate clothing worn in summer conditions.

Table 2. Factors loadings for identified dependent variable items from Pattern and Structure matrices

Item*	N	Factors determined through PCA**			
		PPE 1	PPE2	Non-PPE 1	Non-PPE2
When riding (in winter/summer conditions), how often do you wear..?					
A protective jacket (leather or non-leather) (W)	268	**0.50**	0.18		
		(0.59)	(0.28)		
A protective jacket (leather or non-leather) (S)	268	**0.69**	-0.01		
		(0.69)	(0.18)		
Protective trousers (leather or non-leather) (W)	268	**0.82**	0.07		
		(0.85)	(0.26)		
Protective trousers (leather or non-leather) (S)	268	**0.87**	-0.03		
		(0.86)	(0.18)		
Biking boots (W)	268	**0.65**	0.15		
		(0.63)	(0.06)		
Bright/ fluorescent clothing (W)	268	-0.12	**0.93**		
		(0.11)	**(0.89)**		
Bright/ fluorescent clothing (S)	268	-0.14	**0.94**		
		(0.09)	**(0.90)**		
Bright/ fluorescent strips on your clothing (W)	268	0.34	**0.60**		
		(0.45)	**(0.70)**		
Bright/ fluorescent strips on your clothing (S)	268	0.30	**0.58**		
		(0.39)	**(0.68)**		
Non-biking jeans (W)	268			**0.85**	-0.02
				(0.84)	(0.35)

Item*	N	Factors determined through PCA**			
		PPE 1	PPE2	Non-PPE 1	Non-PPE2
Non-biking jeans (S)	268			**0.89**	-0.10
				(0.84)	(0.28)
Trainers (W)	268			**0.72**	0.15
				(0.79)	**(0.46)**
Trainers (S)	268			**0.80**	0.02
				(0.81)	(0.37)
Shorts (W)	268			-0.16	**0.93**
				(0.24)	**(0.86)**
Shorts (S)	268			0.07	**0.80**
				(0.42)	**(0.83)**
Sandals (W)	268			-0.03	**0.79**
				(0.30)	**(0.77)**
No protective clothing (W)	268			0.18	**0.68**
				(0.47)	**(0.76)**
No protective clothing (S)	268			0.36	**0.42**
				(0.55)	**(0.58)**

Note: * Brackets denote whether original items directed winter (W) or summer (S) wear use.
***Non-bracketed items denote pattern matrix loadings, used to form subsequent factors. Factor loadings over 0.4 are bolded. Bracketed items denote structure matrix loadings.

Table 3. Correlations between post-PCA outcomes

	PPE 1 (Protective)	PPE 2 (Preventative)	Non PPE 1	Non PPE 2
PPE 1 (Protective)	-			
PPE 2 (Preventative)	.22 **	-		
Non PPE 1	-.66 **	-.15 *	-	
Non PPE 2	-.48 **	-.16 **	.50 **	-

Note. * p< 0.05; ** p< 0.01.

Table 4. Factors loadings for all included independent variable items from Pattern and Structure matrices

Item*	Original** Construct	N	Factors determined through PCA***						
			Intention	Attitude	ISN	DSN	RP	AR	Benefits
I intend to wear full PPE on a typical day	Int	267	**-0.97**	-0.01	-0.04		-0.03	-0.03	0.01
			(-0.97)	(0.30)	(-0.30)		(0.29)	(0.24)	(0.23)
I intend to wear full PPE on a cold day	Int	267	**-0.97**	-0.03	-0.01		-0.02	-0.03	0.03
			(-0.96)	(0.27)	(-0.26)		(0.28)	(0.24)	(0.24)
I intend to wear full PPE on a wet day	Int	268	**-0.96**	-0.08	0.01		-0.01	-0.03	0.06
			(-0.93)	(0.22)	(-0.24)		(0.28)	(0.23)	(0.26)
I intend to wear full PPE on a solo ride for leisure	Int	267	**-0.95**	0.43	-0.01		0.01	-0.03	-0.03
			(-0.95)	(0.34)	(-0.27)		(0.31)	(0.22)	(0.20)
I intend to wear full PPE on a ride with others	Int	267	**-0.97**	0.01	0.03		-0.02	-0.05	0.01
			(-0.95)	(0.29)	(-0.24)		(0.29)	(0.20)	(0.21)
Wearing full PPE whilst riding is unpleasant/ pleasant	Att	264	-0.13	**0.68**	-0.09		0.06	-0.10	0.10
			(-0.44)	**(0.77)**	(-0.27)		(0.30)	(0.12)	(0.25)
Wearing full PPE whilst riding is un-enjoyable/ enjoyable	Att	266	-0.14	**0.70**	-0.15		0.07	-0.11	0.04
			(-0.45)	**(0.79)**	(-0.32)		(0.31)	(0.11)	(0.21)
Wearing full PPE whilst riding is foolish/ wise	Barr	266	0.07	**0.75**	-0.13		-0.11	0.06	0.07
			(-0.18)	**(0.73)**	(-0.22)		(0.11)	(0.14)	(0.15)
My friends would (strongly disapprove/ strongly approve) of me wearing full PPE whilst riding (R)	ISN	268	-0.14	0.20	**-0.65**		-0.14	0.32	-0.01
			(-0.40)	(0.35)	**(-0.70)**		(0.15)	**(0.41)**	(0.17)
My family would (strongly disapprove/ strongly approve) of me wearing full PPE whilst riding (R)	ISN	268	-0.22	-0.06	**-0.74**		-0.02	0.21	-0.03
			(-0.44)	(0.15)	**(-0.80)**		(0.23)	(0.29)	(0.16)
Most people who are important to me would choose to wear full PPE whilst riding	DSN	268	-0.18	-0.03	-0.02		**0.44**	0.33	0.06
			(-0.43)	(0.19)	(-0.20)	**(0.48)**	**(0.57)**	**(0.48)**	(0.31)
Riders I most respect wear full PPE	DSN	268	-0.11	0.01	-0.07		**0.52**	0.37	0.12
			(0.42)	(0.25)	(-0.26)	**(0.55)**	**(0.67)**	**(0.55)**	**(0.40)**

Item*	Original** Construct	N	Factors determined through PCA***						
			Intention	Attitude	ISN	DSN	RP	AR	Benefits
Wearing full motorcycle safety clothing whilst riding would protect me from injury	RE	268	-0.07 (-0.28)	-0.07 (0.13)	0.05 (-0.13)		**0.80** **(0.78)**	-0.07 (-0.11)	-0.01 (0.23)
Wearing full motorcycle safety clothing whilst riding would make me feel safer:	RE	268	0.02 (-0.32)	0.08 (0.29)	-0.22 (-0.39)		**0.56** **(0.71)**	0.10 (0.29)	0.23 **(0.46)**
Without motorcycle safety clothing, I would feel vulnerable to being seriously injured:	RAF	268	-0.04 (-0.36)	0.03 (0.25)	-0.03 (-0.37)		**0.52** **(0.66)**	0.33 **(0.50)**	0.04 (0.33)
How would you feel if you were injured as a result of not wearing PPE whilst riding?									
Calm/ Worried (R)	AR	267	-0.01 (-0.31)	0.04 (0.20)	-0.07 (-0.16)		0.04 (0.27)	**0.86** **(0.89)**	0.06 (0.30)
Settled/ Unsettled (R)	AR	267	0.01 (-0.30)	0.08 (0.23)	-0.11 (-0.20)		-0.02 (0.24)	**0.85** **(0.88)**	0.09 (0.32)
Innocent/ Guilty	AR	266	-0.02 (-0.30)	0.03 (0.20)	0.01 (-0.12)		0.34 **(0.49)**	**0.51** **(0.62)**	0.03 (0.27)
Full PPE makes me feel unsafe/ safe	Benef	266	0.02 (-0.20)	0.16 (0.33)	-0.32 **(-0.47)**		-0.29 **(0.52)**	-0.04 (0.16)	**0.44** **(0.59)**
Full PPE makes me feel innocent/ guilty (R)	Benef	264	-0.06 (-0.22)	0.06 (0.17)	-0.06 (-0.18)		-0.06 (0.22)	0.03 (0.21)	**0.80** **(0.81)**
Full PPE makes me feel cold/ warm	Benef	267	-0.03 (-0.19)	-0.04 (0.06)	0.16 (0.03)		-0.03 (0.20)	0.02 (0.19)	**0.78** **(0.76)**

Note: * Items marked (R) have been reversed for analysis.
** Denotes originally designed concepts prior to PCA. „Int" denotes Intention, „Att" denotes attitudes, „Barr" denotes barriers, „RE" denotes response efficacy, „RAF" denotes risk as feelings, „Benef" denotes benefits.
*** Non-bracketed items denote pattern matrix loadings, used to form subsequent factors. Factor loadings over 0.4 are bolded. Bracketed items denote structure matrix loadings.

Table 5. Internal reliability of post-PCA independent and dependent variables

Variable	Number of items	Cronbach‟s *a*
Independent Variables		
Intention	5	.98
Attitudes	3	.79
ISN	2	.80
DSN	2	.71
Risk Perceptions	3	.74
AR	3	.84
Benefits	3	.64
Habit*	12	.95
Dependent Variables		
PPE 1 (protective)	5	.79
PPE 2 (preventative)	4	.83
Non PPE 1	4	.83
Non PPE 2	5	.82

Note: * Assessed with Self Report Habit Index (SRHI)

Table 6. Spearman‟s correlation coefficients of post-PCA independent variables

	Intention	**Attitudes**	**ISN**	**DSN**	**Risk Perceptions**	**AR**	**Benefits**	**Habit**
Intention	-							
Attitudes	.31**	-						
ISN	.42**	.34**	-					
DSN	.42**	.27**	.43**	-				
Risk Perceptions	.36**	.32**	.35**	.65**	-			
AR	.28**	.25**	.32**	.58**	.49**	-		
Benefits	.21**	.30**	.30**	.47**	.50**	.39**	-	
Habit	.47**	.28**	.41**	.46**	.38**	.39**	.22**	-

Note: ** p< 0.01.

Table 7. Demographics of study sample (n=268) with outcome variable group differences

Categorical Variables	Number (%)	Group Differences			
		PPE1	PPE2	Non-PPE1	Non-PPE2
Gender					
Male	232 (86.6%)	t(266)= -1.25, n.s	t(266)=-1.39, n.s	U(268)=4260.5, n.s	U(268)= 4216, n.s
Female	36 (13.4%)				
Age					
17 or younger	7 (2.6%)	$\chi^2(6)$= 13.29, p<0.05	$\chi^2(6)$= 7.28, n.s	$\chi^2(6)$= 25.79, p<0.001	$\chi^2(6)$= 5.82, n.s
18 – 20	31 (11.6%)				
21 – 29	69 (25.7%)				
30 – 39	44 (16.4%)				
40 – 49	71 (26.5%)				
50 – 59	34 (12.7%)				
> 60	12 (4.5%)				
Motorbike type					
Motorcycle	241 (89.9%)	U(268)= 5004.5, p<0.001	U(268)= 2624, n.s	U(268)= 2087, p=0.001	U(268)= 2412.5, p<0.005
Scooter/ Moped	27 (10.1%)				
Local area					
Town/ City (Urban)	170 (64.9%)	t(260)= 0.21, n.s	t(260)= -0.53, n.s	U(262)= 6486.5, p<0.05	t(260)= 004, n.s
Countryside (Rural)	92 (35.1%)				
Highest Educational Level		$\chi^2(5)$= 2.48, n.s	$\chi^2(5)$= 6.02, n.s	$\chi^2(5)$= 3.72, n.s	$\chi^2(5)$= 0.61, n.s
No Qualifications	5 (1.9%)				
Secondary School	41 (15.7%)				
Further Education	120 (46.0%)				
University Degree	95 (36.4%)				

Categorical Variables	Number (%)	Group Differences			
		PPE1	PPE2	Non-PPE1	Non-PPE2
Bike Licence Unrestricted 'A' Licence Restricted Licence Other	 179 (68.6%) 79 (30.3%) 3 (1.1%)	$\chi^2(2)= 12.44$, $p<0.005$	$\chi^2(2)= 3.30$, n.s	$\chi^2(2)= 14.54$ $p=0.001$	$\chi^2(2)= 3.36$, n.s
Ridden miles per year 0-3000 3001-6000 6001-10000 >10000	 88 (32.8%) 82 (30.6%) 46 (17.2%) 42 (15.7 %)	$\chi^2(5)= 10.00$, n.s	$\chi^2(5)= 4.19$, n.s	$\chi^2(5)= 12.87$ $p<0.05$	$\chi^2(5)= 5.31$, n.s
Motorcycle Organisation Member	46 (17.7%)	$t(258)= 0.50$, n.s	$t(258)= 0.56$, n.s	$t(258)= 0.22$, n.s	$t(258)= 0.67$, n.s
Car Licence held	196 (74.8%) $p<0.001$	$U(262)= 4264.5$,	$t(260)= 1.23$, n.s	$t(260)=-5.11$ $p<0.001$	$U(262)= 7403.5$ $p<0.05$
Motorcycle Accidents in last 3 years	84 (31.3%)	$t(260)= 2.10$, $p<0.05$	$t(260)= 1.20$, n.s	$t(260)= -1.70$, n.s	$t(260)= 0.05$, n.s

Table 8. Descriptive data for variables included in analysis

Variable	*N*	Mean	SD
Independent Variables			
Intentions*	265	6.26	1.43
Attitudes*	262	4.71	1.25
ISN*	267	6.32	1.07
DSN*	267	5.32	1.53
Risk Perceptions*	268	5.41	1.39
AR*	265	5.02	1.51
Benefits*	262	5.20	0.99
Habit**	267	1.01	0.11
Dependent Variables***			
PPE 1 (protective)	268	4.39	0.80
PPE 2 (preventative)	268	2.62	1.22
Non PPE 1	268	1.79	0.95
Non PPE 2	268	1.15	0.43

Note: * A score of 1 indicates no agreement with variable, with a score of 7 indicating full agreement

** A score of 1 indicates habit presence as assessed with the Self-Report Habit Index (SRHI) and cut-off score of 21

*** A score of 5 indicates that participants always wear the items, with a score of 1 indicating no wear

Table 9. Hierarchical multiple regression predicting reported wear of motorcycle jacket, trousers and boots (PPE1)

	Step 1		Step 2		Step 3		Step 4	
Step/Predictor	B	β	B	β	B	β	B	β
1. Intention	-0.33	-0.58**	-0.25	-0.44**	-0.25	-0.44**	-0.25	-0.44**
2. Attitudes			-0.08	-0.12*	-0.03	-0.04	-0.04	-0.06
ISN			-0.10	-0.13*	-0.08	-0.11	-0.06	-0.08
DSN			-0.04	-0.08	-0.04	-0.07	-0.01	-0.02
3. Bike type					-0.67	-0.25**	-0.72	-0.26**
126-400cc bike size					0.01	0.01	-0.07	-0.02
401-650cc bike size					-0.07	-0.04	-0.08	-0.05
Bike licence type					0.01	0.01	-0.01	-0.01
Years riding experience					0.01	0.03	0.01	0.01
3001-6000 miles ridden p/a					-0.16	0.09	-0.17	-0.10*
Bike crash in last 3 years					0.13	0.08	0.14	0.08
Car licence held					0.22	0.12*	0.17	0.09
4. Risk Perceptions							0.01	0.02
Anticipated Regret							-0.13	-0.24**
Benefits							0.10	0.12*
Model F	126.05**		37.72**		18.94**		17.53**	
Adjusted R^2	0.33		0.37		0.46		0.50	

Note: * p< 0.05; ** p< 0.001

Table 10. Hierarchical multiple regression predicting reported wear of high-visibility clothing (PPE2)

	Step 1		Step 2		Step 3		Step 4	
Step/Predictor	B	β	B	β	B	β	B	β
1. Intention	-0.19	-0.22***	-0.12	-0.14*	-0.13	-0.15*	-0.13	-0.15*
2. ISN			0.04	0.03	0.02	0.02	0.04	0.04
DSN			-0.17	-0.21**	-0.16	-0.20	-0.13	-0.16
3. Bike type					0.51	0.13*	0.49	0.12*
4. Risk Perceptions							0.06	0.06
Anticipated regret							-0.14	-0.18*
Habit							1.72	0.15*
Model F	13.24***		7.67***		6.91***		4.91***	
Adjusted R^2	0.05		0.07		0.08		0.10	

Note: * p< 0.05; ** p<0.01, *** p< 0.001

Table 11. Hierarchical multiple regression predicting reported wear of non-motorcycle jeans and trainers (Non-PPE1)

	Step 1		Step 2		Step 3		Step 4	
Step/Predictor	B	β	B	β	B	β	B	β
1. Intention	0.31	0.46***	0.24	0.36***	0.24	0.36***	0.24	0.36***
2. Attitudes			0.10	0.13*	0.06	0.08	0.05	0.07
ISN			0.02	0.03	0.03	0.03	0.01	0.01
DSN			0.06	0.10	0.05	0.09	-0.02	-0.03
3. Bike type					0.23	0.07	0.27	0.09
126-400cc bike size					-0.20	-0.06	-0.20	-0.06
651-1000cc bike size					0.18	0.08	0.16	0.07
Over 1000cc bike size					0.31	0.10	0.30	0.09
Bike licence type					-0.05	0.05	-0.07	-0.07
Local area type					0.24	0.12*	0.26	0.13*
Further Education					-0.18	-0.09	-0.15	-0.08
3001-6000 miles ridden p/a					0.26	0.13*	0.26	0.13*
Bike crash in last 3 years					0.01	0.01	-0.02	-0.01
Car licence					-0.34	-0.16**	-0.31	-0.14*
4. Risk perceptions							0.09	0.13
Anticipated regret							0.09	0.14*
Benefits							-0.09	-0.09
Model F	67.84***		19.58***		10.27***		9.20***	
Adjusted R^2	0.21		0.23		0.34		0.36	

Note: * p< 0.05; **p=0.01, *** p< 0.001

Table 12. Hierarchical multiple regression predicting reported wear of short, sandals and no Personal Protective Equipment (Non-PPE2)

	Step 1		Step 2		Step 3		Step 4	
Step/Predictor	B	β	B	β	B	β	B	β
1. Intention	0.14	0.47***	0.10	0.34***	0.10	0.34***	0.10	0.33***
2. Attitudes			0.05	0.16*	0.04	0.13*	0.03	0.10
ISN			0.01	0.03	0.01	0.03	0.01	0.02
DSN			0.03	0.12	0.03	0.10	-0.01	-0.02
3. Gender					-0.20	-0.16**	-0.19	-0.15**
Aged 60 years+					-0.22	-0.10	-0.17	-0.08
Years riding experience					-0.01	-0.03	-0.01	-0.12
3001-6000 miles ridden p/a					0.04	0.03	0.05	0.04
Car licence					-0.10	-0.10	-0.12	-0.13*
4. Risk perceptions							0.06	0.18*
Anticipated regret							-0.02	0.07
Benefits							0.04	0.09
Model F	70.98***		21.97***		12.16**		10.06***	
Adjusted R^2	0.22		0.25		0.29		0.30	

Note: * p< 0.05; ** p<0.01; *** p< 0.001

Table 13. A count of the main PPE comment themes.

“If you have any comments regarding Personal Protective Equipment, please include these here:”	
Key themes	**Count**
Freedom of choice	21
PPE importance	16
Situation-dependent nature of PPE use	15
High PPE cost	14
PPE impracticalities	9
Injuries being dependent on other road-users	8
Anti- PPE legislation	7
Lack of PPE range and clarity	7
Anti Hi-visibility PPE	7
Importance of riding skills above PPE	7

Table 13. Summary of PPE themes in associated concepts.

Concept	Themes
Anti PPE legislation	¬ **Freedom of Choice** ○ "Under no circumstances would I accept any compulsion to wear something I didn‟t want to" ○ "It should always be up to the rider…it is the rider who pays the price for not wearing suitable gear." ¬ **Anti PPE legislation** ○ "..the more the legislators dictate what motorcyclists wear the less they (riders) will cooperate" ○ "If you don‟t want to wear it, you shouldn‟t be forced to." ¬ **Anti high visibility PPE** ○ "A BIG RED SHINY fire engine with BLUE, TWOS and BULL HORN can‟t be seen by drivers.. so why would HI VIZ make any difference?"
PPE importance	¬ **PPE importance** ○ "It is not choice, it is essential and I wouldn‟t ride without it" ○ "..it could be the difference between life and death simple really."
Awareness of realistic PPE protective value	¬ **Injuries being dependent on other road users** ○ "Bikers would be much safer if car drivers were more aware and used better observation skills." ¬ **Riding skill importance** ○ "I prefer better riding skills and to assume all drivers of cars haven‟t seen me" ○ "Common sense and awareness will do far more than crash helmets, leather jackets, Kevlar fibres or armour will ever do for safety"
PPE use barriers	¬ **Situation dependent use** ○ "I cannot wear full leathers on a 250 commuter bike because I‟ll look like a moron!" ○ "I dress according to the conditions and ride according to my dress." ¬ **High cost** ○ "Cheaper, but just as effective, gear needs to be created" ¬ **Impracticalities** ○ "..there is a cost in time, convenience and looking like an action figure of star wars" ○ "Carrying bike kit about is cumbersome and wearing it while off the bike gets too hot." ¬ **Lack of range and clarity** ○ "require a simple straight forward standard…to determine if the garment is of a quality I can use" ○ "There is not enough on the market for women"