Risky Riding: A Comparison between two Personality Theories on Motorcyclist Riding Behaviour

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Abstract

Motorcyclists have the highest likelihood of being involved in a fatal crash of all vehicle passengers. Given the multiple human factors that contribute to crash involvement, few personality models have been utilized to understand which riders are at a higher risk than others. The current study examines how several personality theories compare in predicting high-risk riding among North American motorcyclists. By utilizing personality theories such as the "Big Five" and "Sensation Seeking, and the novel application of "Reinforcement Sensitivity Theory", the relationship between personality and riding behaviour was assessed through online self-report questionnaires. The effect of each personality trait on speeding, stunts, and riding errors were compared within three hierarchical regression models, controlling for age, sex, years active riding, and aggression. Among the strongest relationships observed were 1) Sensation Seeking's positive association with speeding, 2) the Reinforcement Sensitivity Theory's the "Behavioural Inhibition System's" positive relationship with rider errors, and 3) the Big Five's "Neuroticism" inverse association with stunts. These findings offer further support for the application of personality in determining individual differences in motorcycle crash risk and extend our understanding on how the Reinforcement Sensitivity Theory contributes aversive health outcomes.

Keywords: personality, trait, individual difference, motorcycle

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Motorcyclists are 26 times more likely to die in a crash than passenger cars occupants, and are 5 times more likely to be injured; surprisingly, little research has been done to exam the behavioral and psychological factors that may have contributed to crash involvement (National Highway Traffic Safety Administration, 2014). Personality traits have long been used to predict dangerous driving in four-wheel passenger vehicles, but few models of personality have been used to examine and predict the behaviour of motorcyclists (Porter, 2011). There are a number of increased risks associated with motorcyclists, including lack of protection, increased physical and mental demands in operating the vehicle, and poor visibility to other road users. Given these significant differences, it is possible that the effects of personality on motorcyclist behavior and riding outcomes is distorted when compared to four-wheel passenger vehicles (Broughton et al., 2009; Horswill & Helman, 2003; Shahar, Poulter, Clarke, & Crundall, 2010). Building upon the prevailing research that has investigated associations between personality and rider behaviour, this study extends previous research by including physiologically-based personality constructs and other common trait theories.

Personality Psychology

As defined by the American Psychological Association (APA) personality psychology "refers to individual differences in characteristic patterns of thinking, feeling and behaving" (APA, 2016, "Personality"). Among the many personality models to be proposed in the 20th century, the Big Five is arguably the most popular and heavily investigated model (McCrae & Costa, 2008). Although the Big Five has been associated

with solving adaptive problems pertaining to cooperation, mating, and threat detection,(D. D. M. Buss & Hawley, 2010) and having demonstrable heritability (Costa, & McCrae, 1992) , it is not understood as being physiologically based. Only a handful of personality models have been understood in terms of physiological mechanisms. Zuckerman's Sensation Seeking and Gray's Reinforcement Sensitivity theories are two such models of personality that utilize biology in their fundamental framework. The following sections will offer a brief review for each of these models and their relationship with driving and motorcyclists' behaviour.

The Big Five

As one of the most widely used models in personality psychology, the Big Five taxonomy has been praised as the most robust and replicated personality trait model to be developed (McCrae & Costa, 2008). Allport and Odbert(1936) utilized a lexical approach to analyzing dictionary entries for words that represent stable traits. For example, Allport and Odbert reviewed 17,953 entries and selected words that could relate to stable and observable traits and reduced the terms down to 4504. From their 4504, trait researchers such as Cattell (1946) and Fiske (1949) factor analyzed these words to determine broad universal factors. From further factor analysis, Costa and McCrae (1980) discovered three, and later five factors that attempt to describe the underlying nature of personalities without describing where they come from. The Big Five has evolved to become a taxonomy of five dimensions which include extroversion, conscientiousness, agreeableness, neuroticism, and openness to experience. Extroversion, represents a tendency to be assertive, sociable, and energetic; conscientiousness is associated with self-discipline, organization and problem solving (Pervin & John, 1999); agreeableness with altruism, compassion and trustiness;

neuroticism with emotional instability, anxiousness, and rigidity (McCrae & John, 1992); and openness to experience with curiosity, creativity, and appreciation for aesthetics and values (McCrae & Costa 2006). Among the scales most commonly used to measure these traits have been John's (1999) Big Five Inventory (BFI), Costa and McCrae's (1992) NEO Five Factor Inventory (NEO-FFI), and Goldberg's (1993) 100 trait-descriptive adjectives (TDA). The primary difference among these scales is their length and use of phrases (BFI) or adjectives (NEO-FFI, TDA) for each item.

Across the lifespan, age differences have been observed in the Big Five personality traits. Extraversion, openness to experience and, to a lesser degree, neuroticism seem to decrease with age, while agreeableness has been positively associated with age, and conscientiousness being found to peak around middle age (Donnellan & Lucas, 2008). Pertaining to sex differences, it has been found that females generally score higher for neuroticism and agreeableness and males score higher for conscientiousness (Costa & McCrae, 1992). Sex differences in extroversion are less pronounced at the trait level. However when examining its sub-facets, women show higher scores on warmth, positive emotions, and gregariousness, whereas men score higher on assertiveness and excitement seeking (Costa, Terracciano, & McCrae, 2001; Feingold, 1994)

When predicting health outcomes, it has been found that high conscientiousness is associated with increased exercise, healthier sleeping habits, safer sex practices, and decreased alcohol and smoking consumption (Gray & Watson, 2002; Ingledew & Ferguson, 2007; Kashdan, Vetter, & Collins, 2005; Martin & Sher, 1994; Rhodes & Smith, 2006). High extroversion has also been associated with increased exercise, but additionally associated with excessive drinking habits, smoking, and risky sexual behaviour (Benjamin

& Wulfert, 2005; Schwebel, Severson, Ball, & Rizzo, 2006; Spielberger & Jacobs, 1982). High neuroticism has been modestly associated with less exercise and increased smoking and drinking habits (Benjamin & Wulfert, 2005; Martin & Sher, 1994). Low agreeableness has been associated with cardiovascular disease and high openness to experience with increased exercise (Courneya & Hellsten, 1998; Miller, Smith, Turner, Guijarro, & Hallet, 1996).

Sensation Seeking

Sensation seeking is defined as a biologically rooted personality trait that is characterized by the pursuit of varied, novel, and extreme experiences (Zuckerman, 1994). First conceived by Zuckerman and Haber (1965), in their early studies on sensory deprivation resulted in observing individual differences in the amount of stimulation that is needed to reach an optimal level of arousal. Whereas some individuals prefer minimal stimulation, others may find situations with little stimuli unpleasant and consequently seek out novelty and additional stimulation. These individual differences were attributed to underlying biological differences. Specifically, those who scored higher on sensation seeking have been shown to have higher endogenous dopamine levels (Zuckerman, 1975). Zuckerman later developed the Sensation Seeking Scale (SSS) to measure an individual's desire for sensation seeking through a forced choice item, self-report questionnaire. Individuals who score as high sensations seekers will have an optimistic tendency to approach novel stimuli, explore their environment, and take a disproportionate amount of physical and social risks (Zuckerman, 1994). Consequently, it has been found that sensation seekers are more prone to injury, have increased sexual activity, take steeper financial risks, and are more likely to smoke and gamble (Zuckerman, 1994). In short, high

sensation seekers are more inclined to seek out stimulating activities to achieve an above optimal level of arousal.

A key conceptual difference between Zuckerman's theory and other personality theories is that the personality trait of sensation seeking is rooted in a physiological basis. Consequently, one would expect a high degree of heritability. As observed in twin studies, the total trait is highly heritable (58%) with the remainder of variance due to non-shared environmental influence. The trait is most pronounced among young males and increases with age up to sixteen and then progressively declines (Zuckerman, Buchsbaum, & Murphy, 1980). Psychopharmacological studies have also determined that high levels of sensation seeking are correlated with low levels of the neurotransmitter regulating enzyme, monoamine oxidase (MAO). Low levels of MAO lead to enhanced dopamine activity, causing increased reward sensitivity to arousal (Canli et al., 2006).

Reinforcement Sensitivity Theory

The concept of what determines or moderates an individual's inclination to approach or avoid has been a topic of much interest in personality research and among the many theories that address this concept, Gray's Theory of Reinforcement Sensitivity (RST) has been highly influential. Gray's theory was first conceived from pharmacological research on animal behavior and would later be expanded upon to include the examination of individual differences in reward and punishment sensitivity. The theory is now often conceptualized as a physiological model of personality that can be subdivided into two systems that regulate appetitive and aversive motivation (Gray, 1981). These systems have been given several labels over the years, but have most frequently been referred to as the

behavioural inhibition system and the behavioral activation system (Carver & White, 1994).

Behavioural inhibition system. The behavioural inhibition system (BIS) is physiologically comprised of the "septo-hippocampal system, its monoaminergic afferents from the brainstem, and its neocortical projection in the frontal lobe" (Carver & White, 1994, p. 319), which acts to regulate our aversive motivation. According to Gray, the BIS controls our inhibitory responses to stimuli that can signal aversive consequences. More specifically, it regulates our sensitivity to cues associated with novelty and potential threat (Gray, 1987). In terms of behaviour, it is thought to control our experience of anxiety in response to threat evoking cues. When extending the concept to individual differences, people with a more active BIS will have a higher likelihood of experiencing anxiety in situations that can be perceived as threatening and therefore avert themselves.

Behavioural activation system. The behavioural activation system (BAS) is operationalized as regulating approach motivation. Its physiological mechanism is less understood than the BIS, but its underlying process is attributed to dopaminergic pathways, and the nucleus accumbens that regulate our sensitivity to reward from pertinent environmental cues (Stellar, 2012; Urošević, Collins, Muetzel, Lim, & Luciana, 2012). According to Gray, this system additionally regulates our sensitivity to non-punishment and to escape from punishment. Activation of the BAS motivates people to orient or increase their behaviour towards achieving goals; it is also held to be responsible for feelings of happiness, elation, and hope (Gray, 1987). When evaluating individual differences, people with higher BAS sensitivity are more attuned to cues of reward and more likely to act on goal oriented behaviours to experience positive feelings. Individuals

with a highly active BAS system will be more sensitive to the rewards rather than the costs associated with risky behaviours.

The two systems have additionally been found to be orthogonal - given the separate and distinct neurological systems responsible for each system, it possible for individuals in a given population to have different combinations of low and high BIS and BAS Sensitivity (Carver & White, 1994).

Revised Reinforcement Sensitivity Theory

In terms of measuring BIS/BAS sensitivity, Carver and White were the first to operationalize the two systems in the form of a self-report questionnaire. Carver and White first generated a pool of items to reflect BIS and BAS sensitivity, and administered them to 732 college students. After factor analyzing the responses they were able to subdivide the BAS into three subscales: Fun Seeking, Drive, and Reward Responsiveness (Carver & White, 1994). Following upon further revisions to the RST, McNaughton and Gray (2000) extended upon its framework with the addition of a separate motivational system, the Fear-Fight-Flight System, (FFFS). Due to new developments in neurophysiology, the emotional responses initially associated with BIS fear and anxiety, were given separate distinctions (Blanchard, Griebel, & Blanchard, 2001). The new model defines fear (FFFS) as an avoidance response ("get me out of here"), and anxiety (BIS) as an inhibitory risk assessment mechanism ("watch out for danger") (McNaughton & Gray, 2000). The revised BAS is comprised of four subscales being reward interest, goal-drive persistence, reward reactivity, and impulsivity. Reward interest (RI) is characterized as the initial motivation to seek out positive and novel experiences. Goal drive-persistence (GDP) is associated with the consistency in pursuing goals when immediate awards are deferred (e.g., long-term

goal setting). Reward reactivity (RR) is characterized by the excitement of performing an activity well as well as winning. Impulsivity (I) is characterized by the rapid action, in an approach to capture an immediate reward such eating, drinking, or copulation (Corr, 2008). The BIS, BAS and FFFS together make up the Revised RST model.

Measuring the Revised Reinforcement Sensitivity Theory

Among the most commonly used questionnaires to measure the revised RST are the Reinforcement Sensitivity Theory Personality Questionnaire (RST-PQ) (Corr & Cooper, 2016), the Reinforcement Sensitivity Questionnaire (RSQ) (Smederevac, Mitrović, Čolović, & Nikolašević, 2014) and the Jackson 5 (Jackson, 2009). A recent article comparing the structural properties of the available RST measures demonstrated how the RST-PQ may be a more comprehensive measure in accounting for and distinguishing the sub-factors of the revised RST (Corr, 2016). Whereas in some cases measures such as the RSQ and Jackson 5 have demonstrated nearly perfect correlations between the BIS and FFFQ factors (Corr, 2016), the RST-PQ was reported to demonstrate superior convergent and discriminant validity. Given the revised RST being a relatively new model, the majority of health research in the last 20 years that applied the RST, has predominantly used the unrevised two level RST model.

In consideration of these discussed personality constructs, one can reason that with variations in personality comes variation in behaviour. Therefore when an individual is faced with opportunities or challenges, much of how they may interpret a situation or decide to act upon that situation can be largely based on the their individual personality

differences. Therefore the utilization of personality psychology in predicting behaviour has been extensively used in understanding individual differences in driving habits.

Personality and Driving

As of 2014, 67% of all Americans possessed a valid driver license, (U.S. Department of Transportation, 2014). With over 2/3^{rds} of the population being able to drive, one would expect a high variability in individual driving behaviour and performance. Assuming that all drivers have unique backgrounds, with different driving histories, learning experiences, driving styles, and expectations or judgments of their selves and other drivers, the natural variability in who becomes involved in a crash in their lifetime can be mostly attributable to human factors. In an analysis of 2041 traffic crashes, Sabey and Taylor (1980) determined that human factors (e.g., violations, lapses in judgment) contributed elements up to 95% of all crashes. In other words, when evaluating how crashes occur, individual differences in driving behaviour play a large part in determining who is at risk.

Traffic psychology has been able to operationalize these individual differences and has come up with some explanations as to how this natural variability occurs. In addition to the influence of neurological factors of attentional networks and visual processing on driving performance, the use of personality psychology to interpret individual differences in driving behaviour has been one of the most investigated factors to facilitate a better understanding of this variability (Porter, 2011). Understanding driving behavior through the lens of personality has often relied on the trait approach where the possession of one or more of certain traits can be inherently more dangerous or protective in a driving environment than others. Understanding how personality can contribute to negative driving

outcomes can be understood as being a “distal” factor (e.g,. high sensation seeking) that facilitates “proximal” factors (e.g., speeding, stunt driving) that can lead to crash involvement (Sümer & Özkan, 2002).

The Big Five and Driving

In addition to predicting many health behaviours, the Big Five has also been extensively used to understand individual differences in driving (Chraif, Aniţei, Burtăverde, & Mihăilă, 2016; Clarke & Robertson, 2005; Gadbois & Dugan, 2015; Riendeau, 2012). High extroversion has been associated with committing more traffic violations, fatal and non-fatal crash involvement, as well as increased risky and aggressive driving (Benfield, Szlemko, & Bell, 2007; Smith & Kirkham, 1981). High neuroticism is also associated with an overall increase in fatal and non-fatal crashes, and high levels of verbal non-verbal aggression while driving (Jovanović, Lipovac, Stanojević, & Stanojević, 2011; Lajunen, 2001). In contrast, high conscientiousness has been shown to be protective against crash involvement, and overall driver aggression. Low agreeableness has also been associated with lower level of aggressive driving behaviour (Arthur & Doverspike, 2001; Dahlen, Edwards, Tubré, Zyphur, & Warren, 2012). There is however very little evidence to suggest openness to experiences has a significant influence on driving behaviour. One line of research by Clarke and Robertson (2005) suggests that those with low openness to experience would have an increased ability to focus and therefore be at lower risk of crash involvement.

Sensation Seeking and Driving

Sensation seeking has also been a major topic of interest when evaluating individual differences in driving behaviour. Those who score high on sensation seeking veer towards seeking stimulation and excitement while in traffic (Chen, 2009). In a comprehensive review on sensation seeking and driving, Jonah (1997) examined the behavioural outcomes observed among high sensation seekers. One of the major correlational factors observed among high sensation seekers was drinking and driving. This characteristic is most commonly observed among men and seems to progressively decline with age. Jonah (1997) also found that high sensation seekers are less likely to perceive a higher risk of crash involvement while driving impaired. They also perceive driving as a less dangerous activity than people scoring lower in sensation-seeking and are consequently more likely to perform risky driving behaviours. Such behaviour has been found to consist of being more likely to speed, to not wear a seatbelt, to get more traffic violations, and to be aggressive while driving.

Reinforcement Sensitivity Theory and Driving

The RST has also been used to examine the effect of individual differences on driving related behaviours. Among the specific variables explored have been its effects on the compliance and violation of traffic safety rules, the self-reported engagement in risky driving, and its effect on driving simulator performance. Castellà and Pérez (2004) surveyed 792 Spanish adults on their self-reported driving habits and personality characteristics. When examining sensitivity to reward (BAS), it was found that drivers with higher BAS scores had a stronger association with committing more self-reported traffic violations. High sensitivity to punishment (BIS) scores showed a moderate relationship

with normative driving behaviour by having fewer self-reporting traffic violations. In a study examining personality and self-reported risky driving behaviour among young adults, it was found that high sensitivity to reward scores (BAS) were positively related to aberrant driving behaviours and high sensitivity to punishment scores were related to increased driving mistakes (Constantinou, Panayiotou, Konstantinou, Loutsiou-Ladd, & Kapardis, 2011). Similar findings have been observed among novice drivers who demonstrated a strong positive relationship with high sensitivity to reward scores and risky driving behaviour. When analyzing perceived risk towards risky driving behaviours (e.g., speeding, driving under the influence of alcohol, etc.) it has been found that high BIS scores are associated with increased risk perception towards unsafe driving actions. Furthermore, high scores on the BAS subscale reward responsiveness have been shown to be positivity related to increased risk perception (Harbeck & Glendon, 2013). This variability between subscales is arguably attributed to reward responsiveness being more strongly linked to long-term rewards (e.g., long-term goal setting), whereas other subscales such as BAS fun seeking is more strongly related to impulsiveness and sensation seeking (Corr, 2008; Voigt et al., 2009).

The only driving study to utilize the revised RST has been Morton and White's (2013) examination of personality and stress on driving simulator performance. Being the first study to utilize the FFFS factor on driving, it was found that the high FFFS scores were associated with poorer driving performance when under induced psychosocial stress. More specifically, those with higher FFFS scores demonstrated poorer hazard responses during a stress induction procedure. These findings suggest that drivers who scored higher on the FFFS were more sensitive towards anticipating negative evaluations during the task

and thereby reducing their attentional capacity to drive safety. These studies collectively demonstrate the relationship between RST and driving, and more specifically highlight the positive relationship the BAS may have with risky driving.

Personality and Motorcycles

Compared to the automotive literature, the effect of personality on motorcyclist behaviour has received less attention. With most research being conducted in areas where two-wheel vehicles (e.g., scooters and motorcycles) are a much more common form of transportation, such as Taiwan, Australia, and central Europe, fewer studies have examined its potential effects in North American populations. Given differences in licensing, safety and traffic laws, and average motorcycle size between the countries, the effects found in one area may not necessarily generalize to another. Among the personality factors most frequently examined in these regions have been aggression, impulsiveness, and, most rigorously, sensation seeking.

The Big Five and Motorcycles

Despite the Big Five's popularity, only one study has been conducted in the last year to analyze its relationship with motorcyclist riding behaviour. In an attempt to determine the relationship between personality and road safety rule compliance, Ucho and others (2016) surveyed 264 Nigerian motorcyclists. Results revealed that the Big Five factors jointly accounted for 8 percent of the variance in road safety rules compliance. When analyzed independently, it was revealed that extroversion, conscientiousness, neuroticism, and openness were not significant in predicting safety rule compliance. High agreeableness alone was the only factor able to significantly predict safety rule compliance. Surprisingly, when comparing these findings to the previously cited literature

on the Big Five and driving, agreeableness was the only factor to have a significant relationship with rule compliance. Ucho and his colleagues concluded that individuals scoring higher on agreeableness are more likely to abide by societal rules, as well as be more cooperative and orderly while driving. Additionally, they suggested that much of the previous research on the Big Five and driving has shown mixed results. Some studies demonstrate significant relationships that often utilized simple correlational models (Arthur & Graziano, 1996; Taubman - Ben-Ari & Yehiel, 2012), but where more sophisticated statistical models are employed, these relationships are no longer significant (Stephens & Groeger, 2009).

Sensation Seeking and Motorcycles

Though high sensation seekers tend to gravitate towards high-risk activities such as motorcycling, it has been found that different levels of sensation seeking are associated with different riding behaviours. In a report examining the psychological and social factors influencing motorcyclist behaviour and intentions, Watson and collegues (2007) found that high sensation seekers are more likely to ride at extreme speeds, perform stunts, bend traffic rules, and push their own limits. Other factors observed among high sensation seekers are being more likely to ride within two hours of consuming alcohol, going above the speed limit with no fear of detection, and participating in illegal street races (Haque, Chin, & Lim, 2010; Ismail, Din, Lee, Ibrahim, & Sukimi, 2015). Other unique characteristics observed among high sensation seekers are being more likely to join a motorcycle club, prefer a stylish helmet, wearing gloves while riding, and desiring to find the top speed on a recently purchased motorcycle (Haque et al., 2010). Interestingly, the effects of high sensation seeking are not always associated with aversive outcomes. Wong

and collegues (2010) found that high sensation seekers were involved in fewer crashes due to the regulating effect of their perceived behavioural control by being highly attentive to surrounding traffic conditions while riding.

The Present Study

The purpose of this study is to investigate the relationship of three conceptually distinct personality theories on self-reported riding behaviour among motorcyclists. More specifically, how are the personality traits of the Big Five, Sensation Seeking, and RST taxonomy associated with an individual's riding behaviour? By determining which personality traits best correlate with specific riding behaviours, it should be possible to identify which traits are most predictive of safe and unsafe riding. Riding behaviours of specific interest will be largely based on the Motorcycle Rider Behaviour Questionnaire (MRBQ) developed by Elliot (2007). The MRBQ focuses on riding errors, speeding, stunt behavior, and the use of protective equipment. This study is the first attempt to apply Gray's theory of reinforcement sensitivity to a population of motorcyclists and to utilize the MRBQ on a North American population.

Based on previous studies described above on personality and driving, the following hypotheses, to be tested by this study, are proposed in the context of the three major personality trait models:

Hypotheseis 1: Big Five

A. Conscientiousness should have an inverse relationship with speeding, stunts and errors, and a positive relationship with protective equipment use. Given the protective relationship conscientiousness has shown to have with crash

involvement, it is predicted that high scores will be associated with safer riding habits (Dahlen et al., 2012).

B. High Agreeableness will have a positive relationship with protective equipment use and an aversive relationship with stunts and speeding. According to Ucho and others (2016) findings, high agreeableness was a positive predictor of safety rule compliance amongst motorcyclists.

C. Neuroticism scores will have a positive relationship with traffic errors. Given the association high neuroticism has with low confidence and stress susceptibility, it is predicted that higher scores will result in more traffic errors (McCrae & Costa, 2003).

D. Openness to Experience will have a positive relationship with traffic errors. Given the correlation between low openness to experience and increased focus, it is predicted to be positively associated with more traffic errors (Clarke & Robertson, 2005).

E. Extroversion will have a positive relationship with speeding, stunts, errors, and protective equipment use. Given the positive relationship between extroversion and fatal and non-fatal crash involvement, it is predicted that high extroversion will be associated with more unsafe riding behaviours (Clarke, & Robertson, 2005).

Hypothesis 2: Sensation Seeking

Sensation Seeking should have a positive relationship with speeding, stunts, and errors, and inverse relationship with protective equipment use. Given the well-established relationship that sensation seeking personality traits has with fatal and

non-fatal crash involvement, it is predicted that high sensation seekers will have the least safe riding habits (Jonah, 1997).

Hypotheses 3: Reward Sensitivity Theory

A. Overall BAS scores should have positive relationships with speeding, stunts, and errors, and inverse relationship with protective equipment use. This result is expected based on prior findings that higher BAS scores are closely associated with increased risky driving behaviours (Harbeck & Glendon, 2013; Morton & White, 2013; Voigt et al., 2009). More specifically,

- **i.** Reward Reactivity should have a positive relationship with speeding, stunts, and protective equipment use. As shown by Harbeck and Glendon (2013), higher scores on reward reactivity are associated with an increased perceived risk of risky driving behaviours, as well as reported engagement in risky driving.
- **ii.** Impulsivity should have the strongest positive relationship with speeding and stunts, and inverse relationship with protective equipment use. Given the overlap with sensation seeking and impulsivity constructs (Corr & Cooper, 2016), it is predicted that high impulsivity scores will be associated with being least likely to wear protective equipment.

B. High BIS scores should have inverse relationships with speeding, stunts, and errors and a positive relationship with protective equipment use. Research by Castellà and Pérez, (2004) found that high BIS scores are associated with normative driving behaviour and less likely to commit traffic violations.

C. FFFS should have positive relationship with protective equipment use and traffic errors. Corr and Cooper (2016) found that people with a more active FFFS will feel highly uncomfortable in threatening situations, and will be more likely to act on behaviours that will distance themselves from a perceived threat and therefore opt to wear protective equipment to reduce their chance on injury. In addition, Morton and White (2013) found that people with highly active FFFS systems perform more poorly under stress and have more self-reported traffic errors.

Method

Participants

Participants were drawn from local motorcycle dealerships (see Appendix A for poster advertisement), online motorcycle forums (e.g., www.reddit.com/r/motorcycles/) and Amazon Mechanical Turk, which is an online integrated participant compensation system where participants can be recruited rapidly and inexpensively. It has been demonstrated to be a reliable method of data collection when compared to more traditional methods (e.g., paper-and-pencil) and has shown to have more diversity than university student sample populations (Buhrmester, Kwang, & Gosling, 2011). Given the lack of generalizability that would occur if all motorcyclists were recruited locally, online data was chosen to maximize representation.

The final sample (n = 521) consisted of 89% American and 11% Canadian motorcyclists. The sample was predominantly male n = 472 (92%). The average age was 32.9 (SD = 12.4) ranging from 17 to 78. The average duration each rider was licensed for was 8.7 years (SD = 11) and ranged from less than 1 to 54 years with a median duration of

4 years. Riders reported spending an average of 10hrs (*SD* = 7.5) of on the road riding per week. Table 2 displays demographic information and mean personality scores.

Demographic Measures

Demographic measures consisted of questions on rider age, sex, years actively riding, state or province of license, class of license, hours ridden per week, and riding status (e.g., continued rider, returned rider, new rider). In addition, the survey collected information on the model year and engine size of the most used motorcycle, the number of crashes and moving violation within the last year, and the number of near crashes or close calls while operating a car or motorcycle within the last three months.

The Big Five Inventory (BFI)

The Big Five Inventory (Pervin & John, 1999) is comprised of 44 short phrase statements where participants indicate to what degree they agree or disagree with each on a 5-point Likert-type scale (1 indicating strongly disagree and 5 indicating strongly agree). The questionnaire is designed to assess extroversion with statements like “is talkative”, agreeableness with “is helpful and unselfish with others”, conscientiousness with “does a thorough job”, neuroticism with “is depressed and blue”, and openness with “is original, comes up with new ideas”. Within North American surveys received, the alpha reliabilities average above .80 and the questionnaire demonstrates strong convergent and divergent validity with other Big Five measures (Arterberry, Martens, Cadigan, & Rohrer, 2014; Soto & John, 2009).

Brief Sensation Seeking Scale (BSSS)

The Brief Sensation Seeking Scale (Hoyle, Stephenson, Palmgreen, Lorch, & Donohew, 2002) is comprised of eight self-report statements, to which participants indicate their agreement on a 5-point Likert type scale from with 1 indicating strongly disagree to 5 indicating strongly agree. The scale is designed to assess a number of BSSS subscales, for example, thrill- and adventure-seeking " I like to do frightening things", experience-seeking " I would like to explore strange places", disinhibition "I like wild parties", and boredom susceptibility "I get restless when I spend too much time at home". The BSSS scale has a Cronbach α of 0.74 and has been demonstrated to be a valid measure of sensation seeking among young and middle age adults (Hoyle et al., 2002).

The Brief Aggression Questionnaire (BAQ)

The BAQ, created by Webster and colleagues (2015), is a short form version of the Aggression Questionnaire (Buss & Perry, 1992) designed to measure individual differences in aggression. The questionnaire consists of 12 statements (e.g., "Given enough provocation, I may hit another person") answered on scale from 1 "extremely uncharacteristic of me" to 5 "extremely characteristic of me". The scale has demonstrated sufficient reliability with a Cronbach α of .80, and convergent validly with other aggression questionnaires (Webster et. al., 2013). Given the previous association, aggression has been shown to correlate with motorcycle crash risk and therefore was included as a control variable (Haque et al., 2010; Watson et al., 2007).

Reward Sensitivity Theory – Personality Questionnaire (RST-PQ)

Among the six questionnaires developed to measure the Reward Sensitivity Theory, the RST-PQ has been recently praised as one of the most accurate measures for evaluating the three factors of the revised RST (Corr & Cooper, 2016; Krupić et al., 2016). The questionnaire is made up of 73 statements which measure the Behavioural Inhibition System (e.g., "People are often telling me not to worry"), Fight-Flight-Freeze System (e.g., "Looking down from a great height makes me freeze"), and the Behavioural Activation System. The BAS scale is subdivide into four subscales being Reward Interest (eg., "I regularly try new activities just to see if I enjoy them"), Goal-Drive Persistence (e.g.,"I will actively put plans in place to accomplish goals in my life"), Reward Reactivity (e.g.,"I get a special thrill when I am praised for something I've done well"), and Impulsivity (e.g., "If I see something I want, I act straight away"). The statements are answered on a 4-point Likert-type scale on how accurately they describe themselves (1 being "Not at all" to 4 "Highly"). The RST-PQ has additionally demonstrated acceptable internal and convergent validity (Krupić et al., 2016)

The Motorcycle Rider Behaviour Questionnaire (MRBQ)

The MRBQ was developed by Elliott, Baughan, and Sexton (2007) to measure self-reported behavioral factors related to one's crash risk. Questions are answered on a 6-point Likert-type format from 1 "never" to 6 "nearly all the time" and specifically assess speeding (e.g., "Exceed the speed limit on a residential road"), stunts (e.g., "Attempt to do, or actually do, a wheelie"), errors (e.g.,"Skid on a wet road or manhole cover"), and protective equipment use (e.g., "Wear a protective jacket (leather or non-leather)?"). The factors of errors and speeding have been demonstrated to have internal consistencies over

.80, whereas stunts and proactive equipment use have been found to have alpha coefficients below .70 among novice riders. Recent findings have suggested applying to MRBQ to participants outside of Australia and to both experienced and novice riders will inform the scales further development (Sakashita et al., 2014).

Statistical Analysis

Separate hierarchical regression models were performed to examine the effect of personality on each riding behaviour. In the first step, sex, age, years actively riding, and aggression scores were controlled for in each model. The order in which the predictor variables were entered into each model was determined by how much evidence there was to support a relationship between the predictor and each riding behaviour. Given the well-established relationship that sensation seeking and aggression have with unsafe riding (Ismail et al., 2015; Watson et al., 2007), they were the first personality variables to be entered into the model in Step 2. With no prior research examining the relationship with Reward Sensitivity Theory traits and motorcycles, their traits were entered last. Two separate regression models for each riding behaviour were performed to compare our findings with previous research on the Big Five and motorcycles substitute BAS total scores with BAS subtraits scores Reward Interest, Reward Reactivity, Impulsivity and Goal Driver Persistence.

Results

Missing Data

The dataset initially consisted of 1,120 cases, 322 cases were dropped for not residing in the United States or Canada, reducing the sample to 798 cases. Given the

majority of previous motorcycle research has focused on Australian, European and Eastern Asian samples, the current study was oriented towards understanding the riding behaviour of motorcyclists from North America. A visual scan of the data revealed that some participants chose to discontinue the questionnaire after only answering demographic and motorcycle related items. For this reason, participants who missed over 10% of responses to the entire survey were dropped (286), reducing the sample to 521. Little's Missing Completely at Random (MCAR) test using Estimation Maximization was used to determine if the remaining data were missing at random. The test indicated that data were missing completely at random by failing to reach significance $\chi^2(83427) = 83472.58$, $p < 0.46$. For the primary variables of interest, mean imputated scores were generated for cases missing less than 25% of responses. The dependent variable protective gear was excluded from all analysis due to 70% of participants failing to provide enough responses to produce a composite score[1]

Preliminary Data Screening

Preceding the main analysis, data were analyzed to check for missing values, normality, outliers, and colinearity. Scatter plots, histograms and descriptive statistics were used to identify extreme or abnormal values. Skewness and kurtosis tests for normality were conducted on variables that demonstrated abnormal distributions. Main variables of interest were transformed into z-scores to identify univariate outliers. Six univariate outliers were identified (standardized scores in excess of +/− 3.29). Given the large sample,

[1] Depending on the variable, mean imputated scores were created for between 1 and 25 (<1 – 5%) participants with the exception of the dependent variable MRBQ speeding. This variable had mean imputated scores for 122 participants (28%) who responded to at least 75% of the items for this measure. This lack of responses may be due to participants feeling that these items were redundant by responding to similar items presented earlier in the online survey from a separate motorcycle riding questionnaire that was not included in the analyses for this thesis.

the six cases were removed from the following analyses, reducing the final sample to n = 515. The variables rider MRBQ-Errors and MRBQ-stunts demonstrated positively skewed distributions. It was decided to leave the variables unmodified given that underestimates of variances from positively skewed distributions are shown to disappear with samples exceeding one-hundred cases (Tabachnick & Fidell, 2013).

Collinearity among independent variables was assessed using variance inflation factor scores (VIF) and pairwise correlations among predictor variables (see Table 1). The VIF is a measure of multicollinearity where values greater than 4 -10 indicate there is a near perfect linear relationship among two or more of the predictor variables (O'Brien, 2007). An analyses of VIF scores for all predictor variables revealed that none of the values met the conditions for multicollinearity with the highest value at 3.75 (see Table 1). According to Tabachnick and Fidell (2013) multicollinearity is present when correlations between variables exceed .90. Intercorrelations between predictor variables revealed that none of the correlations exceeded .90, with the strongest correlation being between the BIS and neuroticsm *(*r(514) = .76, p < .001) (See Table 1).

Table 1
Intercorrelations and Variance Inflation Factors (VIF) Amoung Predictor Variables

	Correlations													
Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	VIF
1. Age	-													2.75
2. Sex	-.04	-												1.16
3. Yr/Rd	.74***	-.07	-											2.37
4. BSSS Total	-.25***	-.14*	-.17***	-										1.62
5. BAQ Total	-.24***	-.11*	-.13*	.25***	-									1.6
6. BFI Conscientiousness	.25***	-.01	.22***	-.13*	-.13*	-								1.31
7. BFI Agreeableness	.16***	.12*	.10*	-.06	-.49***	.19***	-							1.55
8. BFI Neuroticism	-.21***	.12*	-.23***	-.09	.27***	-.40***	-.32***	-						3.06
9. BFI Openness to Experience	.21***	-.05	.10*	.25***	-.05	.14*	.18***	-.18***	-					1.35
10. BFI Extroversion	.14***	.06	.18***	.26***	.01	.13*	.21***	-.33***	.30***	-				1.78
11. RST-PQ Fear Fight Flight System	-.16***	.29***	-.13*	-.29***	-.02	-.08	.00	.34***	-.19***	-.16***	-			1.47
12. RST-PQ Behavioural Inhibition System	-.32***	.08	-.29***	.08	.28***	-.34***	-.22***	.76***	-.05	-.37***	0.35	-		3.62
13. RST-PQ Behavioural Activation System	-.21***	.10*	-.15***	.36***	.22***	.06	.11*	.03	.24***	.34***	.15***	.28***	-	1.86

Note. Yr/Rd = Years Activley Riding; BSSS = Brief Sensation Seeking Scale; BAQ = Brief Aggression Questioniarre; BFI = Big Five Inventory; RST-PQ = Reinforcement Sensitivity Theory Personality Questionairre
*p<.05. ***p <.001.

Riding Errors

The first hierarchical model examined the effect of age, sex, years actively riding and personality on self-reporting riding errors. Step one of the model included demographic variables: age, sex and years riding. The three predictors collectively explained 2% of the adjusted variance in riding errors (R^2=.02, F(3,497) = 3.43, p <.01). None of the demographic variables were able to individually predict riding errors.

Step two of the model included participant scores on sensation seeking and aggression. The addition of these variables allowed for the model to account for 6% of the adjusted variance in riding errors (R^2 change =.04, F(2,495) = 11.78, p <.001). With higher scores on aggression demonstrating an increase in errors (β = .14, p<.05). Given that Sensation seeking failed to significantly predict riding errors, Hypothesis 2.A was not supported

Step three expanded the model to include the Big Five personality traits extroversion, agreeableness, conscientiousness, openness to experience and neuroticism. The inclusion of these variables allowed the model to account for 11% of the adjusted variance in self-reported riding errors (R^2 change =.07, F(5,495)= 7.44, p <.001). These finding demonstrate support for hypothesis 1.A; that conscientiousness will have an inverse relationship with errors (β = -.15, p<.01). Contrary to predictions made in hypothesis 1.D, openness to experience demonstrated a negative relationship with riding errors (β = -.14, p<.05). Hypothesis 1.C predicted that neuroticism would have a positive relationship with riding errors, the results clearly demonstrated a significant but inverse relationship (β = -.22, p<.05). Hypothesis 1.E predicting that extroversion would positively relate with riding errors failed to reach statistical significance. Table 3 displays the relationship each

Table 2

Summary of Means, Standard Deviations and Ranges for Demographic and Personality Variables

Measure	*M (SD)*	Range
Rider Factor		
Age	31.6 (12)	16 - 74
Years Actively Riding	8.7 (11.8)	<1 - 54
Hr Ridden/Week	9.9 (7.5)	<1 - 33
Personality Factor		
RST-PQ Fear Fight Flight System	1.8 (0.53)	1 - 4
RST-PQ Behviorual Inhibiton System	2.3 (0.53)	1.1 - 3.7
RST-PQ Behaviorual Activation System	2.7 (0.36)	1.5 - 3.9
RST-PQ Reward Responsiveness	2.6 (0.48)	1.3 - 4
RST-PQ Implusivity	2.4 (0.48)	1.1 - 4
RST-PQ Goal Drive Persistence	2.9 (0.51)	1.2 - 4
RST-PQ Reward Interest	2.8 (0.49)	1.3 - 4
BFI Conscientiousness	3.7 (0.63)	1.4 - 5
BFI Agreeableness	3.7 (0.66)	1.6 - 5
BFI Neuroticism	2.5 (0.88)	1 - 4.8
BFI Openeness to Experience	3.7 (0.63)	1.2 - 5
BFI Extroversion	2.9 (0.87)	1 - 5
BAQ	3.4 (0.88)	1.5 - 7
BSSS	3.42 (0.78)	1.1 - 5

Note. BSSS = Brief Sensation Seeking Scale; BAQ = Brief Aggression Questionnaire; BFI = Big Five Inventory; RST-PQ = Reinforcement Sensitivity Theory Personality Questionnaire

Table 3

All Control and Personality Variables on Predicting Self-Reported Riding Behaviour

	Riding Behaviour					
	Errors		Speeding		Stunts	
Variable	ΔR^2	β	ΔR^2	β	ΔR^2	β
Step 1	.02*		.09***		.05***	
Age		.10		-.07		-.18*
Sex		.07		-.15*		-.02
Yr/Rd		.01		-.03		.24***
Step 2	.04***		.05***		.06***	
BSSS Total		.09		.16*		.16*
BAQ Total		.14*		.06		.11*
Step 3	.06***		.03*		.03*	
BFI Conscientiousness		-.15*		-.05		-.12*
BFI Agreeableness		-.10		-.13*		-.11*
BFI Neuroticism		-.22*		-.07		-.26***
BFI Openness to Experience		-.14*		-.08		-.04
BFI Extroversion		-.09		-.08		.06
Step 4	.07***		.01		.01	
RST-PQ Fear Fight Flight System		.19***		-.09		.00
RST-PQ Behavioural Inhibition System		.36***		.08		.19*
RST-PQ Behavioural Activation System		-.11		.08		-.06
Adjusted Total R^2	.18***		.15***		.13***	
n	501		418		500	

Note. ΔR^2 = Change in R^2; Yr/Rd = Years Actively Riding; BSSS = Brief Sensation Seeking Scale; BAQ = Brief Aggression Questionnaire; BFI = Big Five Inventory; RST-PQ = Reinforcement Sensitivity Theory Personality Questionnaire

*p<.05. ***p <.001.

personality trait has with riding errors.

The fourth and final step of the regression model was to include the three broad traits of the RST; the Fear Fight Flight System, Behavioural Inhibition System and Behavioural Activation System. The addition of these variables allowed the model to account for 7% more variance (R^2 change = . 07, $F(3,487) = 14.28$, $p < .001$). In total, all variables were able to account for 18% of the adjusted variance in rider errors (Adjusted $R^2 = 0.18$ $F(13,487) = 9.49$, $p < .001$). The relationship each RST trait has with riding errors is displayed in Table 3. Hypothesis 3.B stating that the FFFS would predict errors was supported ($\beta = .19$, $p <.001$). Hypothesis 3.C predicting that the BIS would have inverse relationships with speeding stunts and errors was not supported. Results revealed that BIS had a strong positive relationship with rider errors ($\beta = 0.36$, $p < 0.001$). Finally, the Hypothesis 3.A predicting that BAS total scores would have a positive relationship with riding errors was not supported.

Two separate multiple regression models were performed to compare the associations of the Big Five with previous research, as well as determine the effect of the BAS subtraits on riding errors. The first model displayed in Table 4 included control variables and all Big Five traits on riding errors. This model accounted for 10% of the adjusted variance in riding errors (Adjusted $R^2 = .10$, $F(8,492) = 7.79$, $p < .001$). The second model displayed in Table 5 included control variables, the RST traits and BAS the subtraits: RI, GDP, I and RR. This model accounted for 12% of the adjusted of the variance in riding errors (Adjusted R^2 .12, $F(9,492) = 8.32$, $p < .001$). Although none of the BAS subtraits were anticipated to predict riding errors, the model demonstrated an inverse relationship with goal drive persistence ($\beta = -.11$, $p < .05$).

Table 4

Sex, Age and Big 5 on Predicting Self-Reported Riding Behaviours

	Riding Behaviour								
	Errors			Speeding			Stunts		
Variable	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
Age	-.00	.00	-.03	-.01	.00	-.17*	-.02	.00	-.28***
Sex	.13	.06	.09*	-.52	.12	-.20***	-.13	.11	-.06
Yr/Rd	.00	.00	.05	-.00	.00	-.01	.02	.00	.26***
BFI Conscientiousness	-.10	.03	-.17***	-.09	.06	-.08	-.15	.05	-.15*
BFI Agreeablenss	-.08	.03	-.13*	-.19	.06	-.17*	-.16	.05	-.17***
BFI Neuroticsm	.04	.02	.09	-.02	.05	-.02	-.10	.04	-.13*
BFI Openeness to Experience	-.06	.03	-.11*	.01	.06	.01	-.04	.05	-.03
BFI Extroversion	.01	.02	.02	-.01	.04	-.01	.05	.04	.07
Adjusted R^2	.10			.11			.09		
F	7.79***			7.61***			7.16***		
n	501			418			500		

Note. Yr/Rd = Years Activley Riding; BFI = Big Five Inventory

*p<.05. ***p <.001.

Table 5

Age, Sex and Reinforcement Sensitivity Theory on Predicting Self-Reported Riding Behaviour

	Riding Behaviour								
	Errors			Speeding			Stunts		
Variable	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
Age	-.00	.00	-.05	-.01	.00	-.19*	*-.02*	*.00*	*-.30***
Sex	.06	.06	.04	-.53	.13	-.21***	*-.17*	*.11*	*-.07*
Yr/Rd	.00	.00	.06	.00	.00	.00	*.02*	*.00*	*.28***
RST-PQ Fear Fight Flight System	.09	.04	.12*	-.23	.07	-.17*	-.12	.06	-.09
RST-PQ Behviorual Inhibiton System	.15	.04	.21***	.17	.08	.12*	-.04	.06	-.03
RST-PQ Behaviorual Activation System									
RST-PQ Reward Interest	-.04	.04	-.05	-.16	.09	-.10	.09	.07	.07
RST-PQ Goal Drive Persistence	-.09	.04	-.11*	-.01	.08	.00	-.14	.07	-.11*
RST-PQ Impulsivity	.08	.05	.10	.07	.10	.05	.11	.08	.08
RST-PQ Reward Reactivity	.00	.05	.00	.20	.10	.13*	.02	.08	.01
Adjusted R^2	.12			.12			.07		
F	8.32***			7.47***			4.95*		
n	502			419			501		

Note. Yr/Rd = Years Actively Riding; RST-PQ = Reinforcement Sensitivity Theory Personality Questionnaire

*p<.05. ***p <.001.

Speeding

The second hierarchical model examined the effect of age, sex, years riding, and personality on self-reported speeding. In the same order as the previous model, step one included age, sex and years riding. The two predictor variables accounted for 9% of the adjusted variance in speeding (Adjusted $R^2 = .09$ $F(3,414) = 14.56$, $p < .001$).

Step two of the model included sensation seeking and aggression. The addition of these variables allowed the model to account for 13% of the adjusted variance in speeding (R^2 change = .05, $F(2,412) = 11.68$, $p < .001$). Consistent with hypothesis 2.A sensation seeking was positively associated with speeding behaviour ($\beta = .16$, $p < .05$). Step three included the Big Five traits. The addition of these variables allowed the model to account for 15% of the adjusted variance (R^2 change = .02, $F(5,407) = 2.42$, $p < .05$) in speeding. Consistent with hypothesis 1.B low agreeableness significantly predicted self-reported speeding ($\beta = -.13$, $p < .05$). Hypothesis 1.A and 1.E were not supported with conscientiousness and extroversion failing to reach statistical significance. Step four's addition of the RST made no statically significant addition to the model. None of the RST traits significantly predicted self-reported speeding, demonstrating no support for hypotheses 3.A and 3.B. The relationship each trait has with self-reported speeding is displayed in Table 3.

When modeling the effects of the Big Five independently (Table 4), the model accounted for 11% of the adjusted variance in speeding (Adjusted $R^2 = .11$, $F(8,409) = 7.61$, $p < .001$). When modeling the RST and BAS subtraits the model accounted for 12% of the adjusted variance in speeding (Adjusted $R^2 = .12$, $(9,409) = 7.47$, $p < .001$). Hypothesis 3.A.I predicting that reward reactivity would have a positive with speeding and

stunts, was partially supported by demonstrating a positive relationship with speeding (β = .13, $p < .05$). Contrary to hypothesis 3.B, BIS scores demonstrated a positive relationship with speeding (β = .12, $p < .05$). FFFS scores demonstrated unexpected results by having a negative relationship with speeding (β = -.17, $p < .05$). The effect of all the RST traits have with speeding are displayed in Table 5.

Stunts

The third hierarchical model examined the effect age, sex, years riding and personality on self-reported stunt behaviour. Age, sex and years riding account for 5% of the adjusted variance in stunt scores (Adjusted R^2 = .05, $F(3,496) = 9.75$, $p < .001$). The addition of sensation seeking and aggression allowed the model to account for 11% of adjusted the variance (R^2 change = 0.06, $F(2,494) = 16.29$, $p < .001$). Consistent with hypothesis 2.A, the hypothesis on sensation seeking, it was strongly related to self-reported stunt behaviour (β = .16, $p < .05$).

The addition of the Big Five traits increased the fit to 12% of the adjusted variance (R^2 change = .03, $F(5,489) = 2.86$, $p < .05$). Consistent with hypotheses 1.A, and 1.B conscientiousness (β = -.12, $p <.05$), and agreeableness (β = -.11, $p <.05$) demonstrated an inverse relationship with stunts. Hypothesis 1.E, predicting a positive association between stunts and extroversion was not supported. Neuroticism unexpectedly demonstrated a strong inverse relationship with self-reported stunts (β = -.26, $p < .001$). The addition of the RST traits in the fourth step did not significantly improve the model's fit. Contrary to Hypothesis 3.C, BIS scores showed a positive relationship with stunts (β = -.18, $p < .05$).

When using only the Big Five traits to predict stunts, the model demonstrated support for hypothesis 1.C; specifically, that agreeableness would show an inverse

relationship (β = -.17, p < .001). See Table 4 for relationship all Big Five traits have with stunts. When predicting stunts with the RST traits independently, the model accounted for 7% of the adjusted variance (Adjusted R^2 = .07, F(9,491) = 4.95 p < .001). This model unexpectedly revealed that stunts were inversely related to goal drive persistence (β = -.11, p < .05). See Table 4 for relationship RST traits have with stunt scores.

Discussion

The current study was designed to examine how several well-established personality questionnaires, as well as a newer version of an RST scale, would relate to riding behaviours that lead to greater crash risk (e.g., motorcycle violations and errors). Several studies have examined the effect that personality has on motorcyclist riding behaviour but three primary factors distinguish this study from the others. Firstly, this study solicited respondents from across North America. Secondly, it included several scales (Big Five, Aggression, Sensation Seeking, RST) in the same analyses to assess the unique contribution of each scale. Previous research on motorcyclist behaviour has rarely examined personality traits other than sensation seeking. Therefore, the current study served as an opportunity to determine if the addition of other personality models would offer a better understanding of the human factors that contribute to motorcycle crash risk. Thirdly, this study included the RST, which has never been applied to a motorcyclist population. It was anticipated that this newer personality model would offer insight into how personality may contribute to aversive health outcomes beyond the typically studied personality scales (e.g., sensation seeking, aggression, and the Big Five).

It was hypothesized that the Big Five, sensation seeking, and RST personality traits would predict behaviours such as speeding, stunts and errors. When controlling for age,

sex and aggression scores, all personality variables were able to account for 18% of the adjusted variance in riding errors, 15% for speeding and 13% for stunts. Some personality traits were hypothesized to have a unique relationship with each riding behaviour. Each of the proposed relationships are discussed in the following. See Appendix B: Table 5 for a summary of all hypotheses and outcomes.

The Big Five

Conscientiousness was hypothesized to have an inverse relationship with speeding, stunts, and errors. Results from three hierarchical regression models demonstrated support for an inverse relationship with errors and stunts. Riding errors have been associated with increased overall crash risk (Elliot, 2007). Therefore, these results are consistent with Brandauand et al.'s (2011) findings that moped riders scoring high on conscientiousness were the least likely to be injured while riding compared to other Big Five traits. The current research replicates and extends these findings by demonstrating the protective effects conscientiousness has with a more diverse motorcyclist population.

It was hypothesized that Agreeableness would have an inverse relationship with stunts and speeding. Both these predictions were supported. These findings are consistent with that of Ucho and collegues (2016), who found that riders scoring high in agreeableness were the most likely to comply with road safety rules. These findings suggest the riders scoring low on agreeableness may be more likely to participate in riding behaviours that could put them at higher risk for crash involvement.

Neuroticism was anticipated to have a positive relationship with riding errors. Unexpectedly, within the hierarchical model this relationship was shown to be negative. These unanticipated findings may be in part due to neurotic individuals being more likely

to avoid ambiguous stimuli (Lommen, Engelhard, & van den Hout, 2010). Riders scoring higher on neuroticism may minimize their exposure to riding situations or environments with which they are unfamiliar or uncomfortable (e.g., riding on busy highways, low visibility conditions). Whereas less neurotic riders may be more likely to perform a riding error by being less reluctant to put themselves in situations or environments they are unfamiliar with.

Neuroticism was also found to have an unanticipated negative relationship with stunts. This suggests that those who score high on neuroticism may be less likely to engage in stunt behaviour. Given the negative relationship neuroticism has been shown to have with overall risk taking propensity (Nicholson, Soane, Fenton-O'Creevy, & Willman, 2005), these findings are consistent with prior research. These findings suggest that neurotic individuals may perceive the risks associated with stunts to outweigh the rewards, or may not feel confident enough in their riding abilities to preform them.

Openness to experience was anticipated to have a positive relationship with riding errors. Results revealed a significant relationship but in the opposite direction. This unanticipated finding may be, in part, explained by the relationship between openness to experience and stress. Previous research on openness to experience and stress regulation has shown that people who rank high in openness are less vulnerable to stress' aversive effects (e.g., high blood pressure, poor sleep quality) (Williams, Rau, Cribbet, & Gunn, 2009). This buffering effect has been hypothesized to be due, in part, to people scoring higher on openness to experience being more adaptive and flexible under stressful situations (Lee-Baggley, Preece, & DeLongis, 2005). Because it has been also found that life stress (e.g., work and family) (Rowden, Matthews, Watson, & Biggs, 2011) and driver

stress (Matthews et al., 1998) have a positive relationship with driver errors it may be possible that individuals scoring high on openness to experience are less susceptible to driving related stress performance and are less likely to commit riding errors.

Extroversion was hypothesized to be associated with speeding, stunts, and errors, but this was found not to be the case, even when modeled independently. These findings serve as the most surprising given the well-established relationship extroversion has been shown to have with crash involvement among four-wheel passenger vehicles (Clarke & Robertson, 2005). These null findings may suggest that extroversion is a less effective trait in predicting crash involvement for motorcyclists than for four-wheel passenger vehicles. Motorcyclists may be less likely to engage in social behaviours that can distract them while riding (e.g., talking on a cell phone, talking to passengers) compared to four-wheel passenger vehicle drivers. Therefore, the effects extraversion may have on risk taking behaviours may have less of an opportunity to manifest themselves on activities such as motorcycling. Further research examining the relationship the Big Five has with motorcycles may benefit from including measures for the Big Five sub-facets (e.g., excitement seeking, assertiveness).

When compared to previous motorcycle and personality research, the current study found that the Big Five Inventory accounted for similar levels of variance in riding behaviour as other studies. Ucho and colleagues (2016) found that when controlling for sex age, religion, education and marital status the Big Five accounted for 11% of the variance in road safety rule compliance. The current study replicated Ucho's findings and found that when controlling for only age and sex, the Big Five was able to account for 10 to 13% of the variance in riding behaviour.

Sensation Seeking

Sensation seeking was hypothesized to have a positive relationship with speeding, stunts and errors. These predictions were partially supported by demonstrating a positive relationship with speeding and stunts and an inverse relationship with errors. These findings are consistent with those of Watson and others (2007), who found that riders scoring high on sensation seeking were more likely to ride at extreme speeds and perform stunts. The inverse relationship observed with sensation seeking and errors are consistent with the work of Wong and others (2010), who found that riders who score high on sensation seeking are highly aware of surrounding traffic conditions and are less likely to crash, but if they do, the crash is likely to be more severe.

Previous research has shown that when controlling for aggression, sensation seeking accounted for 16% of the variance in motorcyclist traffic violations (Ismail, 2015). The current study found that sensation seeking and aggression were able to account for 9% of the variance in speeding and 8% of the variance in stunts. This discrepancy may be in part due to differences in the study population and dependent variables of interest. Ismail and colleagues examined the riding behaviour of illegal street racers in Malaysia.

Reinforcement Sensitivity Theory

BAS total scores were hypothesized to have a positive relationship with speeding, stunts and errors. None of these relationships were supported. These findings are partially consistent with recent evidence to suggest the BAS should not be measured as a one-dimensional construct and rather be assessed by its individual subtraits (Corr, 2015; Krupic, 2016). With this consideration in mind, it was decided to include an RST measure with BAS subtraits.

It was hypothesized that the subtraits reward reactivity and impulsivity would be positively associated with speeding and stunts. Among these predictions only a positive relationship was found between speeding and reward reactivity. These finding are consistent with previous research demonstrating a positive relationship between reward reactivity and self-reported risky driving behaviour (e.g., speeding, driving under influence of alcohol) (Harbeck & Glendon, 2013). It was also found that goal-drive persistence had an inverse relationship with stunts and errors. With goal drive persistence being defined as actively pursuing a desired goal when immediate rewards are not available (Corr, 2008), it may suggest that riders who score high on this dimension may not value the short term rewards of performing stunts, over the risks associated with them. Regarding the inverse relationship goal drive persistence had with errors, an explanation may come from a possible moderating effect of conscientiousness. The current study found a moderate correlation between goal drive persistence and the Big Five's conscientiousness *(r*(515) = 0.42, $p < 0.001$) suggesting that riders scoring higher on goal drive persistence and conscientious may be more attentive and less susceptible to committing errors while riding.

BIS scores were hypothesized to have an inverse relationship with speeding, stunts, and errors. Results did reveal a significant relationship with errors and stunts but, surprisingly, in the opposite direction. To explain this discrepancy, it was initially hypothesized that those who scored high on the BIS would be more attentive to cues signaling punishment and as a result would be more vigilant riders. Given that the BIS is most strongly associated with anxiety compared to all other RST traits (Carver & White, 1994; Corr, 2008), high BIS scores may inhibit riding performance. Research on anxiety and attention has demonstrated that trait anxiety is known to aversively effect

concentration, making anxious individuals more prone to distraction (Bishop, 2009). In combination with the current findings it may be suggested that high BIS scores can inhibit performance on perceptually and physically demanding tasks such as having to operate a motorcycle.

The results suggest that the BIS may not be the overall protective personality trait it was hypothesized to be. In a study examining the relationship between the BIS/BAS scales and risky health behaviours (e.g., sex, alcohol, safety), it was anticipated that the BIS would have an overall protective effect on health (Voigt et al., 2009). Conversely, it was found that high BIS scores were associated with being less likely to wear a seat belt or bike helmet, and drive after drinking. The current study likewise confirms these findings and revealed a positive relationship between the BIS with errors and stunts. Consequently, it may be suggested that in terms of predicting aversive health outcomes, high BIS scores may be considered more harmful.

As previously mentioned, the revised RST subdivides its aversive motivation structure into two systems: the BIS and FFFS. The RST-PQ operationally defines the FFFS for reacting to punishment stimuli that can be avoided, whereas the BIS responds to stimuli that cannot (Corr, 2016). The FFFS was predicted and found to have a positive relationship with riding errors. These findings are consistent with Morton and White's (2013) findings that individuals with higher FFFS scores demonstrated poorer hazard detection when operating a driving simulator (e.g., pedestrian emerging across the road at an un-signaled crossing). The results suggest that the FFFS may play a larger role in predicting non-deliberate riding behaviours such as errors rather than deliberate behaviours relating to rule compliance and speeding.

Physiology of Riding Behaviour

One of the primary features that distinguish the Big Five from the RST and Sensation Seeking is the physiological mechanisms that have been shown to underpin the latter two theories. With the Big Five originating from a lexical approach, it offers a topographical and descriptive understanding to personality. When comparing this approach to the RST and Sensation Seeking, the Big Five overlooks the causal mechanisms that can produce individual differences in thoughts, feelings and behaviours. With the current study demonstrating significant relationships between RST and Sensation Seeking, the variability observed among riders may be in part explained by their neurological correlates.

Individuals who scored high on sensation seeking were the most likely to report a higher frequency of speeding and stunt behaviours. High sensation seekers have been shown to exhibit higher endogenous dopamine levels as well demonstrate stronger dopaminergic responses to cues associated with upcoming rewards (Gjedde, Kumakura, Cumming, Linnet, & Møller, 2010; Marvin Zuckerman, 1985). Therefore, riders who score high on sensation seeking are more likely to find the intense sensory experience associated with speeding and stunts to be more rewarding than the average population.

The RST's BIS trait displayed the strongest relationship with errors than all other personality traits. The physiological underpinnings of the BIS are less understood than that of sensation seeking, but it has been shown that the most prominent physiological component associated with the BIS is the septo-hippocampal system (McNaughton & Corr, 2004). BIS scores have been shown to have a positive relationship with hippocampal volume (Barrós-Loscertales et al., 2006; Cherbuin et al., 2008; Levita et al., 2014). With the known association that the septo-hippocampal system has with anxiety (Gray &

McNaughton, 2003), the positive relationship between BIS and riding errors can be in part due to increased hippocampal activity.

Motorcycles and Personality

The current study replicates and extends previous research on motorcycles with a North America sample large enough to compare the effect of several personality theories. With the majority of previous motorcycle research focusing on sensation seeking, this study was able to determine whether the addition of the Big Five and RST would allow for more insight into individual differences in riding behaviour. Results demonstrate that sensation seeking and aggression accounted for the most variance in speeding, had a positive association with stunts, but had no obvious relationship with errors. These results suggest that sensation seeking may be an effective personality trait in predicting *deliberate* riding behaviours, but not for *involuntary* behaviours related to attention and distraction. These findings are partially consistent with previous research on sensation seeking and driving, where it was found that sensation seeking had a stronger relationship with violations ($\beta = .40$, $p < .05$) than with driving mistakes ($\beta = .15$, $p < .05$) (Rimmö & Åberg, 1999).

When including the Big Five and RST traits to each rider behaviour model, it was found that neuroticism and the BIS, respectively, had the strongest associations with stunts and errors. With riding errors being a stronger predictor for motorcycle crash risk than traffic violations (Elliot, 2007), it may be the case that the BIS accounts for a valuable component of riding behaviour that sensation seeking fails to capture. Furthermore, with stunts having the strongest association with neuroticism, future research on individual

differences in motorcycle crash risk may benefit from including a measure of the RST's BIS and Big Five's neuroticism in addition to sensation seeking.

Limitations

One limitations of the study is the use of a potentially homogenous sample. Given that the majority of data was collected from riders who participate on online motorcycle forums, the sample may not be representative of all riders in North America. The median age for male riders in the United States is 48 and for females is 39 (Bendall, 2015). The current sample median age was 28 for males and 29 for females. Despite this median age difference, 65 participants (12%) were 50 or older suggesting the sample did have representation from a broad range of riders, but was skewed towards a younger demographic. Moreover, prior research examining the quality of online data collection has shown online samples to be just as reliable (John & Srivastava, 1999) and more diverse (Gosling, 2004) than more conventional methods.

Another limitation of the study was the use of a non-experimental, cross sectional design. With this design, the current study cannot establish a causal relationship between personality and riding behaviour. However, by collecting a large, cross-sectional sample, this study also has the advantage of being the first study to examine several personality questionnaires in the same regression model on a North American motorcyclist population and serves as an early step towards understanding how individual differences contribute to crash involvement.

Conclusion and Future Directions

Overall, this study has been able to replicate and extend our understanding of how personality contributes to motorcycle riding behaviour. Personality traits from the RST (BIS and FFFS) are shown to have the most influence on riding errors and the Big Five's neuroticism is shown to have the strongest relationship with stunts. Consistent with previous motorcycle research, sensation seeking and aggression have the strongest associations with speeding (Watson et al., 2007; Wong et al., 2010). By having the strongest relationship with riding errors compared to all other personality traits, the RST is measuring an important component of riding behaviour that other models of personality do not capture.

Future research examining the RST should look at pre-cognitive physiological processes. The addition of physiological measures tracking heart rate, eye movement, cortisol concentration, peripheral vision, reflexes and grip strength may lead to a better understanding of how the RST regulates behaviour.

Other than the relationship the Big Five's neuroticism had with stunts, none of the other Big Five traits were more effective than sensation seeking or RST traits in predicting riding behaviour. Given the breadth of behaviours each of the Big Five traits have been known to account for, future research examining its relationship with motorcycle riding should utilize its sub-facets to make more accurate predictions (Paunonen & Ashton, 2001).

Prior research comparing the efficacy of the broad and narrow traits has shown that narrower traits (e.g., Big Five facet scales) are better at examining specific rather than broad behavioural patterns (Dudley, Orvis, Lebiecki, & Cortina, 2006). Complex

behaviours that cover a wide range of patterns such as job performance and self-regulation are best measured with broad personality traits (Fein & Klein, 2011; Ones, Viswesvaran, & Schmidt, 1993). Furthermore, it has been shown that additional facet level traits account for more variance in predicting specific behaviours than broad traits alone (Paunonen & Ashton, 2001). Therefore further research seeking to compare the efficacy of the Big Five with other personality theories should include facet level traits.

In terms of applied applications, the current findings can be added to the existing knowledge for health communication programs to prevent injury and promote healthy behaviours by framing safety messages to resonate with high-risk populations (Sherman, Mann, & Updegraff, 2006). By tailoring safety messages to be personally relevant to those with a higher-risk of crash involvement, initiatives to promote safe riding habits can target groups of specific interest.

In summary, this study demonstrates significant associations between personality and motorcyclist riding behaviour. Moreover, this is the first study to apply RST to a motorcyclist population, as well as applying the Big Five model to a sample of North American riders. The current findings offer further insight into the relationship between individual differences and high risk behaviours as well offer a better understanding into the human factors that may contribute to motorcycle crash risk.

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Appendix A: Recruitment Poster

Lakehead UNIVERSITY

Motorcycle and Personality Psychology Study

Chance to win 1 of 2
$50

M[illegible] valid motorcycle license. To participate te[illegible] take a picture with your phone and go to the study website:

http://tinyurl.com/gqbx4fj

For more information please email dantonia@lakeheadu.ca

Motorcycle Study http://tinyurl.com/gqbx4fj
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Appendix B: Hypotheses and Outcomes

Table 6

Proposed Hypothesis, Results and Outcomes

	Riding Behaviour								
	Errors			Speeding			Stunts		
	Prediction	Result	Outcome	Prediction	Result	Outcome	Prediction	Result	Outcome
Hypothesis 1: Big 5									
A. Conscientiousness	Negative	Negative	Supported	Negative	/	Not Supported	Negative	Negative	Supported
B. Agreeabless	/	Negative	Unexpected	Negative	Negative	Supported	Negative	Negative	Supported
C. Neuroticism	Positive	Negative	Not Supported	/	/	/	/	Negative	Unexpected
D. Openness to Experience	Positive	Negative	Not Supported	/	/	/	/	/	/
E. Extraversion	Positive	/	Not Supported	Positive	/	Not Supported	Positive	/	Not Supported
Hypothesis 2: Sensation Seeking									
A. Sensation Seeking	Positive	/	Not Supported	Positive	Positive	Supported	Positive	Positive	Supported
Hypothesis 3: RST									
A. BAS	Positive	/	Not Supported	Positive	/	Not Supported	Positive	/	Not Supported
i.Reward Reactivity	/	/	/	Positive	Positive	Supported	Positive	/	Not Supported
ii.Impulsivity	/	/	/	Positive	/	Not Supported	Positive	/	Not Supported
iii. Goal Drive Persistence	/	Negative	Unexpected	/	/	/	/	Negative	Unexpected
iv. Reward Interest	/	/	/	/	/	/	/	/	/
B. BIS	Negative	Positive	Not Supported	Negative	Negative	Supported	Negative	Negative	Supported
C.FFFS	Positive	Positive	Supported	/	Negative	Unexpected	/	/	/

Note. = RST = Reinforcement Sensitivity Theory; BIS = Behavioural Inhibition System; FFFS = Fear Fight Flight System; / = No Relationship

Appendix C: Motorcyclist Survey

Demographics

Please answer the following questions as honestly and accurately as possible. Remember, your responses are completely confidential.

1. Biological sex

- ◯ Male
- ◯ Female
- ◯ Other

2. Age

3. In which country do you currently reside?

- ◯ United States
- ◯ Canada
- ◯ Other (please specify)

4. Do you currently possess a valid motorcycle license?

- ◯ Yes
- ◯ No

If you answered "No" for Question 4 please skip to Question 7.

5. In which state/province do you currently possess a motorcycle license?

6. What year did you obtain your first motorcycle license?

7. At what age did you first start riding motorcycles on public roads?

8. Number of years actively riding?

9. What is your current motorcycle licence class? (e.g. m1, m2, etc.)

10. What is the model year of the motorcycle you ride the most at this time?

11. What is the type of your motorcycle you ride the most at this time?

- ( ) Sport(including super sport)
- ( ) Cruiser
- ( ) Standard (Including naked)
- ( ) Touring (Including sports tourer)
- ( ) Adventure/adventure tourer/dual sport
- ( ) Off Road - trail/enduro/mx
- ( ) Scooter

Other (please specify)

12. What is the engine size of the motorcycle you ride the most at this time?

- ( ) Less than 250 CCs
- ( ) 251 to 500 CCs
- ( ) 501 to 750 CCs
- ( ) 751 to 1000 CCs
- ( ) 1001 to 1250 CCs
- ( ) 1251 to 1500 CCs
- ( ) More than 1500 CCs

13. Average number of hours of on-road riding per week during riding season?

14. Number of moving violations on a motorcycle within the last 12 months (e.g. speeding, running a stop sign or red light, or driving under the influence of drugs or alcohol)?

- ( ) 0
- ( ) 1
- ( ) 2
- ( ) 3
- ( ) More than 3

15. Number of moving violations while driving a 4 wheel passanger vehicle (e.g. car, truck) within the last 12 months?

- ( ) 0
- ( ) 1
- ( ) 2
- ( ) 3
- ( ) More than 3

16. Number of crashes (including minor spills) while riding a motorcycle within the last 12 months?

- ◯ 0
- ◯ 1
- ◯ 2
- ◯ 3
- ◯ More than 3

If you answered "0" for Question 16 please skip to Question 18.

17. If you have crashed on a motorcycle within the last 12 months, how many of these crashes were you responsible for?

- ◯ 0
- ◯ 1
- ◯ 2
- ◯ 3
- ◯ More than 3

18. Number of near crashes or close calls while riding a motorcycle on a public road over the last 3 month?

- ◯ 0
- ◯ 1
- ◯ 2
- ◯ 3
- ◯ More than 3

19. Number of crashes (including minor crashes) while driving a 4 wheel passanger vehicle within the last 12 months?

- ◯ 0
- ◯ 1
- ◯ 2
- ◯ 3
- ◯ More than 3

If you answered "0" for Question 19 please skip to Question 21.

20. If you have crashed while driving a 4 wheel passenger vehicle within the last 12 months, how many of these crashes were you responsible for?

- ◯ 0
- ◯ 1
- ◯ 2
- ◯ 3
- ◯ More than 3

21. Number of near crashes or close calls while driving a 4 wheel vehicle on a public road over the last 3 month?

- ◯ 0
- ◯ 1
- ◯ 2
- ◯ 3
- ◯ More than 3

22. Have you ever taken a break from riding a motorcycle for one or more years?

- ◯ Yes
- ◯ No

If you answered "No" for Question 21 please skip to the next page.

23. If you have taken one or more breaks from riding a motorcycle, what was the length of your longest break in years?

24. What year did you begin riding again after your longest break?

Motorcycle Rider Behaviour Questionnaire (MRBQ)

Please honestly answer how often you perform each behavior on the scale provided.

1. Fail to notice that pedestrians are crossing when turning into a side street from a main road

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

2. Not notice someone stepping out from behind a parked vehicle until it is nearly too late

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

3. Not notice a pedestrian waiting to cross at a zebra crossing, or a pelican crossing(Pedestrian Light Controlled Crossing) that has just turned red

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

4. Pull out on to a main road in front of a vehicle that you had not noticed, or whose speed you have misjudged

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

5. Miss “Give Way” signs and narrowly avoid colliding with traffic having the right of way

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

6. Fail to notice or anticipate that another vehicle might pull out in front of you and have difficulty stopping

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

7. Queuing to turn right on a main road, you pay such close attention to the main traffic that you nearly hit the vehicle in front

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

8. Distracted or pre-occupied, you belatedly realize that the vehicle in front has slowed and you have to brake hard to avoid a collision

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

9. Attempt to overtake someone that you had not noticed to be signalling a left turn

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

10. When riding at the same speed as other traffic, you find it difficult to stop in time when a traffic light has turned against you

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

11. Ride so close to the vehicle in front that it would be difficult to stop in an emergency

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

12. Run wide when going round a corner

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

13. Ride so fast into a corner that you feel like you might lose control

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

14. Exceed the speed limit on a country/rural road

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

15. Disregard the speed limit late at night or in the early hours of the morning

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

16. Exceed the speed limit on a motorway (Highway or Freeway)

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

17. Exceed the speed limit on a residential road

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

18. Race away from traffic lights with the intention of beating the driver/rider next to you

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

19. Open up the throttle and just ‘go for it’ on country roads

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

20. Ride between two lanes of fast moving traffic

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

21. Get involved in unofficial ‘races’ with other riders or drivers

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

22. Ride so fast into a corner that you scare yourself

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

23. Attempt to do, or actually do, a wheelie

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

24. Pull away too quickly and your front wheel comes off the road

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

25. Intentionally do a wheel spin

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

26. Unintentionally do a wheel spin

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

27. Wear riding boots?

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

28. Wear protective trousers (leather or non-leather)?

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

29. Wear a protective jacket (leather or non-leather)?

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

30. Wear body armour (elbow pads, shoulder pads, knee pads, etc)

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

31. Wear no protective clothing?

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

32. Wear gloves?

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

33. Wear bright/fluorescent strips/patches on your clothing

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

34. I can run 2 miles in 2 min

- 1 - Strongly Disagree
- 2
- 3
- 4
- 5
- 6
- 7 - Strongly Agree

35. Use dipped headlights on your bike?

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

36. Brake or throttle-back when going round a corner or bend

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

37. Change gear when going round a corner or bend

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

38. Find that you have difficulty controlling the bike when riding at speed (e.g. steering wobble)

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

39. Skid on a wet road or manhole cover

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

40. Have trouble with your visor or goggles fogging up

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

41. Driver deliberately annoys you or puts you at risk

- 1 - Never
- 2 - Hardly Ever
- 3 - Occasionally
- 4 - Quite Often
- 5 - Frequently
- 6 - Nearly all the time

42. Ride when you suspect you might be over the legal limit for alcohol?

- 1 - Never
- 2 - Hardly Ever
- 3 - Occasionally
- 4 - Quite Often
- 5 - Frequently
- 6 - Nearly all the time

43. Wear a leather one-piece suit?

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

44. Wear bright/fluorescent clothing?

- 1 - Never
- 2 - Hardly ever
- 3 - Occasionally
- 4 - Quite often
- 5 - Frequently
- 6 - Nearly all the time

Reinforcement Sensitivity Theory – Personality Questionnaire

Below is a list of statements about everyday feelings and behaviors. Please rate how accurately each statement describes you in general. Do not spend too much time thinking about the questions and please answer honestly. Your answers will remain confidential.

1. I feel sad when I suffer even minor setbacks.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderatly
- 4 - Highly

2. I am often preoccupied with unpleasant thoughts.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

3. Sometimes even little things in life can give me great pleasure.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

4. I am especially sensitive to reward.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

5. I am interested in pursuing a degree in parabanjology

- 1 - Strongly Disagree
- 2
- 3
- 4
- 5
- 6
- 7 - Strongly Agree

6. I put in a big effort to accomplish important goals in my life.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

7. I sometimes feel ‘blue’ for no good reason.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

8. When feeling ‘down’, I tend to stay away from people.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

9. I often experience a surge of pleasure running through my body.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

10. I would be frozen to the spot by the sight of a snake or spider.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

11. I have often spent a lot of time on my own to “get away from it all”.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

12. I am a very active person.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

13. I’m motivated to be successful in my personal life.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

14. I am always ‘on the go’.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

15. I regularly try new activities just to see if I enjoy them.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

16. I get carried away by new projects.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

17. Good news makes me feel over-joyed.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

18. The thought of mistakes in my work worries me.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

19. When nervous, I sometimes find my thoughts are interrupted.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

20. I would run quickly if fire alarms in a shopping mall started ringing.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

21. I often overcome hurdles to achieve my ambitions.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

22. I often feel depressed.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

23. I think I should ‘stop and think’ more instead of jumping into things too quickly.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

24. I often feel that I am on an emotional ‘high’.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

25. I love winning competitions.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

26. I get a special thrill when I am praised for something I’ve done well.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

27. I take a great deal of interest in hobbies.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

28. I sometimes cannot stop myself talking when I know I should keep my mouth closed.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

29. I often do risky things without thinking of the consequences.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

30. My mind is sometimes dominated by thoughts of the bad things I've done.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

31. I get very excited when I get what I want.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

32. I feel driven to succeed in my chosen career.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

33. I'm always weighing-up the risk of bad things happening in my life.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

34. I'm always finding new and interesting things to do.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

35. People are often telling me not to worry.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

36. I am very open to new experiences in life.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

37. I always celebrate when I accomplish something important.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

38. I have never used a computer

- 1 - Strongly Disagree
- 2
- 3
- 4
- 5
- 6
- 7 - Strongly Agree

39. I find myself doing things on the spur of the moment.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

40. I find myself reacting strongly to pleasurable things in life.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

41. I would instantly freeze if I opened the door to find a stranger in the house.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

42. I'm always buying things on impulse.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

43. I am very persistent in achieving my goals.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

44. When trying to make a decision, I find myself constantly chewing it over.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

45. I would go on a holiday at the last minute.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

46. I often worry about letting down other people.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderatly
- 4 - Highly

47. I would run fast if I knew someone was following me late at night.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

48. I would leave the park if I saw a group of dogs running around barking at people.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

49. I worry a lot.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

50. I would freeze if I was on a turbulent aircraft

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

51. My behavior is easily interrupted.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

52. It's difficult to get some things out of my mind.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

53. I think the best nights out are unplanned.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

54. There are some things that I simply cannot go near.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

55. If I see something I want, I act straight away.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

56. I think it is necessary to make plans in order to get what you want in life.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

57. When nervous, I find it hard to say the right words.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

58. I find myself thinking about the same thing over and over again.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

59. I often wake up with many thoughts running through my mind.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

60. I would not hold a snake or spider.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

61. Looking down from a great height makes me freeze.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

62. I often find myself ‘going into my shell’.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

63. My mind is dominated by recurring thoughts.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

64. I am the sort of person who easily freezes-up when scared.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

65. I take a long time to make decisions.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

66. I will actively put plans in place to accomplish goals in my life.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

67. I often find myself lost for words.

- 1 - Not at all
- 2 - Slightly
- 3 - Moderately
- 4 - Highly

The Big Five Inventory (BFI)

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who likes to spend time with others? Please select a number following each statement to indicate the extent to which you agree or disagree with that statement.

I am someone who....

1. Is talkative

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

2. Tends to find fault with others

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

3. Does a thorough job

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

4. Is depressed, blue

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

5. Is original, comes up with new ideas

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

6. I work fourteen months in a year

- 1 - Strongly Disagree
- 2
- 3
- 4
- 5
- 6
- 7 - Strongly Agree

7. Is reserved

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

8. Is helpful and unselfish with others

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

9. Can be somewhat careless

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

10. Is relaxed, handles stress well

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

11. Is curious about many different things

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

12. Is full of energy

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

13. Starts quarrels with others

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

14. Is a reliable worker

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

15. Can be tense

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

16. Is ingenious, a deep thinker

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

17. Generates a lot of enthusiasm

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

18. Has a forgiving nature

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

19. Tends to be disorganized

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

20. Worries a lot

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

21. Has an active imagination

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

22. Tends to be quiet

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

23. Is generally trusting

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

24. Tends to be lazy

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

25. Is emotionally stable, not easily upset

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

26. Is inventive

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

27. Has an assertive personality

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

28. Can be cold and aloof

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

29. Perseveres until the task is finished

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

30. Can be moody

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

31. Values artistic, aesthetic experiences

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

32. Is sometimes shy, inhibited

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

33. Is considerate and kind to almost everyone

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

34. Does things efficiently

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

35. Remains calm in tense situations

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagre
- 4 - Agree a little
- 5 - Agree strongly

36. Prefers work that is routine

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

37. Is outgoing, sociable

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

38. Is sometimes rude to others

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

39. Makes plans and follows through with them

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

40. I will be punished for meeting the requirements of my job

- 1 - Strongly Disagree
- 2
- 3
- 4
- 5
- 6
- 7 - Strongly Agree

41. Gets nervous easily

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

42. Likes to reflect, play with ideas

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

43. Has few artistic interests

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

44. Likes to cooperate with others

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

45. Is easily distracted

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

46. Is sophisticated in art, music, or literature

- 1 - Disagree strongly
- 2 - Disagree a little
- 3 - Neither agree no disagree
- 4 - Agree a little
- 5 - Agree strongly

Brief Sensation Seeking Scale

Please select a number following each statement to indicate the extent to which you agree or disagree with that statement.

1. I would like to explore strange places

- 1 - Strongly disagree
- 2 - Disagree
- 3 - Neither disagree nor agree
- 4 - Agree
- 5 - Strongly agree

2. I get restless when I spend too much time at home

- 1 - Strongly disagree
- 2 - Disagree
- 3 - Neither disagree nor agree
- 4 - Agree
- 5 - Strongly agree

3. I like to do frightening things

- 1 - Strongly disagree
- 2 - Disagree
- 3 - Neither disagree nor agree
- 4 - Agree
- 5 - Strongly Agree

4. I like wild parties

- 1 - Strongly disagree
- 2 - Disagree
- 3 - Neither disagree nor agree
- 4 - Agree
- 5 - Strongly agree

5. I would like to take off on a trip with no pre-planned routes or timetables

- 1 - Strongly disagree
- 2 - Disagree
- 3 - Neither disagree nor agree
- 4 - Agree
- 5 - Strongly agree

6. I prefer friends who are excitingly unpredictable

- 1 - Strongly disagree
- 2 - Disagree
- 3 - Neither disagree nor agree
- 4 - Agree
- 5 - Strongly agree

7. I would like to try bungee jumping

- 1 - Strongly disagree
- 2 - Disagree
- 3 - Neither disagree nor agree
- 4 - Agree
- 5 - Strongly agree

8. I would love to have new and exciting experiences, even if they are illegal

- 1 - Strongly disagree
- 2 - Disagree
- 3 - Neither disagree nor agree
- 4 - Agree
- 5 - Strongly agree

The Brief Aggression Questionnaire

Using this 7 point scale, indicate how uncharacteristic or characteristic each of the following statements is in describing you.

1. Given enough provocation, I may hit another person.

- 1 - Extremely uncharacteristic of me
- 2
- 3
- 4
- 5
- 6
- 7 - Extremely characteristic of me

2. If I have to resort to violence to protect my rights, I will.

- 1 - Extremely uncharacteristic of me
- 2
- 3
- 4
- 5
- 6
- 7 - Extremely characteristic of me

3. There are people who pushed me so far that we came to blows.

- 1 - Extremely uncharacteristic of me
- 2
- 3
- 4
- 5
- 6
- 7 - Extremely characteristic of me

4. I tell my friends openly when I disagree with them.

- 1 - Extremely uncharacteristic of me
- 2
- 3
- 4
- 5
- 6
- 7 - Extremely characteristic of me

5. When people annoy me, I may tell them what I think of them

- 1 - Extremely uncharacteristic of me
- 2
- 3
- 4
- 5
- 6
- 7 - Extremely characteristic of me

6. My friends say that I'm somewhat argumentative.

- 1 - Extremely uncharacteristic of me
- 2
- 3
- 4
- 5
- 6
- 7 - Extremely characteristic of me

7. I am an even-tempered person.

- 1 - Extremely uncharacteristic of me
- 2
- 3
- 4
- 5
- 6
- 7 - Extremely characteristic of me

8. Sometimes I fly off the handle for no good reason.

- 1 - Extremely uncharacteristic of me
- 2
- 3
- 4
- 5
- 6
- 7 - Extremely characteristic of me

9. I have trouble controlling my temper.

- 1 - Extremely uncharacteristic of me
- 2
- 3
- 4
- 5
- 6
- 7 - Extremely characteristic of me

10. Other people always seem to get the breaks.

- 1 - Extremely uncharacteristic of me
- 2
- 3
- 4
- 5
- 6
- 7 - Extremely characteristic of me

11. I sometimes feel that people are laughing at me behind my back.

- 1 - Extremely uncharacteristic of me
- 2
- 3
- 4
- 5
- 6
- 7 - Extremely characteristic of me

12. When people are especially nice, I wonder what they want.

- 1 - Extremely uncharacteristic of me
- 2
- 3
- 4
- 5
- 6
- 7 - Extremely characteristic of me

Appendix D: Cover Letter

Cover Letter

Cover Letter

Dear Potential Participant,

I am a Master's student in the Department of Psychology at Lakehead University conducting a research study under the supervision of Dr. Rupert Klein, which will examine the relationship between motorcyclist riding behaviour and personality. The title of my project is “Motorcycles and Personality". I am inviting you to anonymously participate in an online survey that will provide important data for this study.

If you volunteer to participate in this study, you will be directed to a secured SurveyMonkey© website to fill out an online survey. Most survey questions require an agree/disagree or never/always scaled answer, which should take approximately 30 minutes to complete (can be completed in more than one sitting if required). The survey is divided into three parts – participant demographics, motorcyclist riding behavior, and general personality traits. Please note that some questions on riding behavior may appear to be redundant, this is, however, a vital component to the study design in evaluating motorcyclist riding behaviour. Please know that you will not be asked to provide any personal information online that could identify you. Also, you can opt out of answering any questions that you are not comfortable with. You may additionally withdraw your data at any time up until submission; submitted responses will not be able to be retrieved since they will be anonymously stored to a larger dataset. As a modest incentive, you will have the option to be entered into a raffle draw to win one of two $50 pre-paid VISA cards upon completion by following a link to another survey to enter your contact information.

The potential benefits in participating in this research is to expand current knowledge on personality's effects on motorcyclists riding behaviour. Such findings can be used towards understanding what aspects of riders personalities put them at higher risk to be involved in various types of crashes.

Only myself and Dr. Klein will have access to the survey results, which will be stored securely at Lakehead University in Dr. Klein's locked lab on a password protected computer for five years as per policy. The results of this study will be disseminated as part of my graduate Master's thesis. Portions of the findings coming from this research will be presented at national or international scholarly conferences. It is anticipated that peer-reviewed journal articles will be published based on this research. All dissemination of findings will be presented in summary form with no information that could identify participants. Participants can request a summary of the study upon completion by being redirected to another survey to enter their email address.

Please note that the online survey tool used in the study, SurveyMonkey, is hosted by a server located in the USA. The US Patriot Act permits US law enforcement officials, for the purpose of an anti-terrorism investigation, to seek a court order that allows access to the personal records of any person without the person's knowledge. In view of this, we cannot absolutely guarantee the full confidentiality and anonymity of your data. With your consent to participate in this study, you acknowledge this. This study has been approved by the Lakehead University Research Ethics Board. If you have any questions related to the ethics of the research and would like to speak to someone outside of the research team please contact Sue Wright at the Research Ethics Board at 807-343-8283 or research@lakeheadu.ca." Thank you very much for your time and consideration. Sincerely, Dylan Antoniazzi H.B.A Masters Student, M.Sc. Psychology Lakehead University 955 Oliver Road, Thunder Bay, Ontario, P7B 5E1 Email: dantonia@lakeheadu.ca Rupert Klein, Ph.D. Associate Professor, Psychology Lakehead University 955 Oliver Road, Thunder Bay, ON, P7B 5E1 Ph: (807) 343-8535 Email: rgklein@lakeheadu.ca	

Appendix E: Consent Form

Consent Form

Consent Form

In terms of the study titled "Motorcycles and Personality", by checking the box provided below, I consent that: I have read and understood the information provided to me in the cover letter. I agree to participate. I understand the potential risks and/or benefits of the study.

My participation is voluntary and I can withdraw from the study at any time, and I may choose not to answer any question. Submitted answers may not be withdrawn, because of the anonymous nature of the data, submitted answers will be combined with a large anonymous data set. The data I provide will be securely stored at Lakehead University for a minimum of five years following the completion of the project. I understand that the results of the research study are available to me upon the completion of the study and I can obtain the results by sending a request to the researcher. Please note that the online survey tool used in the study, Survey Monkey, is hosted by a server located in the USA. The US Patriot Act permits U.S. law enforcement officials, for the purpose of anti-terrorism investigation, to seek a court order that allows access to the personal records of any person without the person's knowledge. In view of this, we cannot absolutely guarantee the full confidentiality and anonymity of your data. With your consent to participate in this study, I acknowledge this. I understand that my individual results on the personality inventories will not be revealed to me.

I understand that I will remain anonymous in any publication or presentation of the research study. Absolutely no individual identifying information is included in the dataset.

* 1. By selecting yes, I indicate that I have read and fully understand the information presented above and I agree to participate in this study.

◯ Yes

Appendix F: Debriefing Form

Debriefing Form

Done! Thank you!

-

Debriefing Form

Thank you for participating in this study on personality and motorcyclist riding behaviour. By participating, you are helping us to gain a better understanding of how individual differences in personality may contribute to crash risk.

Personality traits have long been used to predict dangerous driving in four-wheel passenger vehicles, but few models of personality have been used to examine and predict the behaviour of motorcyclists. Given the recent increase in motorcycle crashes for older riders, many studies have focused on understanding the nature of motorcycle crashes and the factors that may contribute to them. The purpose of this research is to expand upon our current understanding of motorcycle crash risk by applying theoretical models of personality. Through this research, we hope to identify specific personality traits that may relate to safe and unsafe riding behaviours. Personality research of this nature has been utilised in health communication to prevent injury and promote healthy behaviours by framing safety messages to resonate with high- risk populations. By tailoring safety messages to be personally relevant to those with a higher-risk of crash involvement, initiatives to promote safe riding habits can target individuals of the highest risk.

Please be assured that the data you provided will be in no way linked to your name or contact information. All the questionnaires will be labelled with ID numbers that will not be connected to you and all data will remain anonymous

Sincerely,

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