



# Are agricultural quad bike loss-of-control events driven by unrealistic optimism?



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## ARTICLE INFO

### Article history:

Received 17 January 2013

Received in revised form 19 June 2013

Accepted 3 February 2014

Available online 27 February 2014

### Keywords:

Quad bikes

Agriculture

Unrealistic optimism

Attitude

Behaviour

## ABSTRACT

Quad bikes are used extensively in agriculture. Use of these vehicles, however, carries some risk. The promotion of safety behaviours has not reduced this risk. This study tested the hypotheses that farmers with greater unrealistic optimism (UO), fatalistic beliefs or a propensity for risk-taking are more susceptible to quad bike loss-of-control events (LCEs). A cross-sectional study recruited 216 farmers from the Otago and Southland regions of New Zealand. A face-to-face structured interview was carried out to record psychological constructs and history of LCEs. Data were analysed using regression methods. Fifty-two farmers (24%) reported no LCEs, the remaining 164 farmers (76%) reported between 1 and 50 events. Generally, farmers did not have risk-taking personalities or fatalistic beliefs but did appear to have an “it won’t happen to me” attitude towards their risk of quad bike incidents. Number of LCEs was significantly associated with lower UO (IRR 0.84, 95%CI: 0.75, 0.94), higher impulsive sensation seeking (IRR 1.08, 95%CI: 1.01, 1.16), younger age (IRR 0.98, 95%CI: 0.97, 0.99) and male sex (IRR 4.00, 95%CI: 2.15, 7.44). The effect of UO was being driven by a positive relationship between number of LCEs and greater belief in personal risk of having LCEs. Contrary to hypotheses, farmers with stronger beliefs that “it won’t happen to me” were less likely to have had LCEs. Further exploration into the factors that contribute to farmers’ perception of LCE risk and its impact on quad bike safety behaviour is warranted. This may allow for more targeted interventions.

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## 1. Introduction

In 2011, more than one third of workplace fatalities in New Zealand (NZ) occurred in agriculture and quad bikes were responsible for 27% of these workplace deaths (Department of Labour, 2012). Quad bikes are in common use in NZ agriculture (Basham et al., 2006; Milosavljevic et al., 2010) with approximately 70,000–80,000 vehicles in operation (Carman et al., 2010; Moore, 2008). Over the past 10 years 45 people have died in NZ as a result of agricultural quad bike incidents with an estimated 850 injury claims being made every year to NZ’s nationalised injury healthcare insurance scheme, the Accident Compensation Corporation (ACC) (Department of Labour, 2012; Shulruf and Balemi, 2010). Only a third of farmers who experience a workplace injury, preventing them from working for seven days, make an ACC claim

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(Cryer et al., 2009), and an estimated one in nine quad bike loss-of-control events (LCEs) result in farmers submitting an injury claim (Milosavljevic et al., 2011). The potential for serious agricultural quad bike LCEs therefore means that understanding risk factors for LCEs is a research priority.

In a retrospective analysis of NZ workplace serious harm records, fatalities from quad bike incidents were positively associated with rollovers, carrying unstable loads (e.g. weed spray) and the riding surface (public roads being the highest risk) (Shulruf and Balemi, 2010). Although being an employee and having attended a formal training course seemed protective, there were only 42 and 40 observations in these analyses suggesting a tenuous link requiring further investigation. Despite extensive literature regarding quad bike incidents, a systematic search for studies of risk factors for occupational quad bike incidents in the agricultural field revealed only three peer-reviewed publications that satisfied the criteria for robust comparison of agricultural workers who have or have not experienced quad bike LCEs (Carman et al., 2010; Jones and Bleeker, 2005; Milosavljevic et al., 2011). Publications were ex-

cluded if they had not differentiated between recreational or occupational use and for including participants of all ages in their analyses. Of the three articles reviewed, two reported on the NZ population (Carman et al., 2010; Milosavljevic et al., 2011) and one on US farm youth (Jones and Bleeker, 2005). The prevalence rate for quad bike loss-of-control events (LCEs) was over 60% whilst injury rates requiring medical care ranged from 5.5% (Milosavljevic et al., 2011) to 8.4% (Jones and Bleeker, 2005). Injury or incident risk was significantly associated with non-modifiable factors such as rider age, height and weight (Carman et al., 2010; Milosavljevic et al., 2011), as well as modifiable factors such as speed, exposure and vibration (Jones and Bleeker, 2005; Milosavljevic et al., 2011), carrying passengers (Jones and Bleeker, 2005), and vehicle pitch when traversing slopes (Carman et al., 2010). Authors of all three studies concurred that targeting rider behaviour could reduce quad bike incident risk.

Efforts to address quad bike safety issues in NZ have focused on changing behaviour through educational material sent to farmers from ACC, the Department of Labour and other farm-safe agencies; quad bike safety training courses; and random farm inspections. Such initiatives appear largely ineffective in reducing the accident rate (Basham et al., 2006; Department of Labour, 2012; Palmer et al., 2009). The hierarchy of controls, a widely accepted approach to risk management, advocates substitution and engineering controls ahead of behaviour-based options. Following these principles farmers can choose not to use quad bikes on their farms or fit rollover protection systems (ROPS) or a crush protection device (CPD). Quad bike manufacturers, however, are opposed to such engineering measures resulting in conflicting messages to quad bike users leaving behaviour modification as the primary option in the current climate.

The perception of the general public, fuelled by media coverage, and those involved in improving health and safety within the agricultural sector, suggests farmers are 'different' to non-farmers (APNZ, 2012; Basham et al., 2006; Lovelock et al., 2008; RWNZ, 2010; Sunday Star Times, 19.12.2010). Farmers are attributed as having a variety of personality, behavioural and attitudinal characteristics based on a masculine stereotype, with references to "gung-ho" and "macho" personalities (Basham et al., 2006; Lovelock et al., 2008), "she'll be right" (APNZ, 2012; Basham et al., 2006), "blasé" and "cavalier" attitudes (RWNZ, 2010; Sunday Star Times, 19.12.2010). There is also a suggestion that farmers are risk-takers and think "it won't happen to me" and underestimate their potential for injury (Basham et al., 2006; Lovelock et al., 2008; Sunday Star Times, 19.12.2010).

Unrealistic optimism (UO), also known as optimism bias (Weinstein, 1987), is a psychological construct first coined by Weinstein (1980). It is the tendency to think that negative events are less likely to happen to you than to your peers, and the tendency to think that positive events are more likely to happen to you than to your peers. UO has also been thought of as the belief that "it won't happen to me" (Caponecchia, 2010; Caponecchia and Sheils, 2011; Weinstein, 1984) and is seen in relation to general accident risk (Castanier et al., 2012; DeJoy, 1989; Rutter et al., 1998) and general health risks (French and Hevey, 2008; Weinstein, 1982, 1987; Zlatev et al., 2010). The presence of UO has been linked to occupational health and safety through its effect on safety behaviour motivation (Arnold et al., 1997; Caponecchia, 2010; Caponecchia and Sheils, 2011; Dalziel and Job, 1997; Moen and Rundmo, 2005; Rutter et al., 1998). If UO represents the "it won't happen to me" attitude among farmers, then this could be a factor in risky quad bike riding and worthy of investigation. Farmers who perceive themselves as less susceptible to quad bike LCEs than their peers may be less likely to attend safety courses voluntarily or pay attention to guidelines. If that is the case then attempting to improve quad bike safety behaviours through education alone may not be successful in this group.

The aim of this study was to examine the predictive value of UO, to see if this can explain why some farmers have never experienced a quad bike LCE whilst others report one or more than one. Farmers' propensity to risk-taking and fatalistic beliefs were also explored as possible mechanisms for behavioural risk factors. The primary hypothesis to be tested was that farmers with greater UO, fatalistic beliefs or a greater propensity to risk-taking would have had more quad bike LCEs.

## 2. Methods

Face-to-face, structured interviews were used to collect data. The interview questions were developed based upon those used in previous quad bike research (Lower et al., 2005; Milosavljevic et al., 2010). Participants were interviewed at their workplace or a suitable alternative of their choosing. One interviewer (LC) conducted all data collection using software developed at the University of Otago.

### 2.1. Measures

The study's primary outcome variable was number of LCEs. An LCE was defined as any occasion the driver lost control of the quad bike during their day-to-day farming activity, to the extent that it tipped or rolled over, the driver was thrown from the bike or chose to jump off or 'abandon ship' for reasons of safety. The rider may have been injured or not injured in the event and the quad bike may or may not have been damaged. The number of LCEs experienced by the participant in their working lifetime was recorded. A rating score for confidence in this recalled number was also recorded (on a scale from 0 indicating the participant was not confident at all with their estimation up to 4 indicating the participant was very confident with the number).

UO was operationalized using two self-report questions: (a) "How likely do you think it is that you will have an 'accident' on your quad bike over the next year?" (personal risk); and (b) "How likely do you think it is that a typical farmer the same age, sex and farm type as you will have an 'accident' on a quad bike over the next year?" (peer risk). The hypothetical comparative peer was specified as having the same age, sex and farm type to reduce threats to validity that might be introduced by participants thinking about potential variations on these variables. Both questions were rated on a 7-point scale ranging from 1, indicating "Extremely unlikely" through 3, indicating "Neutral, 50:50" to 7, indicating "Extremely likely". The personal risk was subtracted from the peer risk to give a total UO score, with positive scores indicating greater UO. The same approach to measuring UO has been used in previous occupational health and safety studies (Arnold et al., 1997; Caponecchia, 2010; Caponecchia and Sheils, 2011; Dalziel and Job, 1997; Moen and Rundmo, 2005).

Fatalism was measured using the Present-Fatalistic sub-scale of the Zimbardo Time Perspective Inventory (ZTPI) (Zimbardo and Boyd, 1999). This scale consists of 9 statements rated on a scale of 1–5 (1 indicates that the statement is "very untrue/uncharacteristic" of the respondent and 5 indicates that the statement is "very true/characteristic" of the respondent). The ZTPI is a reliable and valid measure of time perspective, a psychological construct thought to reflect the primary temporal manner guiding how a person evaluates their life experiences between three main categories past, present or future (Zimbardo et al., 1997). Present time perspective has been shown to be an independent predictor of risky driving and risk taking in general (Breen and Zuckerman, 1999; Keough et al., 1999; Protogerou and Turner-Cobb, 2011; Zimbardo et al., 1997).

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