COACHES’ PERCEPTIONS OF CATASTROPHIC INJURIES RISKS IN SOUTH AFRICAN RUGBY UNION: A QUALITATIVE EXPLORATION THROUGH A SOCIO-ECOLOGICAL LENS

by

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Dedicated to:

Elaine and Andrew Joshua

For encouraging me to never settle for normal but to grab hold of dreams and ‘Go for it’.

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Thank you.

Jonathan Joshua

Declaration

I, Jonathan Joshua, hereby declare that the work on which this dissertation/thesis is based is on my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, or is to be submitted for another degree in this or any other university.

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Chapter 1: Introduction

Catastrophic injuries in rugby

Physical contact sports carry an inherent risk of serious injury (1). Despite a general acceptance of the risks of injuries in sport, the important lesson that is learned about most injuries is that they can be prevented (2). However, before one can implement preventative strategies it is fundamental to develop an understanding about what important role-players, such as coaches, perceive about the risk of injuries in the sport (3).

Rugby Union is the most popular contact sport worldwide (4). It is well known for its aggressive physical nature and the ‘hard hits’ often advertised to promote the sport in the media. Due to the aggressive physical contact inherent in the tackle, scrum, maul and ruck phases in rugby, there is a high risk of sustaining a catastrophic injury (4-6).

Catastrophic injuries (CIs) are defined as “any head, neck, spine or brain injury that is life threatening, or has the potential to be permanently debilitating and results in the emergency admission of a rugby player to a hospital or medical care centre” (6). This type of injury is acknowledged as the most traumatic for all involved (7,8). The annual incidence of rugby related CIs is two per 100 000 players in South Africa (6), which is regarded as statistically ‘acceptable’ based on the Health and Safety Executive scale which categorises risk from ‘negligible’ (0.001– 0.1 cases per 100 000 population) to ‘acceptable’ (0.1– 2.0 cases per 100 000 population); ‘ tolerable’ (2.0–100.0 cases per 100 000 population); and ‘ unacceptable’ (>100 cases per 100 000 population), and therefore comparable to other high contact sports (14). In South Africa, a recent four-year registry reported fifty-four CIs in junior and senior rugby union combined, which occurred between 2008 and 2011. Despite the optimism of lower incidence rates, given the total number of players and player exposure...
hours, the South African Rugby Union’s (SARU) stance is that CIs are unacceptable and ‘one CI is one too many’, so every effort must be taken to prevent them (7).

**BokSmart programme**

The South African BokSmart programme, based on successes of New Zealand’s RugbySmart programme, was developed due to the severity of the physical and emotional outcomes of CIs (9,10). The programme aims to reduce the risk of CIs by ensuring that all coaches and referees employ safe principles in terms of players’ playing behaviour. Brown et al’s (2014) recently investigated the programme’s effectiveness in terms of adoption and sustainability (11). The researchers reported on the programme’s success since its inception in 2009 in terms of reducing the annual incidence of CIs in South Africa. The BokSmart programme provides training courses and an awareness programme for the appropriate role players and stakeholders such as coaches, referees and medical staff; ensures that clubs oversee appropriate player-to-position selection; perform assessments of the laws of the game and advises modification of the laws to ensure player safety; enforces the laws of the game and advises on training principles such as appropriate strength and conditioning levels for players (7,9).

**The role of coaches**

In rugby union, coaches are the primary agents of change (12) involved in preventing CIs. Coaches achieve this goal by imparting relevant knowledge about prevention of CIs and other injuries, implementing correct techniques and physical training and motivating players’ attitudes and behaviour on and off the field (7,9,13).
Coaches and perceived risk

To ensure safe and correct coaching behaviour and technique, it is mandatory for all rugby coaches in South Africa to be BokSmart accredited (11). However, a coach may have certain perceptions about the risks of CIIs, which may be different compared to actual risks measures (10). It is this difference in beliefs that may influence coaches to downplay the risks involved in the sport. Furthermore, coaches’ perceptions of CIIs risks likely influences their coaching behaviour and therefore may increase the risk of players sustaining such an injury. It is commonly documented in rugby circles that coaches employ players out of position or keep them on the field despite, for example, signs of concussion (6,10,14).

Risk perception in sport and other fields

Risk perceptions are documented as key influences of individuals’ safety or risk taking behaviour (15-23). Empirical literature concludes that perceptions of a hazard, danger or risk play a role in the extent of individuals’ precautionary or risk taking behaviour, which then escalates or reduces the risk of injuries from that particular danger. For example, a common bias linked to a lowered perceived risk of personal danger is reflected in the overconfident forecast commonly phrased as, ‘it will never happen to me’ (24).

In sport, policy makers who implement the laws of the game would find value in others’ perceptions of injury risk because it provides data about ‘what, how, and why’ role-players such as coaches have certain beliefs and attitudes about CIIs risks involved in the game (9,25). It is argued that if strategies to reduce risks of CIIs are based on coaches’ and players’ contextual, meaningful information then chances of effective adoption and sustainability of preventative measures are increased (3,20,24,24,26-30).
Despite a paucity in risk perceptions research in sport, a host of studies in other fields of risk research has provided valuable insight into individual and public risk perceptions (24,29,31-33). For example, Renn and Rorhman (2004) concluded that risk perception principles are universal regardless of diverse social and cultural backgrounds (19). Also, people use similar subjective criteria to assess risks by processing various factors that influence their perceptions, which results in the level of caution given to certain risks (16,18). For this reason, risk perception theories from other fields can be used to understand perceptions of the risk of CIs in rugby.

Another prominent topic in risk perceptions literature is that various levels of society, namely the individual, community and policy makers, disagree about the seriousness of risks (19,24,34). This means then that more than often, rugby role players (e.g. experts, governing bodies, coaches, players and the public) may disagree about the seriousness of CIs risks.

Factors that affect risk perception

Notably, the way individuals or groups perceive risks depend largely on the aetiological context in which they experience the risks. Experience, cultural background, socio-economic conditions and knowledge are amongst some of the factors that are suggested to influence the way individuals assess the seriousness of risks (18,25,33,35). The manner in which these factors are cognitively processed is beyond the scope of this study, but it is important to acknowledge that coaches’ perceptions of CIs and other injuries risks depend on their subjective reasoning in view of a plethora of contextual factors (24). Experts, by contrast, view risks in more formalised terms, considering measurable factors such as epidemiological data and player biomechanics (3,33,36). Essentially, how serious coaches perceive the risks of CIs and the measure of precautionary behaviour given to such risks will depend on the influence of intrapersonal, interpersonal and societal factors.
The role of a socio-ecological model

Socio-ecological models (SEM) help us to understand the complex, dynamic interplay between intrapersonal, interpersonal and societal levels of influence that affect risk perception and behaviour of groups or individuals (37). Specifically, SEM’s provide a platform from which to 1) explore factors that affect the tendency of individuals to employ safe or risky behaviours (25,38,39) 2) gather understanding of the positive or negative influences associated with the different physical and social environments , 3) design contextually relevant intervention strategies (15) and 4) apply interventions based on the contextual elements, specific to the social levels of influence (37,40).

Purpose of this study

Prevention of CIs is a primary injury prevention priority of rugby union authorities in South Africa. Given the available research on risk perceptions in other studies, it was felt that rugby union could benefit from the knowledge of how coaches and their beliefs about the risk of CIs can influence their coaching behaviour and hence mitigate the chances of CIs occurring. It is important to understand how coaches perceive this risk because that knowledge will inform policy makers on how to develop and implement appropriate preventative strategies (18,41). While risk perception studies of ‘dangers’ in other research fields are prominent, the lack of risk perception studies in rugby leaves a void in the literature.

Most rugby research has placed warranted emphasis on the epidemiological and biomechanical components involved in the tackling phases of rugby to develop strategies to reduce injuries (5,10,42). However, support exists to supplement current research by adding multifactorial components to CIs prevention efforts. These components would explore the subjective beliefs of rugby role players about the risk of CIs (3,15). Knowledge of how coaches perceive the risks of CIs
to their team and their opposition may educate rugby researchers and governing bodies about the principles which govern risk perceptions and behaviour (3,9,22,30,36,43,44). In addition, gathering this kind of contextual data prior to development and implementation of injury prevention strategies can improve programme effectiveness, adoption and sustainability (15,17).

This study uses an SEM framework to explore how coaches in South Africa perceive the risk of CIs and discusses factors that may be responsible for shaping those perceptions. The following chapters present the literature review, methods, results and discussion of a qualitative study on a select group of rugby coaches in South Africa.

Chapter 2: Literature review

Risk perceptions

Risk perceptions are a popular topic in risk communication literature. The study of risk perceptions have been relevant to issues such as Human Immunodeficiency Virus (HIV) and Acquired Immune Deficiency Syndrome (AIDS) (21,45,46), cancer (34), environmental risks (24,27), crime (31), drinking and driving(47), seatbelt use (48) and myocardial infarctions (48). Interestingly, the issue of risk perceptions is relatively new in sports injury prevention literature. Few sports-related studies (3,15,17,28,30,49,50) have mentioned risk perceptions as a contributing factor to sports injuries.

An observer might view injuries such as CIs as accidents that cannot be avoided (51). However, many contributing factors that predate these kinds of injuries can be controlled, such as the individuals’ attitudes and beliefs and their environment (36). Thus, Finch (2006) strongly suggested that injury prevention strategies cannot be proposed unless a multifactorial account of all contributing
factors is investigated (50). This reflects the importance of aetiology, defined as the study of attribution of all factors including the susceptibility of the individual involved, in the development or cause of an injury or disease (49,51,52).

Risk perceptions have predominantly been linked with studies in psychology (20,29,33,53-55), risk behaviour (48), risk communication literature (24) and other hazards or dangers such as pollution (19). In recent years, perceptions of risks have slowly but increasingly been investigated as a key factor involved in the risk of injuries in general. This is because, like intentions and attitudes, perceptions of risks are subjective precursors to risk-taking behaviour which lead to injuries (9,16,19,22,24,36). However, the subject of risk perceptions has not been central in mainstream sports injury prevention studies despite support for its investigation by prominent researchers in the field (10,15,17,28,49,56). Moreover, sports studies have failed to elaborate on the complex nature of risk perceptions and how it influences athletes' behaviour. To date, just two published studies have investigated athletes perceptions in sports, namely Australian football and squash (30,43).

Risk perceptions: Objective and subjective measures

Apparent in risk studies is the disparity between subjective public opinions about the seriousness of some risks and the objective assessments of risks by experts (10,19,24). Hence, risk perceptions are viewed from two perspectives: the view of the public and the view of policy makers or experts.

Generally speaking, objective measures of risks are indicative of information common to quantitative methodologies such as risk probability, correlations and other statistical computations and results. Subjective risk assessments mainly involve factors more common to qualitative research such as gathering data about the beliefs, perceptions and attitudes of the individual or members of the community towards risks.
Subjective risk perception

At the level of the individual, perceptions of risks are based on personal opinions, memory of past experiences and evaluation of information from various other sources (34,57,58). Public opinion of risks can be understood in terms of how groups of individuals perceive the risk of a dangerous future occurrence and their feelings and beliefs about a threat (24,27,28,59,60). Public perceptions of risks are generated through local knowledge and experience of the threat and weighed against media messages and expert opinions (19,31,61). Therefore, the public will appraise the value of expert information based on their own experiences and current practice within their socio-cultural context. They may very well uphold their own opinion if the information from the experts is not trusted (24,33,47). This demonstrates the important consideration for experts and policy makers: that public perceptions, intentions and attitudes toward risks are among the central determinants of injury related behaviours or sustained management of risk-protective behaviours (36,62).

In light of this, empirical studies advise not only to use proxy objective measures to calculate probabilities of risk but also to engage in qualitative research methods to provide insight into the beliefs and perceptions of the individuals to whom these injuries occur (3,6,14,14,24,33,48).

Objective risk analysis

In contrast subjective risk perceptions, policy makers primarily view risk in objective, statistical, calculated terms. Perceptions of risk at a policy level are defined in objective terms as the product of frequency of dangerous occurrences and consequences thereof (59). This technical definition lets experts estimate the probability or frequency of incidence of the hazard (33). Fuller (2007) defined risk as the expected loss within a specified time frame(51). As seen in Figure 1, this measure allows policy makers to categorize risk, ranging
from unacceptable to acceptable levels, and implies that risks can be managed according to their severity.

\[
\text{Risk} \left( \frac{\text{Expected total loss}}{\text{Unit time}} \right) = \text{Severity} \left( \frac{\text{Total loss}}{\text{No. of loss events}} \right) \times \text{Incidence} \left( \frac{\text{No of loss events}}{\text{Unit time}} \right)
\]

*Figure 1: Formula for objective risk (51)*

Objective risk assessments show statistical estimates and allow for quantifiable, predetermined levels of risk. While objective risk calculations are accepted as proxy measures of risk probability, the uncertainty of rare and extreme events such as CIs present difficulties for objective calculations of probability because calculating probability includes ‘past incidences’ as a variable. Therefore, despite the value of ascertaining epidemiological data such as annual CIs incidence, actual predictions of CIs risks are at most, calculated guesswork that are subject to future uncertainty (120).

Risk perception: A mismatch in risk communication

Individuals’ subjective perceptions of risk seldom match objective risk estimations of experts (63). Even though risk perception studies are few in rugby-related research, one can draw from the available extensive literature in other fields. In a review of risk literature, Botterill et al (2004) emphasised the importance of addressing disparities between objective expert information and subjective public risk perception. More importantly, researchers urge cooperative work between the opinions of the expert and those of the public since both offer valuable insight into risks (24,64). Ideally, for risk communication to be effective between policy makers and the public, communication between stakeholders at all levels should be reciprocal and transparent. Policy makers should understand and engage public risk perceptions and the public should trust and help to inform policy makers on subjective, contextual matters (10,24).
In this manner, injury prevention strategies are likely to be based on objective risk estimations (as in Figure 1) as well as subjective local knowledge and experience (18,24,33,48). While such collaborative ideals appear to be best-practice principles, risk communication literature abounds with evidence indicating that many previous strategies were based on either expert-only or public-only interventions with no collaborative work (36,62).

Research shows that individuals or local community groups distrust expert opinion because experts fail to adequately acknowledge the value of risk perceptions of the public, who use local knowledge and experience to guide their behaviour (46). Burningham et al (2008) reviewed the unsuccessful community flood-risk interventions that were implemented by local authorities in the United Kingdom (24). The authors criticised the government’s ‘deficit model’, which viewed the public as uninvolved passive receivers of information as opposed to active stakeholders who could impart local knowledge and assist in interventions in their community. Essentially, authorities overlooked the value of public knowledge and perceptions of flood risk and implemented an awareness campaign. As a result, the community largely ignored local risk warnings and guidelines. Given the argument that communities appraise experts’ assessments of risks in light of local knowledge of the risk, it is understandable that the local residents mistrusted information from the authorities because their intuitive perceptions about the risks of flooding were overlooked.

Subjective factors which affect risk perceptions, such as outlined by Renn et al (16,19,24), were pertinent to Burningham et al’s (2008) study; the researchers reported that public risk assessment was based on personal experience with the threat and local knowledge (18,25) that floods had not occurred there in many years. Therefore, locals’ perceptions of flood risk were that it ‘does not happen to them’ and that such occurrences are rare and extreme.
Despite the lack of similar evidence in sports injuries prevention research, this example may not be dissimilar to the real-world setting of high-risk contact sports such as rugby. In other words, it is possible that local coaches distrust higher sport governing bodies and ignore the need for precautionary playing behaviour because their perceptions of CIs are based on personal experience and intuitive knowledge that CIs are rare and extreme, and that CIs risks are acceptable (10) and therefore won’t happen to them.

The disparity between how experts view risks and the opinions of individuals or community groups should be considered when implementing interventions in a rugby setting. Differences in views of risk perception of rugby governing bodies and other rugby role players such as coaches have implications for risk communication between these groups. It is a goal of SARU to successfully communicate and build collaborative relationships with local rugby clubs and tailor their interventions based on local context (7).

Risk perception: Complex and contextual

Risk perceptions are complex because individuals are influenced by multiple factors such as personal experience and memory associations (41). Risk perceptions are constructed within a social and cultural context (48,65) that sensitise or attenuate the level of importance individuals give to certain risks (16,18,25). Researchers Botterill et al (2004) inform us about the rigidity of formed opinions: once individuals’ perceptions of a particular risk are formed, it is difficult to change how they perceive that risk (33). Therefore risk perceptions, such as when individuals perceive a high or low level of vulnerability to a particular threat, are not only difficult to change but also play an important role in their decision making processes toward precautionary or risk-taking behaviour (32,45,66).

Risk perceptions, as determinants of coaches’ behaviour, are also contextual and are influenced by culture and the local socio-economic status (SES) (24).
Wildavsky and Drake (1990) suggested exploring trends of risk perceptions across various population groups to identify the relative level of importance different individuals and communities ascribe to particular hazards (25). In other words, ‘which individuals perceive what hazards to be how dangerous’ (25, 37). In the same way, one could explore how South African coaches from different backgrounds perceive their teams’ risk of CIs. In the same vein, Fuller (2004) suggested that policy makers identify definable, vulnerable groups that may be more susceptible than others to downplaying risks of CIs (40).

Based on the premise that risk perceptions are multifactorial, contextual, and subjectively complex, Slovic (41) concluded that investigations into individuals’ perceptions of risk may be more adequately understood by using qualitative methods that investigate aspects of individual and groups’ behaviours and determinants of behaviour rather than objective measures of risks based purely on epidemiological information (3, 9).

Importance of behavioural and social science theory models

Since the advent of professionalism of rugby union in 1995, research into the injuries involved in the sport have largely focused on epidemiological studies. This research has yielded positive results as an evidence-based approach to attenuate the number of injuries in the game by improving coaches and players technical skills and training (121), rehabilitation and return to play guidelines (122) but has been ineffective in terms of improving uptake, adoption and sustainability of injury prevention interventions at a population level (17). Affirming the need to investigate behavioural components in sport, Finch (2011) advised investigation into aetiology of injuries by going beyond individual-level interventions to include behavioural and social science theory models (BSSTMs) that align individual, the broader community and organisational efforts (15). Similarly, McGlashan and Finch (2010) encourage future sports injury prevention studies to include investigations into the complexity of behaviours in addition to
the plethora of objective factors involved in the sports setting. The authors bemoaned the lack of BSSTMs in sports literature and reported that of one hundred sports injury prevention studies that met their criteria, only eleven percent explicitly used BSSTMs (3). This is an adequate reflection of sports injuries research where quantitative methodologies have dominated the field. In rugby for example, common injury risk factors such player biomechanics and equipment have been more apparent starting points for researchers (4) than investigating behavioural influences such as risk perceptions. Therefore, proponents of BSSTMs grounded in the use of qualitative methodologies, are challenged to continue their contribution to provide insight into the determinants of safety and risk behaviour in rugby (3).

Socio-ecological models (SEM) in sport: A framework of aetiology and the factors that influence risk perceptions

A SEM provides a multifactorial-framework approach to encapsulate athletes’ aetiologies that can lead to injuries. This approach has been proposed to strengthen the design, adoption and sustainability of injury prevention interventions (36,67,68). In the case of risk perceptions, SEMs are based on the premise that multiple levels of society influence the perceptions and behaviour of individuals and groups (39).

The three main levels of SEMs are intrapersonal, interpersonal and environmental levels. The intrapersonal level relates to the individual’s biological and cognitively based factors such as knowledge, attitudes, behaviour (36). Theories of risk perceptions, motivation and behavioural theories are used to understand this level. The interpersonal level accounts for how peers, family, colleagues, teammates or other close relationships affect the individual’s perceptions and behaviour. Lastly, the environmental level represents the role that societal influences, such as sporting institutions’ policies and
socioeconomics, play in the individual’s beliefs and behaviour. Social constructs and cultural influences are relevant to this level (18,37,39).

Researchers have recently advised the use of SEMs for sports injuries prevention research (44). For example from Eime et al (2005) used an ‘ecological’ study design to investigate the effectiveness of a squash eyewear promotion strategy. Despite the efforts of the researchers to endorse the use of ecological study designs, a critique is that the study predominantly used a quantitative methodology-surveys when SEMs may best be evaluated using qualitative methods that use one on one interviews or focus groups. This is especially relevant when the ‘problem’ is poorly understood and researchers require a contextual understanding. Nonetheless, they rightly pointed out that intrapersonal, socio-cultural factors, institutional policies and physical environments, as various levels of the socio ecological model, all influence, an athlete’s behavioural choices (44,63). Thus, no known sports studies has qualitatively used SEMs to date. Proponents of this approach stress that behaviour modification strategies in sport should be based on the SEM framework since it acknowledges multiple levels of societal influence (44). Intrapersonal, interpersonal and environmental levels of influence represent the dynamic complexities that affect the sports role players’ thought processes and behaviour(15).

With this view, suggestions have been made to address rugby injuries in the same way (14). The concept of SEMs suggests that rugby coaches and players adopt subjective implicit viewpoints (perceptions) about the risk of CIs depending on the level of influence that socio-ecological factors have on their behaviour. In this way, SEMs can provide sporting bodies and researchers with a framework to understand, manage and mitigate the factors that place individuals at higher risk of CIs (14). Failure of policy-level rugby role-players to understand the beliefs of local rugby coaches and their environmental context
will lead to unsuccessful CIs prevention campaigns because of poor adoption and maintenance of these interventions by the targeted groups (28).

The need for comprehensive aetiologies brings into question the success of previous sports injury prevention models. While a number of researchers have cited multifactorial models, most of these studies failed to address broader aetiological and ecological issues such as culture and socioeconomic issues, which predispose coaches and athletes to risk-taking behaviour. Thus, sports science researchers have perpetuated the dominance of biomechanical factors and environmental factors such as equipment and conversely under-represented the importance of behavioural components, cultural differences and socioeconomic issues.

However, below is a brief overview of three prominent sports injuries prevention models that reflect SEM principles. These models imply the importance of a thorough aetiological investigation.

**Four-stage injury prevention model (Van Mechelen, 1992)**

A prominent model in sports injuries research, the four-stage injury prevention model (Figure 2) describes data collection (stage 1), establishing aetiologies (stage 2) and preventative measures (stage 3) and lastly reviewing effectiveness of the interventions (stage 4). An SEM would contribute to stage two by establishing and displaying a comprehensive contextual aetiology of CIs that include subjective measures of risks meaning risk perceptions. SEMS will therefore influence the output of stage three by strengthening the effectiveness of preventative measures. One serious limitation of this model as outlined by Finch (2006) is that it does not consider implementation issues such as the need to be adopted by athletes and stakeholders (50) therefore the model does not demonstrate a contextual understanding of the problem and the subsequent intervention challenges.
TRIPP: Translating research into injury prevention practice (Finch and Donaldson 2010)

Recently, Finch and Donaldson (2010) stated the critical importance of obtaining comprehensive aetiological data and implementation of effective ‘real-world’ injury prevention strategies with understanding of the socio-economic and socio-cultural contexts to which interventions will be applied.

Table 1: TRIPP model (28)

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<thead>
<tr>
<th>Stage</th>
<th>Research need</th>
<th>Research process</th>
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<tr>
<td>1</td>
<td>Count and describe injuries</td>
<td>Injury surveillance</td>
</tr>
<tr>
<td>2*</td>
<td>Understand why injuries occur</td>
<td>Prospective studies to establish aetiology and mechanisms of injury</td>
</tr>
<tr>
<td>3</td>
<td>Develop potential preventative measures</td>
<td>Basic mechanistic and clinical studies to identify what could be done to prevent injuries</td>
</tr>
<tr>
<td>4</td>
<td>Understand what works under ideal conditions</td>
<td>Efficacy studies to determine what works in a controlled setting</td>
</tr>
<tr>
<td>5*</td>
<td>Understand the intervention implementation context including personal, environmental, societal and sports delivery factors that may enhance or be barriers</td>
<td>Ecological studies to understand implementation context</td>
</tr>
<tr>
<td></td>
<td>Understand what works in the “real world”</td>
<td>Effectiveness studies in context of real-world sports delivery</td>
</tr>
<tr>
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</tbody>
</table>

* indicates where a SEM could contribute to this model
More recently, Finch (2006) reviewed and added additional components to the TRIPP model (Table 1), which includes components of Van Mechelen's four-stage model. These components were: description of the intervention context and evaluation of the effectiveness of the intervention in real-world settings (50). An SEM fits into stage five, which requires researchers and policy makers to understand the demographic context where the intervention is implemented. This includes individual, environmental, societal and sports delivery factors that can enhance or be barriers to the effectiveness of the intervention (15). While this model presents critical criteria for developing real world, contextually relevant interventions, the challenges lie in, for example, gathering data from a diverse cultural and socioeconomic landscape such as South Africa. However, the benefits of possibly achieving a zero incidence of CIs in any country outweigh the challenges involved. Therefore, the TRIPP model fits well within a South African context (11) as it draws attention to the context in which any injury prevention program is implemented.

Fuller and Drawer (2004): Risk management framework

Fuller and Drawer (2004) present a risk management framework that accounts for various intrinsic factors involved in risks of injury (40). These risk factors are aptly placed in stage one in figure below. The merit of the framework lies in its stages that constantly call for re-evaluation. This model includes factors such as risk perceptions and evaluates communication from policy maker to athlete regarding risks of injuries, however, the sparsity of current sports research on risk perceptions suggests that the model may not be utilised to its full potential. In addition, the authors include Bahr and Krossaug's (2005) suggestion of context (a crucial component in SEMs) stating that injury causation should include investigation of both player's and opponent's contextual situation (1,51).
SEMS and aetiology: Acknowledged but inadequate

Multifactorial approaches toward sports injuries have been introduced as far back as 1994 (1,26,50,52). However, the full value of these models appear to have been under-recognised in rugby studies since a number of important aetiological factors have largely been ignored. For example, Meeuwisse et al’s (2007) dynamic recursive model of aetiology of athletic injuries fails to elaborate on athletes’ perceptions of injury risk, which predispose them to injury. The authors refer to intrinsic and extrinsic factors but limit these to biomechanical issues and ground hazards with little emphasis on behavioural determinants of injury risks such as beliefs and attitudes of the athletes. Similarly, other sports injury prevention models have failed to fully explore the subjective effects of culture and socio-economics, self-experience and knowledge on sports people’s perceptions of injury risks. For example, Bahr and Krossaug’s (2005) comprehensive injury causation model cite “psychological factors; coaching and
player/opponent behaviour” but the authors fail to expound on the importance of these factors (1).

Recent research has re-emphasized the need to investigate subjective determinants of behaviour such as risk perceptions, beliefs and attitudes (3,49-51). Notably, these are commonplace components of BSSTMs and studies of other hazards (19,25,41,63) but least investigated in rugby research. In addition to individual behavioural determinants, researchers now emphasize the importance of investigating interpersonal and societal issues in sports injuries prevention studies because sports individuals are highly influenced by their peers, communities and cultural settings (15). Thus, it is important to note that individual-level interventions ultimately fail because they fail to address the community and social issues of the targeted groups, which influence the maintenance and motivation of individuals’ on-going risk protective behaviours (36).

Therefore, the gap in the literature is that while Finch (50), Meeuwisse (52), Bahr (1) and Van Mechelen (26) include some level of investigation into behavioural determinants of risks in their models, no study to date has comprehensively investigated these factors. There is also a shortfall of studies that expound on the socio-ecological and behavioural components that affect sports role-players such as coaches. As a result sports governing bodies fail to understand how coaches’ perceptions of injury risks and other behavioural determinants are linked to behaviours of individuals, their communities and social environments.

With this view, it would be reasonable, if not necessary to explore how certain aetiological factors can affect South African rugby coaches’ perceptions of CIs risks.
Factors affecting risk perceptions

Overview of risk perceptions literature

Risk perceptions are influenced by multiple factors (18). A number of key studies informed the theoretical basis for this section (14,25,41,45,48,69,70), which is an overview of a few key factors cited in risk perceptions literature. Individual and public estimations of risk are affected by factors that may be categorised under: intrapersonal (intrinsically motivated), interpersonal (relationships) and environmental (societal) factors (37,67,68).

In an early study, Slovic et al (1982) posited, “What are the determinants of perceived risk?” The researchers established that perceptions of risks are based on several subjective considerations: perceived benefit of the outcome of risky behaviour or risk aversion, familiarity with the risk, how one can control the risk, the catastrophic potential involved, and uncertainty about the level of risk (41). Since then, researchers have offered various views into the determinants of risk perceptions; many of them dissented from Slovic et al’s initial conclusions. For example, Wildavsky and Drake’s (1990) research investigated the influence of culture, politics, economics, personality and knowledge on risk perceptions (25) . The authors found that a cultural theory best predicted a broad range of perceived risks but that ultimately, one’s worldview best accounts for how and why certain people place greater levels of awareness and precaution on some risks over others.

Sjoberg instead refers to the psychometric model by Fischoff et al (23) to explain variance in risk perceptions. The psychometric model is based on rating-scales that individuals’ use to rate hazards according to their dread and non-dread perceived risks. According to Sjoberg (2000), the psychometric model explains up to forty percent of the variance in risk perceptions, as opposed to Wildavsky and Drake’s (1990) cultural theory (25) that explains twenty percent.
Other factors that have gained research interest are *cognitive biases*. A number of cognitive biases are commonly cited in the literature to explain the variations in perceptions of risks (18,33,70,71). Cognitive biases are best reflected in the common adage ‘it won’t happen to me’. This generally refers to as one’s level of perceived vulnerability or perceived invulnerability toward a hazard (24,32,48,72). Leventhal et al (1999) emphasised the importance of investigating individuals’ meaning related to various risks such as cancer (34). The authors were of the view that one’s perceived vulnerability depended on the meaning and beliefs associated with the risk. For example, a low perceived vulnerability suggests that individuals and groups inherently adopt an optimistic bias and perceive themselves to be less vulnerable than others to a threat (32,45,72). The authors concluded that public motivations toward behaviour change are influenced by the significance of the threat, its consequences and time-line and the available strategies for self-protection against the risks.

Another perspective is that of Gerrard et al (1996) who looked at the perceptions of risks involved in HIV and AIDS (45). The authors argued against Motivational Theory, which infers that perceptions of risks are stable and causal to behaviour (48). Their view was that Motivational Theory fails to acknowledge severity and complexity of threats. For example, when strategies towards risk-averse behaviour are complex, individuals may simply choose to ignore the threat and fail to implement safety behaviour. Individuals may perceive themselves to be highly vulnerable to catastrophic risks but ignore its consequences due to the complexity of the risk situation. Alternatively, Gerrard et al (1996) concluded that perceptions of risks do not necessarily motivate behaviours but are reflections of already practiced behaviours (45). Both arguments from Leventhal et al (1999) and Gerrard et al (1996) are based on meta-analyses of studies where risk perceptions are poorly correlated with positive behaviour change.

*Heuristics* are also a form of cognitive bias. They are cognitive shortcuts or quick judgements that inform risk perceptions i.e. instant judgements that individuals
use to solve problems of uncertainty (70,71). Cognitive processes referred to as availability, representativeness and anchoring and adjusting (70) are key features in heuristics theory. Sjoberg (18) disregarded this theory stating that risk perceptions (beliefs) have a greater correlation to individuals’ values as opposed to being overtly subject to automatic cognitive processes. Despite some criticism there is prominent support for Kahneman et al’s (1982) initial heuristics theory (70) and its role in risk perceptions. For example, Botterill et al (2004) cited **heuristics** as the most important influence to risk perceptions. More recently White et al (2011) surveyed junior cricket players’ perceptions of injury risk and referred to heuristics to explain the variance in perceptions of risk (17).

Other factors, which have not been thoroughly investigated in rugby injuries prevention research are experience with threats (24,48), the role of **aggression** (38,69,73), and the influence of **mass media** (74).

**Possible factors influencing South African rugby coaches’ perceived risk of CIs**

The previous section provided a selection of arguments and common influencing factors cited in previous literature that affect public risk perceptions. This section explores the factors that could affect the rugby coaches’ perceptions of CIs risks concerning their players’ and those involved in rugby union.

**Coaches’ culture and socio-economic status**

South Africa is known for its diversity of cultures and races with Caucasians (9,2%), Coloured\(^1\) (9,0%), Indians (2,6%) and Black (79,2%) people making up the majority of the population (75). With the diversity of cultural and social systems in South Africa come diverse worldviews and behaviour patterns (76). It is logical

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\(^1\) Coloured people were first classified under the South African apartheid regime, whose slave-ancestors were imported from West Africa, Mozambique, Indonesia, Madagascar and India in 1654.
to assume that risk perceptions and attitudes toward CIs in rugby differ between the various cultures in South Africa. Moreover, one could postulate as to which factors play a greater role in influencing coaches’ risk perceptions and behaviour across the various cultures (65).

As previously mentioned, Wildavsky and Drake (1990) were of the opinion that cultural bias best predicted individuals risk perceptions as opposed to knowledge, personality and political factors. Cultural theory denotes that cultural values and community belief patterns shape an individual’s perceptions of various risks (25). This might suggest that coaches and the clubs to which they are affiliated assume not only an identity but may have collective beliefs and perceptions about the risks of CIs, which are embedded in the community.

Economic theory considers how the socio-economic status (SES) of a country, community or individual influences the way individuals perceive risks (19,25). Importantly, economic theory implies that those who are the poorest are most in danger of risks (19,24,25). Research confirms the impoverishment of marginalised populations in apartheid South Africa, which resulted in gross social inequalities such as lack of education, malnutrition and poor health (75). The implication here is that physical performance and education in rugby depends on such factors as physical conditioning and good nutrition, which allow young players the capacity to mentally and physically develop under the stresses involved in the sport. In South Africa, poor communities lack opportunities that can be afforded by higher SES communities to develop their mental and physical attributes needed to play rugby. Therefore, it could be argued that risks of serious injuries (CIs) are higher in lower SES communities.

The socio-economic statuses (SES) of local population groups are important because, in a relatively young democracy, the discriminatory legacy of apartheid is still relevant. Notably, Hermanus et al (2010) reported two notable findings. The first is that ethnicity is still an important predictor of SES and the related medical treatment in South Africa, where ten percent of black players recovered
fully from spinal cord injuries compared to fifty-six percent of white players (6,77). Secondly, their study also showed that a higher percentage (forty percent) of CIs occurred to higher SES (White) individuals compared to lower SES ethnicities during a given period: twenty percent (Black) and thirty-two percent (Coloured) (77). This means that the link between SES or ethnicity and CIs is not linear i.e. SES is not necessarily a predictor of CIs incidence.

**Coaches’ knowledge**

Knowledge theory infers that threats like CIs are dealt with according to the immediate dangers they represent i.e. depending on whether the threat is immediate and believed to be real, individuals will act in a risk averse or risk-taking manner (25). The question applicable to rugby coaches is whether having knowledge-only about CIs is enough to shape their perceptions about their players’ risk of sustaining CIs. In other words, can knowledge alone predict coaches’ risk-taking or risk-protective behaviour? The recent definition of coaching effectiveness proposed by Jean Côté and Wade Gilbert, includes intra- and interpersonal knowledge as two out of three core elements of the definition: “The consistent application of integrated professional, interpersonal, and intrapersonal knowledge to improve athletes’ competence, confidence, connection, and character in specific coaching contexts” (117). This infers that prescriptive-styled knowledge, such as ‘spear tackles can cause CIs’, is not effective enough to cause players to take precaution because knowledge must affect players on the intrapersonal and interpersonal level. Furthermore, Fuller (2007) showed that players make risk-taking decisions based on knowledge and the experience of previous situations in which they performed the same risk-taking behaviour (51). Therefore the narrative of “I did this before and nothing happened” may be alarmingly applicable since such events resulted in no catastrophic consequences. Similarly, this could be true of risk-taking coaches.
Coaches’ cognitive bias

Cognitive biases influence public beliefs, perceptions and attitudes and they are prominent factors cited in mainstream risk perceptions and behavioural research (24,25,70). However, some sports science researchers have elaborated on the influence of cognitive biases on sports role-players.

To translate ‘knowledge of a threat’ into positive behaviour change, individuals must perceive themselves to be vulnerable to the threat (32,46,72,78). In other words, mere knowledge about a threat may not be enough to cause individuals to employ more risk protective behaviours if they do not feel susceptible to the threat. More evidence supports the notion that people are more likely to view themselves as less vulnerable to injury or death than ‘others’, across a wide variety of risk situations. Moreover, coaches and players can underestimate risks depending their familiarity with a situation (10). For example, despite having highest incidence of CIs in rugby, players in the ‘forwards’ position are likely to underestimate the risks involved in the scrums merely because of their experiential familiarity with the position. This affiliation bias is reflected in the rugby environment where coaches and players merely accept the high risks of injuries involved in the game. Another such bias, cognitive dissonance, may also affect the risk perceptions of coaches (40). For example, coaches and the public are known to admire athletes who continue to play ‘through their injuries’. In this way, cognitive dissonance affects perceptions of risks because coaches will disregard information about the risk of CIs (or concussion) if it conflicts with their intentions to win. This process also perpetuates the image of the ‘tough athlete’ in rugby. Also, perceived vulnerability, affiliation bias and cognitive dissonance are but a few biases that may be part of coaches’ heuristic processes.

Kahneman et al’s (1982) heuristic framework consist of three main pathways that may, in part, explain cognitive mechanisms behind coaches’ risk perceptions: availability, anchoring-adjusting and representativeness (70). Availability is the most widely cited heuristic pathway because of its mechanism of immediate
association. It denotes the ease with which a reference or past experience is brought to mind. Availability heuristic suggests that a coach will believe CIs are likely if they can personally recall an incident of occurrence. Representativeness is the tendency to make generalized judgments when information is limited. For example, the public may view CI’s as more likely to occur to a particular group of people because of stereotypical characteristics represented by this group for example, the poor and uneducated segment of the population. Anchoring and adjusting is based on the concept of a focal reference point from which individuals will adjust their judgments or perceptions. For example, a coach with no experience of CIs throughout a rugby playing and coaching career will use this information as an anchor point to supports the notion that CIs ’do not happen to me’. Hence, it would be challenging to convince this coach about the risks of CIs and the importance of its prevention.

Aggression

Aggression is accepted as part of the game of rugby and also considered as an important factor in individual and team performance (38,69,73). However, motives behind aggressive tackles may be brought into question in the tackle phase in rugby in terms of sanctioned and unsanctioned aggression (73). A coach’s predisposition towards hostile aggression may in turn cause their players to underestimate or ignore the risks involved in the tackle phases of a rugby game. Studies confirm that young adults and adolescents accept a level of violence in sports like rugby and use unsanctioned aggression to gain a psychological advantage over opponents (38,73,79). This is also referred to by Emery et al (2009) as the normalization of violence in sport (43). Notably, a recent study found that the safety of the ball carrier and the tackler were ranked lowest on what is important to junior rugby union players when making a tackle during a rugby match (9). Interestingly, the author noted that players would risk their own safety as well as that of the opponents if aggression behaviour will
lead to successful outcomes. Hence, Emery et al (2009) advises that the intentions of sportspersons must be considered (43).

**Attitudes and intentions**

*Attitudes* are defined by Eagley and Chaiken (1993) as an evaluative position with reference to a specific object (80). Attitudes are part of risk perceptions as described by Mearns and Flin (1995) who defined risk perception as the study of people’s beliefs, judgements and attitudes about dangers or threats (81). McKee et al (1995) noted that there is confusion in the literature about studies that use similar measurement tools for risk perceptions and attitudes. The authors conclude that the terms ‘risk perceptions of’ and ‘attitudes toward’ can mean the same thing and that often distinctions between the two are not clearly stated in studies (21). In the context of this study, the reader is encouraged to acknowledge that *attitudes* refer to coaches’ attitudes towards the risk of CIs and intentions refer to their motives. It is plausible that if a coach’s attitude reflects one of having little priority on CIs risk-protective behaviour, it is likely that they believe CIs are not likely to occur and that the outcomes of the game (winning) is of higher importance. Similarly, if intentions to win outweigh the need to employ risk protective behaviour then the coach’s attitudes towards CIs are that they are not a likely threat.

**Experience**

Coaches’ *experience* or lack of experience with CIs may also influence the level of importance they place on CIs education and prevention. There are conflicting views in the literature about whether self-experience with ‘threats’ will lead to protective behaviour. However, experts agree that experience plays some role in how individuals perceive the threat (21,24,45,48). For example, research linking self-experience to behaviour change has shown that behaviour change may occur in the following ways: societal attention, victim related influence and intra individual (intrapersonal) response(48). Societal attention suggests that a rugby
club might pay greater attention to the threat of CIs if it occurs to a player at the club. In other words, greater preparedness may be shown in rugby clubs with past experience of CIs than in those who have not. Secondly, victim-related influence is when pressure is placed on risk-taking individuals to engage in more precautionary behaviours. Weinstein (1989) points to the example of hospitalised smokers pressurised by their doctors and families to quit smoking. The third scenario is intra-individual response to a threat: That if a coach has a personal experience with a CI, this may cause them to pay more attention to CIs prevention since they perceive their players as possible future victims. Intra-individual response suggests that the level of importance coaches’ place on CIs risks depends on the severity of their experience with CIs.

**Normative pressure**

In a study of coaches’ pressures that surveyed the same population base for four decades Scantling et al (2005) found that coaches are subject to various forms of pressure, which play a role in their behaviour. Coaches’ normative pressures arise from self, field-side (parents and spectators) and upper management at the club or school. In turn, rugby players are also subject to pressures stemming from self, peer, parents, crowd as well as pressure from the coach. It would be interesting to observe the affect of pressure on coaches (and players) perceptions of CIs risks as they manage the intrapersonal, interpersonal and societal expectations.

**Role of the media**

CIs in rugby are most often given extensive media coverage. The powers of the news media lie in its ability to positively or negatively affect public perceptions of rugby risks. Sjoberg (2000) stated that the influence of mass media on risk perception is under debate but that increased societal media coverage of dangerous hazards may increase population levels of perceived risk (18). In reference to media reporting Kitzinger (1999) stated that news media will focus
on unusual accidents and that news stories tend to be event-orientated rather than issue-orientated (74). Similarly, in an Australian football (AFL) study Finch et al. (2002) reported that irresponsible media may negatively influence young players' attitudes and beliefs because of the manner in which the news media portray players when they continue playing despite injuries (30). Kitzinger (1999) concluded that the media is central to theories of risks since it influences public beliefs and attitudes about risks (74).

Conclusion

CIs have featured as a main topic in a number of rugby studies. However, it presents as a paradox because while incidence of CIs are low relative to the amount of rugby played in South Africa (2,07 per 100 000 players) (6), it still has irreparable consequences for all those involved. However, despite being a high-risk sport, there is a likelihood that coaches engage in risky game behaviours and tactics due to their beliefs, attitudes and general perceptions about the risks of CIs (118,119). Risks perceptions are well known for influencing the level of importance the public gives to certain risks over others and research show strong evidence of a link between individuals' behaviour and how they perceive risks. These coaches may perceive their players to be invulnerable to CIs merely because of its rarity. While statistical correlates of CIs risks in rugby are well known, public subjective beliefs (coaches, players and community) about the risks of CIs have not yet been investigated. Therefore, researchers must begin to ask whether, how and why coaches of various social and cultural groups are more likely than others to express low levels of CIs risk awareness than others, with the aim of collating coaches' perceptual belief patterns. This kind of research require qualitative methodologies because it goes beyond objective figures and calculated estimates of risk to reveal how people feel and think about the probabilities of risks and the subjective factors that contribute to how risks are perceived.
The study of risk perceptions in rugby injuries prevention has lagged behind that of other research fields. A few sports-injuries prevention models acknowledge risk perceptions as a risk factor and antecedent leading to injuries, however, no rugby studies to date has elaborated on its influence on sportspersons. Researchers’ views around what factors significantly influence risk perceptions vary. However, all generally agree that these influences are multifactorial. Therefore, rugby risk perceptions research requires a multifactorial approach. In addition, sports researchers using the previously-mentioned theoretical frameworks (3,26,28,40,49) have failed to investigate sports persons perceptions of risks despite suggesting its importance.

This kind of behavioural and risk communication research is needed in rugby research because disparities in opinions and beliefs exist between the various levels of rugby stakeholders (coaches, players and rugby’s governing bodies) about the dangers of CIs. This disparity between various role-players is not uncommon in risk communication studies in other areas (7, 8). Thus, once policy makers and sports bodies develop a more thorough understanding about how and what local coaches perceive about their players risks of CIs then educational interventions can be tailored to suit the contextual differences between coaches from various SES communities, whose views about the risks of CIs differ from each other.

Research aims

This study posits that rugby coaches’ perceptions of CIs risks are a focal influence in their decision-making process to engage in risk-averse or risk-protective behaviour. Secondly, factors outside of the common rugby epidemiological confines highly influence coaches risk perceptions and behaviour. Therefore, the aims are twofold. The first aim is to interview rugby coaches and explore their responses as they report on their perceptions of the CIs risks in rugby union. The second aim is to use a coaches’ socio-ecological
model as a lens to make sense of coaches’ intrapersonal, interpersonal and societal contextual factors that influence their perceptions of CIs risk and ultimately their behaviour.
Chapter 3: Methodology

Introduction

This chapter discusses the steps taken in the methodology and explains the rationale for the study design, details of the sampling procedures, data collection methods and data analysis. In addition, some attention is drawn to how previous literature and the data from this study guided the final thematic framework and how the relevant themes apply to a working socio-ecological model for South African rugby. It is important to note that this study formed part of a larger qualitative study, conducted by Dr James Brown (JB), which evaluated the BokSmart program. Therefore, two researchers (JJ and JB) conducted the fieldwork and used similar study criteria. A senior qualitative researcher, Dr Catherine Draper (CD), supervised the process.

Central study design

The subjective and socially constructed nature of risk perceptions was highlighted in the previous chapter. General research consensus imply that acquiring an understanding of subjective issues such as public perceptions of risks, is well conducted using a qualitative design (82). Qualitative research would essentially provide the researcher with a platform from which to explore phenomena that are not well understood, by providing rich, descriptive insights from the perspective of the study participants (83,84). Qualitative enquiry goes beyond the abject application of numbers to people and events and sets out to rigorously understand meaning and context regarding the issues that are investigated, in this case the risk perceptions of coaches about CIs (123). Conversely, quantitative methods that produce statistical, measurable results has little bearing when research involves efforts to understand unknown subjective phenomena such as beliefs (85). In rugby injury prevention research where the
predominant discourse is of quantitative design, qualitative studies have potential to increase knowledge in a field that is dominated by ‘hard science’. Qualitative approaches to sports injury prevention, in collaboration with quantitative research, can provide fresh insight into how rugby injuries occur and more importantly, provide strategies for injury prevention on a national scale (28,86-88).

Since the aim of this study was to understand coaches’ perceptions and beliefs around the issue of CIs, a qualitative approach suited the methodology as it was felt that it best presented the experiences of South African rugby coaches (85,89).

The role of the researcher in qualitative studies

In a qualitative approach, the researcher is the main research instrument (90,91) and the facilitative skills of the researcher provide the platform for participants to feel safe and fosters a willingness for them to share their experiences (74, 93). Since this study concerns novel phenomena, the researcher’s role is one of a discovery–orientated instrument that aims to extract information-rich data from participants.

Focus groups

In recent years focus groups have gained popularity as a data collecting method in qualitative studies (92). Focus groups are a form of group interview that uses group interaction as the main component by stimulating participants to engage with each other about their shared experiences and knowledge and differences of opinion. Importantly, focus groups not only reveal what people think about phenomena, but allows researchers to explore how and why participants think as they do because the method is rooted in the understanding the local context of the participants; therefore the researcher is able to gauge collective perspectives about certain phenomena (92,93). Limitations of focus groups include social
desirability or loyalty to institutions as found by Keegan and Colleagues (1999) where coaches may not be openly critical of their institution's or peer's style of coaching even if it were of a risk to their players (125).

**Role of researcher in focus groups**

The role of the researcher in focus groups is a fundamental part of the research since he or she acts as the main research instrument. In doing so the researcher is both an observer and participant (94) at various points in the process, however it is crucial for the participants to feel that the researcher is there to learn from them. Therefore, while their input is minimised, the researcher aims to maximise interaction between the participants about their shared and dissented points of view (93). In this way, the research benefits because the researcher is allowed freedom to carefully observe important group dynamics while facilitating further discussion amongst participants. It is also important for the researcher to observe how the groups’ interactions influence each other's expressed ideas.

The facilitator’s (researcher) personality, social identity as well as their interpersonal skills highly influence group dynamics, which in turn has an influence on the quality of the data. The facilitator assumes the balanced role of being passive and active in the process by rousing interest in the group about a topic— in this case CIs—and thereby guide the groups interaction and discussions without being dominant, suggestive or bias towards a certain point of view (93).

**Appropriateness of focus groups for coaches**

In keeping with the aims of the study—to present the narratives of local rugby coaches’ concerning their risk perceptions of CIs in rugby union— the researcher (JJ) needed to identify the predominant community beliefs and perspectives, highlight common attitudes as well as the differences in opinions between coaches from various SES communities. Both researchers agreed that focus groups would best extricate and present the views of local coaches as opposed to one on one interviews. Single interviews result in reasoned, formal responses
to direct questions from the researcher whereas focus groups gather more data-opinions, agreements and differences are expressed from a variety of sources within focus group sessions. As a result of focus groups, the researcher was able to extract more information from coaches’ normal, everyday interactions, jokes, anecdotes and disagreements (93). Thus, focus groups revealed more about what a community of coaches know and believe about the risk of CIs.

**Sampling**

This study took place in the Western Cape (WPRU), South Africa. The South African sporting population displays disparities in socio-economic status (SES) between various communities. It can be argued that SES has various implications on coaches and players alike in terms of their general health, educational and physical development. Given recent research that showed the SES disparities of young children in South Africa (95), one could postulate that lower SES rugby coaches’ development and adoption of educational materials is stunted due to various issues pertaining to SES. This is because SES is closely linked with education, physical activity levels as well as physical growth development. There is a possibility that coaches from low SES backgrounds have altered perceptions, beliefs and attitudes about the risks of CIs, due largely to the lack or dissemination, translation and adoption of knowledge in disadvantaged communities (1). Similarly, low SES young players’ physical development for sport is likely to be stunted as recent observations show that higher SES active children have increased physical growth, specifically height and weight than lower SES youth (95).

This information was thought to be relevant to the coaches that were recruited in this study since the socio-economic statuses of South African rugby clubs and schools are closely linked to the league divisions (25,96). In addition, access to medical services is limited South Africa and therefore low SES groups are at a disadvantage especially in remote areas (97). There is also evidence that shows
higher divisions are generally associated with better player performances, improved socio-economic conditions and more optimal recovery from injuries (98). Because of such disparities, purposive sampling was used to identify research participants from local schools and amateur clubs who reflect the local socio-economic diversity.

Focus groups methodology generally tends towards homogeneity in order to capitalise on the shared experiences in the groups regarding phenomena of interest, which in this case were the risk perceptions of coaches. It was understood that homogenous FGs were more likely to maintain the coaches’ naturalistic everyday communication and behaviour with each other and thereby maximise participatory interaction from all participants in the groups. In addition, homogenous groups helped the researchers’ observe the differences in perspectives between the schools and clubs operating under the various SES conditions. Therefore, coaches’ FGs were categorised according to club and school competitions, and three SES levels: low, middle and high.

In addition to the coaches FG’s, the researchers agreed that the perspectives of referees’ would add weight to the results due to their perspectives about coaches’ beliefs and behaviour. In addition, referees operate with coaches from all socio-economic conditions and within all divisions of the game. For this reason, one referees’ focus group was deemed sufficient. The referees’ data was of benefit to the credibility of this study as an alternative source of data (triangulation) about coaches’ perceptions of CIs risk.

For the purposes of this study, it was not feasible to conduct the seven focus groups in all 14 rugby unions of South Africa. Therefore, based on proximity to the researchers, the Western Cape region with Western Province Rugby Union (WPRU) as its rugby governing body was selected as the region to study. The schools were randomly selected from Western Province Rugby’s list of schools and clubs. The setting up of focus groups involved a combination of email and telephonic contact with a representative head coach from each school and club.
For schools, this was the sports co-ordinator or head teacher-coach and the senior head coach for clubs. The representative school and club coaches were informed about the purpose of the study and, in turn, invited their coaching colleagues (other head coaches or teacher coaches) to attend a single FG. If coaches refused, we would repeat the process. Three schools and three clubs agreed to be part of the study and one school declined citing ‘lack of time’ as their reason. Prior to the recruitment process, the researchers agreed that more clubs and schools would be recruited if information saturation were not reached.

The FG participants were school, junior coaches (under-nineteen) and club, senior coaches from three different levels of school and club competitions, which reflected the groups’ SES. All coaches had previously attended a BokSmart safety programme. The three clubs were a lower league low-income status club (LC), a middle league, middle-income status club (MC), and a top league, higher-income status club (HC). The three schools used in this study are currently allocated status on the Western Cape Education Department (WCED) poverty index as the low (LS), middle (MS) and high (HS) socio-economic status schools. While also classified as ‘grassroots’, the coaches from the middle SES school were of marginally higher SES compared to the low SES level school. All high SES school coaches were of a higher socio-economic background compared to the middle and lower SES schools. Interestingly, one school (MS) had an experience of a CI. Furthermore, the LS, MS, LC, and MC are located in areas in the Western Cape province historically known as disadvantaged areas.

The focus groups’ size ranged between three and sixteen participants per group (see Table 2). The lower SES school (LS) consisted of three teacher-coaches, one male and two females. The middle school (MS) consisted of three teacher-coaches and one non-BokSmart-accredited coach. The high SES school (HS) consisted of seven coaches. The clubs were of matching SES criteria as the above-mentioned schools and consisted of eight (low SES), sixteen (middle SES)
and seven (high SES) club coaches. Lastly, ten referees agreed to be part of a referees' focus group.

In summary this study consisted of six rugby coach focus groups and one referee focus group (see Table 2).

Table 2: Characteristics of schools and clubs

<table>
<thead>
<tr>
<th>Focus Groups</th>
<th>Number Of Participants</th>
<th>Ethnicity Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low SES School</td>
<td>3</td>
<td>Black African</td>
</tr>
<tr>
<td>Low SES Club</td>
<td>8</td>
<td>Black African</td>
</tr>
<tr>
<td>Middle SES School</td>
<td>4</td>
<td>Mixed Race (Coloured)</td>
</tr>
<tr>
<td>Middle SES Club</td>
<td>16</td>
<td>Mixed Race (Coloured)</td>
</tr>
<tr>
<td>High SES School</td>
<td>7</td>
<td>Caucasian</td>
</tr>
<tr>
<td>High SES Club</td>
<td>7</td>
<td>Caucasian</td>
</tr>
<tr>
<td>Referees</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

Data collection and analysis procedures

Two researchers (JJ and JB), one of which was the main facilitator (JB), attended all focus groups. The focus group interviews were facilitated in a semi-structured format, which was ideal to allow coaches’ to clarify their experiences and beliefs with each other regarding CIs (99). The interviews averaged between forty-five minutes and seventy-five minutes long. The lengths of the interviews were dependent on the group sizes and amount of group interaction. Except for the referees group and the high SES club, all focus groups occurred at the coaches’ rugby home grounds with the purpose to maintain their natural environments in
the hope of reflecting coaches’ socio-cultural norms and values inherent to their communities. It was also felt that the different ethnicities and socio-economic backgrounds of the primary and secondary researchers: black, low-middle SES background and Caucasian, high SES background, respectively, neutralised or mitigated cultural and socioeconomic communicative barriers and increased transparency amongst the coaches’ to express themselves freely.

Guide questions

A set of open-ended guide questions were formulated by two senior researchers (JB, CD) and approved by the BokSmart programme implementers (SARU). These guide questions were part of a larger study, which evaluated coaches’ and referees perceptions of the BokSmart programme and were specifically designed to stimulate discussion around the coaches’ opinions around the subject of CI’s. They consisted of the following components: a) an introduction b) an ice breaker question c) a transition into specific open-ended questions regarding the subject of CI’s d) further key questions designed to boost further discussion on these issues e) end questions.

Firstly, the researchers facilitated a pilot focus group interview with a diverse group of past referees, players and coaches. This purpose of this pilot focus group was to refine the questions to make sure they were appropriate and contained no sensitive questions. As a result, some questions were omitted due their sensitivity such as “Have you, in the past, witnessed a CI?”. The refined questions were further applied to a second pilot group and thereafter approved for implementation by the senior researcher and SARU.

The introduction disclosed the purpose of the focus group, assured participants of confidentiality, anonymity and how the results of the research would be used. This was followed by a clear definition of CIs to ensure a collective understanding of the main topic. As an icebreaker, coaches were asked to guess the annual incidence of CIs in South Africa across all divisions of rugby and
whether school or club rugby represented the highest incidence of CIs. This was helpful to set the background for the ensuing discussion amongst the coaches. Thereafter, a series of specific open-ended key questions were asked with the intention of generating data-rich responses to ascertain coaches’ perceived salience towards the problem and prevention of CIs. Lastly, end-questions allowed coaches to reflect whether they believed they had sufficient education about CIs and to suggest ways that sporting bodies could assist in this regard. The final version of the guide questions is displayed in Table 3 below:
### Table 3: Guide questions structure

<table>
<thead>
<tr>
<th>Opening</th>
<th>Please introduce yourself (with your number) and say how long you have been refereeing and at what level you currently officiate? Do you ref school/club/both?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>SARU defines a serious/catastrophic injury as “Any head, neck, spine, or brain injury that is life-threatening or potentially permanently debilitating and results in the emergency admission of a rugby player to a hospital or medical care centre.” We will assume this definition for the rest of the meeting.</td>
</tr>
<tr>
<td>Icebreaker</td>
<td>Write down on piece of paper the number of Rugby-related head, neck or spine catastrophic injuries in SA? At what level do you think the largest number of these injuries occur – professional, club or school? [Ask for show of hands].</td>
</tr>
</tbody>
</table>
| Transition:             | 1. Are catastrophic head, neck or spine injuries a problem in Rugby? Why?   
2. What is SARU currently doing to reduce/prevent the amount of rugby-related catastrophic head, neck or spine injuries in the country? Effective?   
3. If you were in charge of Rugby in SA, what would you do to reduce/prevent the amount of rugby-related catastrophic head, neck or spine injuries in the country?   
4. As a coach/referee, what part do you have to play in reducing and preventing the amount of rugby-related catastrophic head, neck or spine injuries in the country?   
5. Who else has a part to play in reducing and preventing catastrophic injuries? Why? |
| Key (10-20 minutes for each): | 6. How do you ref to reduce/prevent catastrophic head, neck or spine injuries? Why?   
7. The group didn’t mention (choose appropriate: checking if players experienced to play in front row, concussion of players, checking BokSmart cards minimum field/facility medical requirements, illegal equipment check), why not?   
8. You are a ref of a match where a player suffers a suspected catastrophic neck injury following a tackle/scrum: the player is conscious (i.e. awake with eyes open), but unable to move. There is no medical assistance/first aid available. What would you do?   
9. Have you ever done this or would it be possible to do? If not, why not? |
| Ending questions:       | 10. Do you feel you’ve had sufficient training to reduce/prevent the amount of catastrophic head, neck or spine injuries? Do you feel you need to be |
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| Clarification or elaboration probes: | a) Could you explain that a bit more? 
b) What do you mean when you refer to...?
c) When you say... what are you actually doing?
d) It sounds like you are saying, "...". Is that correct?
e) So you are saying . . . ? (Researcher made sure to ask coaches if paraphrase accurately relayed what they meant) |

11. Is there anything else you would like to add to the discussion about Rugby-related catastrophic head, neck or spine injuries in South Africa?

Data transcription

Transcription is a technique in the data collection process that helps the researcher prepare the data for analysis by converting the data, verbatim, from an audio recording into a textual format (100). An external transcriptionist transcribed FG’s interviews verbatim. The researchers then read through and checked transcripts for accuracy.

Data analysis

Analysis techniques were based on Giorgi’s phenomenological method (86), the constant comparative method (87) and the process of de-contextualising and re-contextualising (85) the data. Giorgi’s method focuses on descriptions of human experiences and holds that the researcher must remain true to the facts as they present themselves (86). The method thrives off participants who provide descriptive interpretations about the meaning of phenomena as they see it. In addition, Giorgi’s method required the researchers’ to immerse themselves and remain true to the coaches’ data to describe their beliefs about CIs. The method suited this study because the researchers were relied upon to understand the coaches’ context from which the data emerged and to explore the meaning of the data. In this way, the aims of the study were operationally met, which was to discover meaning regarding beliefs of rugby coaches concerning CIs. Giorgi’s method involved a four step process (85,86):
• Get a total impression of the data
• Identify meaningful units (information-rich data applicable to study aims)
• Organise the meaningful units into dominant themes
• Summarise the dominant themes in view of what it tells us about risk perception of rugby coaches.

The constant comparative technique involved the assessment of transcripts line for line, paragraphs and field notes and allocating relevant codes to match the concepts linked to the data (87). De-contextualizing and re-contextualising the main themes that emerged from the data was challenging as it required knowledge of existing literature about risk perceptions as well as a grasp on understanding the coaches’ context (101). This meant firstly, that the researchers referred to existing literature related to risks, risk perceptions, CIs in rugby and injury prevention studies. Thereafter, the data was viewed and understood in connection to the pre-existing literature i.e. the data was de-contextualised. Lastly, the data was then re-contextualised to develop themes that were specific to the South African coaches’ context and worldview. This process prevented the researcher from arriving at personal, reductionist interpretations of the data since an ‘umbilical cord’ between empirical literature and the contextual experiences of the coaches was maintained. Research supports this inductive approach where themes that emerge from field data are linked to previous theoretical concepts in the literature (40,85,102). Below is an example of the process in applying Giorgi’s method (86), decontextualization and recontextualization (85) and the constant comparative method (87).
Giorgi's Method

1. Total impression of the data (above): Raw data amplified and analysed to extract meaningful units based on the subject matter of the study i.e. Coaches perceptions of CIs risk

2. Identify meaningful units (Coaches’ CI experience below)

3. Organise the meaningful units into dominant themes

4. Summarise the dominant themes in view of what it tells us about risk perception of rugby coaches.

Researcher (pg 59): “His CIs experience resulted in a proactive effort to improve his coaching skills, player care and management by actively engaging in the BokSmart course he would otherwise pay less attention to. He noted that only because of the CIs experience, did the importance of CIs prevention become a priority for him.”
Coaches’ CI experience (pg. 59)

“Now with one of our players breaking his third vertebra you know it opens for me as a coach a new life on how I perceive the game, it makes me more caring about my player. It makes me want to learn more about the sport and how to make it more safe for that child to play ...I was scared but it made me a better coach...I went to the BokSmart, the first BokSmart I didn’t ask much questions, I went to the second BokSmart I asked all those questions. Why? I was confronted with (CI).” Mid School Coach

Decontextualization and recontextualization: The above text was ‘lifted out’ of the data’ and investigated more closely with other texts across the data such as the one above that reflected similar issues such as the following response from the High SES school coach (pg.60):

“Since I have been playing rugby for 23 years, coaching for 10 or 11 years, I have never dealt with a catastrophic injury. I think it is more dangerous to go for a surf...If you had to compare the statistics in rugby to ...any other sport the statistics probably show that rugby is not that bad in terms of catastrophic injuries so there is probably too much hype about it.” High SES School Coach

The main application in the constant comparison method is succinctly stated in the title- constant comparison. Raw data was constantly compared and categorised bearing in mind their similarities, conceptual patterns and discriminative content. For example, the initial categories: 1) Aggression and 2) Attitudes and intentions proved challenging as coaches’ responses matched properties of both these categories. In the end, attitudes and intentions was chosen as a primary category due to its theoretical relation to the subject of risk ‘perceptions’ as the overarching subject matter.
Thematic framework: Central themes

Previous risk and risk perceptions literature provided the theoretical basis for several themes to be adopted in this study (9,19,25,36,48,70,103). The literature explores the influence various socio-ecological factors have on individual and collective perceptions of risks and behaviour, which was discussed in the previous chapter. However, in the research process some themes, initially thought to be relevant in respect of pre-existing literature, were either modified or omitted from the study once the researchers gained understanding of the coaches’ SES context. The reason for this is because risks perceptions studies have been conducted in countries and contexts outside of local South African coaches’ environment. This meant that previous research required scrutiny in terms of its relevance to South African coaches. For example the role of culture or cultural bias, known to influence perceptions of risk (25), was omitted as an isolated theme mainly due to the complex historical links between culture (ethnicity) and SES in the era of Apartheid South Africa (75,77,104). The voluminous subject of culture and cultural bias was therefore not within the scope of this study. However, it was agreed that SES was a less sensitive topic to explore as a dominant theme. Similarly, aggression was omitted as an isolated theme due both to its ambiguity of being in being passive attitude or active, sanctioned, unsanctioned behaviour (10). Instead, the over-arching theme of attitudes and intentions suited as the umbrella theme under which aggression could be included since attitudes are defined as individuals’ beliefs and perceptions concerning a particular behaviour (9,43). Therefore, coaches’ responses that related to aggression were assessed for inclusion under the theme of attitudes and intentions (such as the will to win at all cost)- antecedents that influence aggressive behaviour. In summary, initial themes were modified to form the final thematic framework that was used in the data analysis process (Table 4).
Table 4: A) Initial Conceptual Themes According To Risk Perceptions Literature And B) Modified Themes Adjusted For The South African Coaches’ Context

<table>
<thead>
<tr>
<th>A) Initial Conceptual Themes</th>
<th>B) Modified Themes For Coaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cultural Bias</td>
<td>1. Socio-Economic Status</td>
</tr>
<tr>
<td>2. Economic Factors</td>
<td>2. Knowledge Of Rugby And Cls</td>
</tr>
<tr>
<td>4. Experience</td>
<td>4. Coaches’ Cognitive Biases</td>
</tr>
<tr>
<td>5. Cognitive Biases</td>
<td>5. Coaches Attitudes And Intentions</td>
</tr>
<tr>
<td>6. Aggression</td>
<td>6. Coaches Pressure (Normative Pressure)</td>
</tr>
<tr>
<td>7. Attitudes And Intentions</td>
<td>7. Mass Media influence</td>
</tr>
<tr>
<td>8. Normative Pressure</td>
<td></td>
</tr>
<tr>
<td>9. Mass Media</td>
<td></td>
</tr>
</tbody>
</table>

**Socio-ecological model: Factors that influence risk perceptions**

In light of the socio-ecological factors that influence risk perceptions, socio-ecological models (SEMS) respect the notion that multiple levels of influence human experience and behaviour (11) and thereby affect the adoption and maintenance of health and safety interventions. SEM frameworks explore the interplay between the individual and their relationships with various interpersonal and societal levels of influence (68).

It was agreed that a basic rugby-specific socio-ecological model (SEM) could categorise the themes listed above and thereby serve as a working framework for the results. In this manner, the SEM displayed the dominant views and opinions of coaches linked to their multifactorial levels of influence - intrapersonal, interpersonal and societal factors (Figure 4).
Issues of rigour, validity and trustworthiness

In qualitative research, scrutiny is given to the credibility, validity and rigour of a study. These components also apply to this study. It is important to note that the results of this study should not be interpreted as facts that will be applicable to the population but as results of a novel study that will guide future endeavours of this nature.

As the main instrument, the researcher is also the main threat to trustworthiness in a qualitative study; therefore meticulous steps were taken throughout the data collection and analysis processes. Researcher’s bias in the interpretation of the data is accounted for by means of triangulation, peer reviews and a commitment to reflexivity to ensure that the researcher remained transparent and true to the data (85). Self-awareness of cultural and social preconceptions challenged the researcher to seek alternative explanations and interpretations.
from the data, thereby contesting personal views (105). However, since the concept of a genuinely neutral observer is non-existent, the researcher’s perspectives, social and cultural background, previous experiences and pre-existing knowledge were nonetheless entwined, albeit accounted for, in the research process (85). For example, the researcher was constantly self-aware that his ethnicity and socio-economic background was reflected in the MS and MC groups but he shared little or no familiar life experiences, cultural and socio-economic similarities with the LS, LC, HS and HC. Therefore, the researcher (JJ) acknowledged that his perspectives and interpretations of the Middle coaches data were understood through shared personal living conditions—such as similar developmental experiences in club, school and community conditions, and conversely limited in view of the low and high SES level coaches.

Despite differences in cultural and socioeconomic pre-conceptions, the researchers’ (JB and JJ) fundamentally agreed on the predominant themes emerging from the all the focus group data. Therefore triangulation of the data was achieved as they scrutinized the same data set, crosschecked the coding of the data, and supplemented or contested each other’s interpretations of the data for the final thematic framework. This was overseen in the presence of a senior research supervisor, which served the credibility of the results. Thus bias was accounted for but not necessarily eliminated (41,85,99) but the process of reflexivity added reliability to interpretations of the data.

**Ethical issues**

This study was granted ethics approval by the Human Research Ethics Committee of the University of Cape Town (HREC REF 443/2011). All participants provided written informed consent for their participation.

Furthermore, consideration was given to sensitive guide questions, which were omitted from the study, and the assistive link between SES and ethnicity was supported by recent research and consensus from other studies (75,98).
Chapter 4: Results

Risk perceptions of coaches concerning CIs and the factors that influence their risk perceptions

Socio-economic issues such as knowledge and infrastructural resources accounted for the strongest influences, meaning the most cited, in determining how coaches in low and middle-income areas perceived risks of CIs. Also, there was a tendency for coaches, especially high SES level coaches, to perceive their teams to be invulnerable to CIs despite knowledge of its devastating effects.

As noted in chapter three, initial themes were modified to reflect the coaches’ local context. The results are presented in terms of the themes, which are the perceived socio-ecological factors affecting the rugby coaches in this study and the relevant SEM level (Table 5).

Table 5: Socio-ecological level and corresponding socio-ecological factors influencing South African rugby coaches and relevant SEM level

<table>
<thead>
<tr>
<th>Socio-ecological level</th>
<th>Socio-ecological factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Intrapersonal/interpersonal/societal:</td>
<td>Socio-Economic Status</td>
</tr>
<tr>
<td>2. Intrapersonal/interpersonal/societal:</td>
<td>Knowledge Of Rugby And CIs</td>
</tr>
<tr>
<td>3. Intrapersonal:</td>
<td>Coaches’ CIs Experience</td>
</tr>
<tr>
<td>4. Intrapersonal:</td>
<td>Coaches’ Cognitive Biases</td>
</tr>
<tr>
<td>5. Intrapersonal/interpersonal:</td>
<td>Coaches Attitudes And Intentions</td>
</tr>
<tr>
<td>6. Intrapersonal/interpersonal/societal:</td>
<td>Coaches (Normative) Pressure</td>
</tr>
<tr>
<td>7. Societal:</td>
<td>Mass Media influence</td>
</tr>
</tbody>
</table>
1. Intrapersonal/interpersonal/societal: Socio-economic status

All coaches remarked on the infrastructural disparity between the low SES and higher SES schools and clubs. All coaches agreed that economic resources at middle and lower SES clubs and schools were in stark contrast to that of high SES clubs and schools. HC and HS coaches felt that there players were safe from harm due to the readily available medical support at higher SES clubs and schools and noted that because of this they have less concern should injuries occur during practice or matches.

“Fortunately in our scenario we always have a physiotherapist at our training ... The same happens at school level where some schools have an ambulance parked at the field for every afternoon's training session.” High SES Club Coach

High SES level coaches also believed that the problems existing at lower and middle SES clubs and schools are due to the lack of readily available medical care and financial support.

“And the lower you go down, especially at school level, those schools just don’t have the financial backing to have an ambulance there three afternoons a week when they train... It becomes a financial implication regarding safety to get first aid, especially at school level and lower club levels.” High SES Club Coach

Middle SES coaches (MS, MC) implied that sporting bodies’ neglect ‘grassroots levels’ increase their risks of CI’s due to the lack necessary infrastructural resources that would enable them to manage the their injury risks. Their underlying perceptions were that CIs predominantly occur at the ‘grassroots level’ and not in the ‘affluent’ communities.

“You know the grass roots level is always a neglected level...the affluent community or the schools have all the structures in place ...your coaches get the proper training because of the facilities ... Therefore I can say that the catastrophic injuries in this
Similarly, low SES coaches (LS, LC) revealed a level of discontentment toward governing bodies such as WPRU and SARU. The (LC) coach’s concern was that infrastructural support from the sporting bodies was slow.

“As far as I know the board that we play under (WPRU) was supposed to provide us with those sorts of resources. I’m not saying they don’t, it’s like taking a long time before you get resources, if you get like cushions (tackle shields) this year it will take about four years again to get more cushions.” Low SES Club Coach

The commonality between all coaches was their acknowledgement that financial resources and infrastructure play an important role in the management and control of CIs. For this reason coaches perceived that lower SES communities bear the highest risks of CI’s.

2. Intrapersonal/interpersonal/societal: Coaches’ knowledge of rugby and CIs

The general view amongst low and middle SES level coaches (MS, MC, LC, LS) was that their knowledge of CI’s is inadequate. One MC coach said that he had no knowledge of CIs and relayed the sense that he was not educated in this regard despite being BokSmart accredited. Middle SES level coaches were concerned about the general lack of CIs awareness in their communities.

“I would say it is a problem due to the fact that we are, how can I put it, ...we are illiterate in the sense of what does it cause and so forth...like I never knew what a catastrophic injury was, how many there are.” Mid Club Coach

Another concern was the issue of teacher-coaches in the low-income communities, who had no prior rugby playing or coaching experience but acquired some level of skills and rugby training at their schools in order to
facilitate the sport amongst the learners. The LS coaches were primary examples of what may be a common trend at schools where, of the three coaches present in the focus group, two were teacher-coaches with no prior rugby playing experience. The referees were aware of what may be a national trend as they referred to the same concern - the education of teacher-coaches.

“Most of the school coaches come from teachers themselves and I think we must put funds available or allocate funds to have these teachers that are being appointed as coaches to be properly trained.” Referee

Low and middle SES level coaches’ had similar opinions regarding the problem of below-standard coaching and inadequate knowledge of CIs that could be prominent in the lower leagues. Interestingly, coaches at the high SES levels displayed a perceived confidence about their rugby knowledge. It was notable when a high SES level coach (HS) admitted use of out-dated approaches to prevent CIs because his response could also be reflective of the general perceived knowledge confidence of coaches’ at most high SES clubs and schools.

“I’m still with the basic old school [practice of] just proper warm-up, that’s the only thing I do to prevent them [cat. Injuries] and I think that is a bit out-dated, I think we can do much more, but at the moment I am just focusing on warming the guys up and actually stretching before matches, that is all I can do.” High SES School Coach

Despite the high SES level coach admitting the use of out dated techniques and a lack of updated knowledge on CIs prevention, high SES level coaches did not relay an urgency to update their knowledge in this regard. Conversely, there was a general sense of urgency and enthusiasm in the way that middle and lower SES coaches stated their need for more education about on prevention of CIs.

“I think the coaches need to be trained or need to be taught on how a human body works…which bones are involved during, maybe the ruck or the scrum, which bones
are involved, which joints that could be dislocated... You must be eager to learn if you are a coach and you must be involved.” Low SES School Coach

3. Intrapersonal: Coaches’ CIs experience

In general, not many coaches experience CIs in their career. Of the coaches in the FGs, one coach (MS) witnessed a catastrophic injury occur to his player. This experience resulted in a significant self-reported behavioural change, an increased sense of vulnerability to CIs and increased priority on prevention strategies. The MS coach was emotional as he reflected on his experience and explained at length how it helped him improve his coaching methods and his care for his players. His CIs experience resulted in a proactive effort to improve his coaching skills, player care and management by actively engaging in the BokSmart course he would otherwise pay less attention to. He noted that only because of the CIs experience, did the importance of CIs prevention become a priority for him.

“Now with one of our players breaking his third vertebra you know it opens for me as a coach a new life on how I perceive the game, it makes me more caring about my player. It makes me want to learn more about the sport and how to make it more safe for that child to play ...I was scared but it made me a better coach...I went to the BokSmart, the first BokSmart I didn't ask much questions, I went to the second BokSmart I asked all those questions. Why? I was confronted with (CI).” Mid School Coach

Conversely, some high SES level coaches (TC, HS) appeared unaffected about the issue and implied that CIs would never occur to their teams. Their beliefs stemmed from the fact that they never experienced or witnessed one in their coaching careers. This ‘no experience’ with CIs seemed to reinforce cognitively biased beliefs that CIs happen elsewhere and not in their socio-demographic region. As a result, coaches downplayed the threat of CI’s and were of the opinion that the public or media inflates the hype surrounding the issue. High
SES level coaches (HS) also made unfounded assumptions that incidence rates of CIs are lower compared to other sports.

“Since I have been playing rugby for 23 years, coaching for 10 or 11 years, I have never dealt with a catastrophic injury. I think it is more dangerous to go for a surf...If you had to compare the statistics in rugby to...any other sport the statistics probably show that rugby is not that bad in terms of catastrophic injuries so there is probably too much hype about it.” High SES School Coach

In addition, the rarity of CIs may influence coaches to think that CIs in rugby are akin to freak accidents that occur for no fault of the player, coach or environment.

“Every now and then he will get a catastrophic injury that is just a freak accident that some guy just lands badly, and something else happened, and this guy could be the most well-equipped well-trained person on the entire field but bad things do happen. And so to be at the point where you can coach prevention, sure... but also at the end of the day shit happens.” High SES School Coach

Moreover, high SES level coaches were polarised in their opinions about CIs, as they appeared to acknowledge its devastating consequences but quickly verified that its extreme rarity and that the problem is over-hyped. High SES level coaches relayed a sense of confidence that CIs are less of an issue when one considers the relative incidence rates to the number of rugby players in South Africa. This comment reflected the thoughts of the group, which could be indicative of the general prevailing narrative amongst high SES level coaches.

“I would say it is an issue but if you look at the number of rugby games taking place every single Saturday in season the percentage of catastrophic injuries in relation to the amount of players actually playing the game on a Saturday in my view is not that great, or is not that big.” High SES Club Coach
4. Intrapersonal: Coaches’ cognitive biases

Variability in the coaches’ risk perceptions could also be accounted for by motivational and cognitive factors that influence them and bias their judgements as to their team’s vulnerability to CIs. For example, coaches in general perceived their teams to be less vulnerable than ‘others’, and that CIs do not happen ‘here’ but in areas where they perceive the risks of CIs to be higher. Perceived invulnerability to CIs were aptly typified by the following remark:

“We automatically assume on our fields it doesn’t happen.” High SES School Coach

Similarly, coaches seemed to make generalised judgements from incomplete information (heuristics). Akin to stereotypes, the coaches displayed common publicly held beliefs about certain SES groups. These that are regarded as sources of error because of their general overuse. The representativeness heuristic was prevalent in the high SES level coaches’ responses. They referred to ‘poorer’ rugby playing communities as being more susceptible to the dangers of CIs and relayed a sense of confidence that their teams are invulnerable to CIs. This demonstrated a level of ‘perceived invulnerability’ to CIs.

“That’s why I also said club rugby is where the most injuries take place, because I have also always got this idea that the lower level of rugby you play and not like I’m saying all club rugby but there is a lot of club rugby coming around that I feel school rugby is on a higher level, and when you play on a higher level the chances of injury for me is less, and I don’t know if that is true, that is the perception I go in with...So although we don’t see it (CI) on our fields as often, I thought it would be probably quite prevalent in the poorer areas.” High SES School Coach

Downward comparisons epitomise the belief that the unfamiliar ‘others’ are more susceptible to threats. Downward comparisons were made by high SES club coaches who believed the schools were more at risk than clubs, especially
schools in the lower leagues. This was more plausible to them due to their perceptions that there is a greater lack of financial resources at schools compared to clubs.

“I would say school and the lower club levels, not the (high SES) club level...And the lower you go down, especially at school level, those schools just don't have the financial backing.” High SES Club Coach

Interestingly, downward comparisons were not exclusive to high SES level coaches since LC coaches believed that a higher risk of CIs existed at schools rather than clubs and implied that CIs do not happen in club rugby. Similar to perceived invulnerability, LC coaches were of the belief that school coaches are less educated than them because they are only involved in the game as a school duty.

“You see most of the problem is that the coaches from schools they are not well trained for the safety and how to let the boys play rugby...Most schools don't even have teachers that have played rugby. They just watch rugby, because of the interest they also want their schools to play rugby or to participate in rugby games, so I think it is a problem.” Low SES Club Coach

5. Intraperpersonal/interpersonal: Coaches attitudes and intentions

All coaches acknowledged the intention to ‘win at all cost’. There was a general acknowledgement amongst coaches that this intention most often outweighed the importance player safety and can have catastrophic consequences on the health and safety of players. An MC coach recalled an incident in which a player was not substituted by his coach and continued to play on despite visible signs of concussion.

“"The most important thing for a coach is he's got to produce results ...so as a result he also keeps the players a bit longer ...I witnessed on Saturday ...one of the players getting a knock ...immediately you could see that he had sustained a concussion but the player got up and instead of just taking and pulling him ...you know but then he still played until you know a few minutes later but you could see that he was totally
out of it, you know that sort of thing from the coach because he needed to produce results...that willingness to win leads to greater injury risk and greater injuries.” Mid Club Coach

High SES level coaches admitted to the tendency of placing a low level of importance on employing risk-protective behaviour and to putting their players at risk for CIs. The high SES school group acknowledged that the ‘win at all cost’ attitude shows a poor regard for the players’ safety. Moreover, one coach spoke for the group and openly admitted that they risk players’ lives by playing them out of position.

“We are all walking a very fine line, which we have to, and it is embarrassing...we can’t force okes into positions they don’t want to be in...catastrophic injuries are not related to warm-up, I don’t think at all, what we need to do is to stop doing what we do [which is, to say:] “You have to play Prop on Saturday, we’re stuffed, we need you there.” High SES School Coach

The HC and HS coaches felt that forwards players in particular, are at risk due to the coach’s win-at-all-cost intentions. They felt that young players who are coached to simply ‘run’ the ball through the opposition go on to lack the specific ‘forwards’ skills required for the position as they reach senior age group levels.

“You find a lot of guys I mean they’ll put for instance a guy...especially speaking about forwards now ... just because he’s the biggest, just to run with the ball and they don’t actually teach him the skills where as they get older they lack those skills because you know they just basically coach him to win games, if that makes sense.” High SES Club Coach

The referees group unanimously acknowledged this problem as a common trend. The group agreed that coaches and players’ could be cognitively dissonant to the risks of CIs and display hostile aggression i.e. they can ignore objective information about injury risks if it interferes with their intentions to
win. One described a common scenario where the intention to win is associated with ‘taking players out’ of the game.

“Some of those players will take three or four guys out of that other team because they knew they are playing now for a position in a different league, so rugby is no more rugby, they are playing for something that they want but they are injuring somebody else...say I'm in Division Four, so now we're playing the finals and we have to win this game to go to Division Three, so now because I know that numbers two and three are better than me and if I take them out of the game, we can maybe win this game.” Referees

There was also concern for whether referees could cope with these kinds of team attitudes and manage the physical collisions in schools’ matches where youths’ intentions to win and physically overpower opposition teams are coupled with team disparities in physical development and rugby safety skills.

“I was at an u13 tournament ... I agree with the schools [that they account for greatest proportion of catastrophic injuries] because some of those boys were huge. You couldn’t believe that these were under 13s that you fear going into scrums because of the huge difference in body build that you fear the necks of the lighties scrumming ... I didn’t ref, I just went as a spectator and scrum times you just feel fear coming into you, I hope this ref can control this now because of inexperience and maybe the want or the will to win, win at all cost.” Referee

It must be reiterated that the coaches did not construe aggression as an isolated factor that contributes to how they perceive CIs risks. Instead, one could argue that coaches referred to aggression as secondary in comparison to ‘primary factors’ such as win-at-all costs attitudes and intentions. Still, the high SES level coaches recognised the need to continually manage players' aggression at rugby games and felt that it is mainly the responsibility of a coach and match officials to monitor and control for signs of unsanctioned aggression amongst players.
“I think we as coaches being there can see when that happens, when it moves into that... And to then look after the players we would sort of stop it at that stage before it gets to that, before it really gets like messy. So I think there we also play quite a big role to sort and control injuries that could happen” High SES Club Coach

6. Intrapersonal/interpersonal/societal: Coaches (normative) pressure

The general consensus amongst the coaches was that players do not question their tactics or instructions. The high SES club coach relayed the a possible trend that compounds the problems that arise with a ‘win at all cost’ mentality in that players’ won’t contest coaches’ instructions and decisions, even if the coaches’ decision put them at risk for CIs. The HC coach reported on the trend that coaches often switch players out of their position when under pressure, which is carried out without dispute from players who fear they may lose their place in the team or could be ostracised by their coach or team-mates should they dispute the coach’s decisions.

“But in saying that I agree with you 100% that a kid is going to trust his coach... I mean you can tell an oke to do flipping whatever and the oke is going to listen to you... Somebody gets injured now all of a sudden he’s turning a flank into a hooker and the player’s ability to say no without a repercussion you know of never getting an opportunity again or saying you’re not a team player or you’re not a whatever.” High SES Club Coach

Field-side pressure from parents and spectators is an example of the interpersonal factors that affect perceptions of CIs risks at the public level. HS coaches were of the opinion that parents and the public place the youth at risk and have skewed perceptions about the risks of CIs because they encourage unsanctioned aggression tactics. The HS coaches referred to field side pressure, which is common from parents.

“...Parents, as well, that are so worked up on the side of the field that they encourage them [their children] to go in there, and encourage dirty play, off the ball play...” High SES School Coach
The referees also unanimously agreed that field side pressure can be detrimental to the health and safety of players; parents encourage unsanctioned aggression and inexperienced referees may succumb to this field-side pressure from parents. This comments of the coaches and referees show that pressure stems from multiple role-players, not only coaches since different levels exert pressure on each other. Ultimately, players pay the costs of such pressures.

“It’s a problem in terms of there's a lot of pressure on young kids you know placed by parents to play the game hard. I've heard of instances where money is being put or incentives are given to youngsters to play the game hard and to win at the end of the day...unfortunately the problems that we're sitting with, an inexperienced referee being the fact that he wants that game to be played because it’s his first game or second game will rather seek opportunities to allow this game to be played so that the guys can have the game and undermine the safety issues” Referee

To counter the negative effects of pressure placed on players to perform certain tasks which place them at risk for injuries, a HC coach made a suggestion to encourage players’ taking responsibility and allow them to be part of the coaches’ decision-making process during matches. While some HC coaches admitted that this could be difficult to administer and manage on a national scale, they agreed in principle that it would be a step in the right direction for the wellbeing of players and will help coaches to proactively decrease the risk of CIs.

“Catastrophic injuries are not related to warm-up, I don’t think at all, what we need to do is to stop doing what we do [which is, to say:] “You have to play Prop on Saturday, we’re stuffed, we need you there...I think another that a player owes himself and I think this is where we are going to draw a fine line here, is a player needs to be able to say ‘no’... It’s a very fine line in terms of what could be arrogant and whatever but ...the player taking responsibility...he needs to be able to say “Sir/coach, I’ve never played there before, I’m not comfortable going into scrums and walk away from it.” That’s a difficult thing to administer but I think it could play a big role.”

High SES Club Coach
7. Societal: Mass media influence

The general consensus amongst coaches was that the mass media did not influence coaches’ perceptions of CI's risks. However they were of the opinion that public perceptions are strongly influenced by media messages. FG coaches’ main concerns could be summed up as: various forms of news and social media play a positive or negative role in influencing public perceptions of safety about the game. For this reason, coaches were sceptical and critical about the role of the media. Low and high SES level coaches referred to the tendency of the media to idolize the aggressive nature of the game and also blamed news media for perpetuating a negative image of the sport. One LC coach referred to a televised match in which two national players were involved in a ‘big hit’ and the tackler was lauded for his aggressive tackle. The LC coach disagreed with the manner in which television media praised these kinds of tackles and believed that the media sensationalism following the ‘big hits’ of role model players’ can be dangerous and harmful to young learners of the sport who may emulate this behaviour at their competitive level.

“How can you applaud that, you must talk to the players, don't do that as professionals, you mustn't do unnecessary things [big hit tackle] in front of the people [spectators] because these learners are watching and you are their hero. The moment you do that, they [learners] are going to do it at their level.” Low SES School Coach

High SES level coaches’ also believed the image of rugby is tarnished as a result of media hype, especially surrounding the issue of CI’s in the game. They were concerned about parents who discourage their children from the sport due to perceptions that rugby is dangerous. Coaches blame the media for influencing this sort of public perception.

“...but I think that the press does tend to make a hype about it [cat. Injuries] and it does tend to create a negative perception from parents particularly mothers, I mean
we have still got boys at school whose mothers won't allow them to play rugby, I'm amazed at it but that is still the case.” High SES School Coach

It was clear that all coaches alluded to the various forms of media as powerful tools that are not used to their full potential to sway public perceptions. Specifically, the LC and MC coaches agreed that sporting bodies should make better use of media tools to promote health and safety for rugby players and protect the image of the game. The LC coach likened a possible CIs intervention to the approach that government undertook when it tackled the issue of AIDs in South Africa.

“Now there is another way that the government or SARU can do, having more advertisement in TV, people like TV mos, and pamphlets. Like if you’re talking about Aids in South Africa, every pamphlet, you are talking about, every pamphlet there will be Aids involved and also in advertisement in TV, there will be Aids involved. You see, therefore the people must get educated through advertisement as well, you see. Because the parent cannot go to the field or school and study here how to play rugby, but they can get it in rugby...therefore if now we can involve them by adding more, little things more, little things about the catastrophic injuries” Low SES Club Coach

The results of the study are briefly summarised in Table 6, which show the coaches’ central responses and their related themes, which are the main socio-ecological factors that might influence coaches in South Africa. In addition, suggestions are given as to what these dominant opinions might imply about how rugby coaches perceive the risk of CIs in the South African rugby.

In Figure 6 the results are displayed within the framework of a coaches’ SEM as outlined in chapter three. This model shows the specific socio-ecological factors that were found to be relevant to South African coaches. In addition, the model outlines the main socio-ecological influences that are relevant to coaches from various SES communities. It is of interest to note that specific factors had more influence than others on coaches from dissimilar SES backgrounds and
communities. The SEM also displays factors that influenced all coaches’ perceptions of CIs regardless SES as well as factors that appeared to have less of a role in this regard.

It is important to understand that the interplay between the various (bio)socioecological factors are complex (115,116) and that while coaches’ relay their level of importance as seen in the results, the reader should not view any of the socioecological factors in isolation of each other. Instead the reader is encouraged to respect the individual and collective multifactorial network that influence coaches’ perceptions of CIs risks involved in the sport.
Table 6: Central coaches’ responses and Major central themes modified for South African context and interpretation of coaches’ response.

<table>
<thead>
<tr>
<th>Coaches responses (Meaningful units)</th>
<th>Modified themes for SA context</th>
<th>What it suggests about coaches’ perception of CIs</th>
</tr>
</thead>
<tbody>
<tr>
<td>“You know the grass roots level is always a neglected level…the affluent community or the schools have all the structures in place … Therefore I can say that the catastrophic injuries …are so high because they don’t have the necessary facilities.”</td>
<td>Socio-Economic Status</td>
<td>Resources (SES) at lower SES coaches’ schools and clubs ↑beliefs of CIs risks.</td>
</tr>
<tr>
<td>“I would say it is a problem due to the fact that we are, how can I put it, …we are illiterate in the sense of what does it cause and so forth…like I never knew what a catastrophic injury was, how many there are.”</td>
<td>Coaches’ Knowledge Of Rugby And CIs</td>
<td>High SES coaches are confident regarding their rugby knowledge and knowledge of sufficient medical support due to ↑SES. Some high SES coaches aware of their beliefs of invulnerability to CIs. Middles coaches aware of ↓knowledge at ‘grassroots’ levels. SARU should identify knowledge gaps and prioritise effective translation and adoption of knowledge to specific coaching audience.</td>
</tr>
<tr>
<td>“…now with one of our players breaking his third vertebra you know it opens for me as a coach a new life on how I perceive the game, it makes me more caring about my player. “…I have been playing rugby for 23 years…I have never dealt with a catastrophic injury. I think it is more dangerous to go for a surf…”</td>
<td>Coaches’ CIs Experience</td>
<td>Middle coach CIs experience resulted in change of perceptions and behaviour. Coaches’ self-experiences play a role in changing behaviour or preventing behaviour change.</td>
</tr>
<tr>
<td>“So although we don’t see it (CI) on our fields as often I thought it would be probably quite prevalent in the poorer areas.” High SES school coach</td>
<td>Coaches’ Cognitive Biases</td>
<td>High SES coaches’ perceive themselves as less vulnerable (↑perceived invulnerability) to CIs and make downward comparisons.</td>
</tr>
<tr>
<td>“…the most important thing for a coach is he’s got to produce results… he also keeps the players a bit longer which then leads to a greater risk of injury that could lead to a catastrophic injury that sort of thing.”</td>
<td>Coaches’ Attitudes And Intentions</td>
<td>All coaches acknowledged that ↑will to win-at-all-costs ↓player safety and influenced hostile aggression.</td>
</tr>
<tr>
<td>“…what we need to do is to stop doing what we do (which is, to say) “You have to play Prop on Saturday, we’re stuffed, we need you there…”</td>
<td>Normative Pressure/ Coaches Pressure</td>
<td>Pressure exists at all role-player levels. Coaches’ ↑pressure on players coupled with ↓ability of players’ to challenge coach ↑susceptibility to CI’s.</td>
</tr>
<tr>
<td>&quot;I think the point, that plan is very, very crucial, the information is not here in the townships, its far away they are to the towns, UCT, Stellenbosch, Newlands. You bring the staff here. I think those people mos, they’ve got material, and they’ve got cars, that can bring here.&quot;</td>
<td>Cultural Bias Likened To SES Above</td>
<td>SES status is also linked to cultural context i.e. ↓SES groups mainly consist of black and mixed race coaches and ↑SES mainly white coaches.</td>
</tr>
<tr>
<td>Parents, as well, that are so worked up on the side of the field that they encourage them [their children] to go in there, and encourage dirty play, off the ball play so now because I know that numbers two and three are better than me and if I take them out of the game, we can maybe win this game…</td>
<td>Aggression Likened To Attitudes And Intentions</td>
<td>Appears to be the consequence of other factors such as attitudes and intentions.</td>
</tr>
<tr>
<td>&quot;How can you applaud that, don’t do that as professionals, you mustn’t do unnecessary things [big hit tackle] in front of the people [spectators] because these learners are watching and you are their hero.</td>
<td>Mass Media</td>
<td>Forms of mass media play a role in influencing how the general public perceive CI’s risks and other injury risks associated with rugby</td>
</tr>
</tbody>
</table>
Figure 6: Socio-ecological model displaying factors influencing South African rugby coaches’ risk perceptions of CIs according to high, middle and low SES level coaches.
Chapter 5: Discussion

Rugby coaches play a primary role in nurturing players’ personal development, interpersonal skills and rugby education (106,107). They are fundamental ‘change agents’ that help reduce injuries to players and increasingly go beyond the confines of the sport to improve players’ psychological, attitudinal and social development outside of the rugby game (12,108,109). Due to their influence on young players it is important for policy makers to understand the subjective parameters that govern coaches' beliefs, attitudes and perceptions in relation to various aspects of rugby. This is relevant because differences in how experts, coaches, players and the public perceive risks are at the heart of communication problems between these role-players (15,25,110). Indeed it is this mismatch in perceptions of risk between local users (coaches and players) and higher level stakeholders (Boksmart and other governing bodies) that may be promising for future interventions to reduce the risks of CIs. In addition, the difference in how these risks should be managed is an important consideration for experts as different levels within the socioecological model might view risk-management strategies different from the other. It goes to say then that perceptions of risks between the various stakeholders and the management of risks are a complex interplay and require the strengths of ‘bottom-up’ and ‘top-down’ strategies.

In recent years, and since the conception of BokSmart in 2012, there has been considerable emphasis on improving coaches’ education, particularly their role in the prevention of CIs (7,9,11,13). BokSmart’s main aim is reduce the number of CI’s in rugby union by using evidence-based approaches. However, to date the majority of evidence has focused on bio-medical, tactical, technical and other policy approaches to reduce injuries (1,52). Recent research (3,15,28) stress the need for long term multifactorial strategies that include behavioural and risk communication interventions for the individual, community and society. Therefore, if Boksmart and associated governing bodies used a socioecological
framework and enlisted the help of risk communication experts to facilitate strategies to bring about changes in the risks perceptions of local coaches with regard to CIs, this may lead to positive behaviour change at the grassroots level and may be effective as a ‘bottom-up’ approach to reducing the incidence rate of CIs.

South African rugby coaches’ through the lens of a Socio Ecological Model

The factors that influence coaches’ perceptions of CIs risk can be understood through the lens of a SEM. This model aligns with BokSmart aims, which is to include all role-players of the game through a multifaceted approach that provides effective education that can be adopted by all communities across the population (7).

The plethora of factors represented in the preliminary SEM demonstrates their influence on coaches’ risk perceptions at each level of the model, that is, intrapersonal, interpersonal and societal. It also indicates that strategies to change coaches’ risk perceptions and behaviour at a national level can only be implemented once extensive investigation of these factors are addressed at each level (3,15,37). In other words, the ecological context of the individual within their community and society needs to be understood prior to implementing interventions for injury prevention. In this manner, the SEM reveals that CIs in rugby are linked to behavioural determinants such as attitudes, beliefs and perceptions-factors that appear to have been underrated in rugby injury prevention research. For this reason, it is important for CIs prevention, to manage these factors, which affect the behaviour of coaches and players.
Perceptions and dominant socio-ecological factors influencing South African coaches

Certain factors appear to play a greater role than others in influencing how South African coaches perceive players’ risk of CI. The results of this study suggest that coaches’ in general perceive issues of a socio-economic nature to be one of the primary contributors to increased risks of CI. In addition, some coaches are prone to cognitive biases that cause them to downplay the threats of CIs.

Middle and Low SES level coaches: Socio-economic factors and knowledge

Coaches’ from middle and low SES settings appear to be governed by beliefs and perceptions about their communities' disadvantaged socio-economic conditions, which could stunt the development coaches and players in these settings. The perceptions of middle SES coaches’ appear to be linked to beliefs that they are not knowledgeable enough regarding CIs prevention and therefore perceive their players to be more at risk for CIs compared to those in high SES settings. Similarly, low SES level coaches also viewed their teams as more at risk for CIs compared to high SES clubs and mainly due to lack of adequate rugby infrastructure such as equipment.

A concerning factor for SARU is that a BokSmart-accredited coach (middle club) had no knowledge of CIs. The BokSmart course extensively covers the topic of CIs therefore it is not possible that a BokSmart-accredited coach has never heard of CIs. However, it could mean that the coach had no further exposure to the topic of CIs following his course since the narrative at clubs seem to be that CIs ‘do not happen’. Overall, this could be a worrying reflection of knowledge (of CIs) that exists at low and middle SES levels and could point toward a subsequent low level of importance given to CIs education at clubs.
Physical and skills development of all young players’ depend on them having access to updated rugby knowledge, good nutritional support and adequate rugby infrastructure (2), all of which are linked to favourable socio-economic conditions. In South Africa, poorer communities may lack the developmental opportunities to foster the cognitive and physical attributes needed to play at competitive levels of the game. Therefore it could be argued that their risks of sustaining CIs are higher relative to players’ in higher SES communities. Interestingly, while teams in low SES (black and coloured) communities may be linked to an increased risk of CIs, they are not necessarily linked to a higher number of CIs (77).

Poor infrastructural conditions and the lack of CIs knowledge appear to play the main role in influencing low and middle SES coaches’ perceptions of CIs risks. Future research could be motivated to investigate: 1) The effectiveness of the current content of rugby CIs education in the BokSmart courses and whether it has optimal reach into low and middle SES communities; 2) Whether coaches optimally adopt CIs education content and apply it in their coaching methods; and 3) Whether the current CIs education or the educators are tailored for the socio-cultural context where courses take place. Policy-makers and sports bodies should evaluate the current status of rugby knowledge in lower income communities and aim to address the infrastructural issues that exist at these levels since they make up the majority of the rugby playing community in South Africa. Furthermore, policy makers should aim to tailor injury prevention messages to target vulnerable populations.

**High SES level coaches: Cognitive biases**

In contrast, high SES level coaches appear to have sufficient knowledge about CIs and optimal infrastructural environments but seem predisposed to cognitive biases. Results in this study indicate that high SES coaches regard themselves as distinctly less vulnerable to the threat of CIs than low SES level coaches. This
means they are prone to a prevailing cognitive narrative that ‘CIs don’t happen here’, perceiving their teams to be less vulnerable to CIs than other teams especially those from low SES communities where education and resources are a problem. Hence downward comparisons are made at this level because those less fortunate are seen as more at-risk (32,45,72). Therefore, some coaches will perceive their teams to be less vulnerable to CIs than other teams depending on whom they compare themselves to. Similarly, the representativeness bias based on generalised assumptions and limited information, seems to govern high SES level coaches’ opinions because they automatically assume that CI’s occur in poorer areas (6,24,71,77).

It is plausible that favourable economic factors (SES), education (knowledge) and an extended coaching career without exposure to CIs (experience) could reinforce coaches’ cognitive biases to the threat of CI. This can be based on assurances ascribed to favourable socio-economic conditions such as medical personnel that are present at all matches and training sessions, in comparison to lower SES clubs and schools who reportedly do not have safety privileges to this extent. Indeed the lack of immediate medical support and adequate rugby infrastructure suggests that low SES coaches may perceive their players as more vulnerable to serious injuries than players from higher SES schools and clubs.

Despite high SES level coaches appearing to be most susceptible to cognitive biases in this study, the problem can be found at all SES levels because the low incidence rates of CIs creates ‘an invisibility about the threat’ of CIs, which means that coaches may not prioritise this problem if it never happens or they may simply choose to ignore the threat.

Overall, the central beliefs of a coach appear to outweigh their knowledge of the risks involved in risky behaviour. Coaches could disregard the possibility of catastrophic consequences if they believe that ‘it does not happen to us’. Therefore, it is crucial that sporting bodies understand that merely supplying more information about the risks of CIs will not be effective if coaches’ hold
onto beliefs that CIs do not happen in their teams and more likely to occur in poorer, less educated areas rather than their own. Rugby sports bodies must address the beliefs of coaches by first understanding ‘what’ and ‘how’ they believe (25), since the way that coaches view their players vulnerability to CIs may be an indicator of better CIs prevention coaching practices.

Another strategy for rugby sports bodies is to investigate the effectiveness of ‘heuristic’ verbal cues that could reinforce beliefs. One example from this study was that every coach was familiar with ‘one catastrophic injury is one too many’. This heuristic judgement that CI’s are dangerous and should be eliminated in the sport could function as a familiar verbal prompt for coaches at all levels. Therefore researchers could investigate the effectiveness of verbal cues such as ‘safety-first’.

All coaches

Below are brief discussions and summaries of several factors that emerged as applicable to all coaches regardless of cultural background or socio-economic status: Experience, attitudes and intentions (includes aggression) and normative pressure. Mass media did not appear to play an important role in the coaches’ perceptions of CIs risk. Rather, coaches believed that the media more easily influences parents and young players’ perceptions of injury risks.

Experience

The low incidence rates of CI’s mean that few coaches in SA will have direct confrontation with this threat. Although self-experience or exposure to CIs might alter risk perceptions and thereby decrease risk-taking behaviour of coaches, no coach should have to witness a CIs in his career. Thus, self-experience with CIs in rugby cannot be a strategy. In addition, previous studies affirm that the relationship between self-experience and behavioural change is a complex one and show mixed results on whether personal experience with a threat can in fact increase risk awareness and precautionary behaviour (24,36,45,46,62,111).
However, no experience or exposure to the threat of CIs counts as experience. This seems to affirm coaches’ perceptions that risk-taking coaching behaviour will bear little consequences. Therefore, as with the majority of South African coaches having never witnessed a CIs in their rugby careers, they learned that CIs do not happen to their teams and therefore it is understandable to degree that less priority is given to strictly adhering to best practice CIs prevention protocols simply because of the perception that CIs do not occur in their team.

For these reasons, the type of experiences can determine whether or not coaches place a high level of importance on the subject of CIs prevention. Essentially, South African coaches in general seem to underestimate the danger of risk taking behaviours (38,45,48) simply because nothing, in their experience, will happen to them. It may be resourceful for SARU to use coaches with past exposure to CIs in an advisory and educational role to guide other coaches on the importance of CIs prevention.

**Attitudes and intentions**

Coaches at all SES levels were familiar with the common notion ‘win-at-all-costs’. This attitude or intention implies the worrying narrative that may be common amongst coaches: players’ risk of CIs are of less concern compared to the rewards of winning, which to the coaches, outweigh the rare possibility of CIs (25,36,65). Specifically, coaches reported that: 1) They keep players on for longer despite possible injuries, 2) They force players to play out of their normal positions; and 3) Winning is their only motive regardless of player safety. If such behaviours were common practice in South Africa it would be a major concern for sports bodies like SARU whose best practice protocols require coaches to employ a ‘safety-first’ approach (9). With this view a coach’s behaviour, which is determined by attitudes and intentions, beliefs and perceptions, may be considered by rugby governing bodies as a risk factor that must be managed. Research reiterates that when winning is the only motive, coaches will
compromise player safety in order to ‘win at all cost’ (43,69,79,112). This is especially evident in rugby matches where stakes are high and players will do what is expected of them without question. Similar trends were observed in recent studies (9,30) where the rewards of winning would motivate players to ‘play through an injury’ despite knowledge of the risks involved.

Therefore, while sporting bodies cannot change coaches’ natural primary intentions to win, more can be done to manage coaches’ intentions to ‘win at all cost’. Rugby bodies could investigate the effectiveness of a three-prong approach to this problem: 1) Effective enforcement of current policy rules such as the BokSmart position statement on coach accountability (12,113) while 2) gaining an understanding that coaches, players and the public perceive risks in a subjective, more broad manner compared to experts’ more narrow and objective risk evaluations (33); and 3) Develop and pilot interventions that assist coaches’ at a cognitive, subjective and behavioural level. For example, coaches’ ‘win-at-all-cost’ attitude might be modified if they observed evidence that the ‘safest techniques are the most effective techniques’. Indeed, recently Hendricks (9) observed that players and coaches are generally more excited about promoting safety-first if it means that improved safety methods will concurrently improve performance. Interventions to cleverly promote ‘safety-first’ attitudes are not new. Such interventions have previously been implemented to some success by the New Zealand Rugby Union’s RugbySmart and SARU’s BokSmart (9). Therefore researchers should continue to expound on these recent observations in an effort to counter the risk-taking attitudes and intentions of rugby coaches.

**Normative pressure**

Notably, it is likely that the above-mentioned ‘win-at-all-cost’ mentality stems from the coaches’ pressure from self, peers, parents and rugby structures such as club management. Scantling et al (2005) concluded that coaches are subject
to the pressures of others to produce wins (Scantling:2005jx). In the focus groups, coaches readily acknowledged the pressure they place on players by instructing them to play out of position despite the risks involved. This is in keeping with research that point toward this trend in rugby; Sye et al [2003] found that 76% of high school rugby players reported their teammate ‘staying on’ despite suffering concussion. In another study, one hundred and fifty one players believed that a teammate had stayed on because of being under pressure (106). Therefore, while pressure can positively influence competitive player behaviour, it is a particularly dangerous if the accepted normative pressure is to ‘play on’ through injury.

As various rugby role-players exert pressure on each other, the burden to perform is ultimately on the coach and players. Essentially, the cascade of pressure ends with players, whose safety is compromised at the cost of producing results for the coach. For this reason, normative pressure in the rugby community should be eased and managed because it compounds with the ‘win-at-all-costs’ factor to further increase players’ injury risk. Thus, how coaches manage their intrapersonal, interpersonal and societal pressures can determine the difference between their players’ wellbeing and a catastrophic injury. One strategy that emerged from the focus groups is that players should be given the power of self-responsibility. This means that at a policy level, SARU and the relevant sporting bodies should sanction players’ to dissent coaches’ instructions should it threaten their safety.

Study limitations

Methodologically, a key limitation in this study was the sample size of focus groups. Focus groups had different numbers present, but this was the reality of different SES strata – less resourced clubs/schools have different numbers of coaches. Acceptable ranges, in terms of the number of participants in focus groups, generally vary between a minimum of four and maximum of twelve
participants per interview (82,93). Researchers note that quality should be balanced with quantity as the aim is to explore depth and complexity of phenomena (114). Another disadvantage was that only three teacher-coaches were present for the FG at the low SES school due to the lack of full attendance. In addition, the male coach held the predominant opinion in the FG interview, which meant that the two female teacher coaches were less involved, thereby stunting group interaction. This was an issue since the purpose and value of focus groups lie in their ability to generate a wealth of data from the interaction between participants (114). For these reasons, the amount of meaningful data generated from the low SES school was restricted due to the lack of contribution from all participants. The problem of group attendance/dropout is common in conducting focus groups across all SES settings. Future researchers should be mindful and prepared to manage group attendance, dropout, and verbally dominant participants and encourage dissoned opinions by facilitating an inclusive atmosphere. Future studies should improvise strategies to manage the problem of ‘no show’ participants by obtaining higher levels of commitment from club and school group organisers.

Theoretically, a more established model such as Bronfenbrenner’s five-stage bioecological model could have been selected as the framework but due to the limitations of time, size of the study, novelty and the complexity of the phenomena in this study, a simpler SEM was chosen. In addition, some of the questions could be considered as ‘leading’ e.g. “Are catastrophic head, neck, or spine injuries a problem in Rugby? Why?”. It may have been more appropriately phrased as: ‘What is the prevalence or incidence of CIs? How do you know that?’. Another limitation is that the researchers could have captured more demographic information about the coaches such as their age, education levels, coaching qualifications and experience. As mentioned earlier, the nature of this explorative study suited the limited amount of demographic information obtained. However, along with a more robust socioecological framework, more
detailed demographical information motivates the case for a larger study of this kind.

Lastly, strength of triangulation and challenges of reflexivity should be accounted for. It would have added to the strength of the study if a few individual interviews were added to the design of the study for triangulation purposes. This would have provided the opportunity to ‘double check’ the researcher’s interpretations of the focus group outcomes. As it stands, triangulation was done by the researcher and his supervisors, but this represented only the researcher’s interpretation of the focus group responses and does not necessarily reflect the coaches’ views. Attempts to harness the skill of reflexivity in a study of this kind must be considered as the researchers are invariably entwined in the research process. Not only may the researchers be biased to preconceptions, assumptions and similar or dissimilar life experiences toward certain SES groups over others but the researchers must take active steps to account and control for these factors that could influence the interpretations and conclusions of the data. A strong future consideration is to sustain appropriate levels of objectivity by strictly adhering to principles of personal and epistemological reflexivity (124).

Future research

The topic of risk perceptions in rugby injury prevention research is novel. Therefore, future research in this area is crucial to corroborate evidence that will help to reduce the number of CIs in rugby. Firstly, policy makers and sporting bodies would be interested to extend this kind of research beyond a few schools and clubs in the Western Cape and investigate risk perceptions on a national scale. Secondly, it would be of interest to further substantiate whether a link exists between coaches’ risk perceptions of CIs and coaches’ risk-taking behaviour. It would also be of interest to corroborate further evidence regarding the socio-ecological (aetiological) determinants of coaches’ risk perceptions.
Future researchers might do so by integrating Bronfenbrenner’s (115) original bioecological model as a more robust empirical model to use in a study of this nature. The challenge of such an endeavour would be to establish whether this validated model is contextually relevant to community-based data and the demographics of study participants, in this case, the non-elite rugby coaches.

Indeed, answers to these questions could confirm whether there is a national trend of players being subjected to unprecedented risks by coaches’ due to a low level of importance placed CI’s prevention education. In this sense, a leading indicator could be a national decrease in the incidence rate of CIs while conversely, no change or an increase in CI’s per year would be a lag factor as this could be indicative of the lack of behaviour change amongst coaches at a national level. Finally, since risk communication deals with changing the views of its recipients; future research would do well to concurrently investigate effectiveness of sports bodies’ current risk communications strategies as they deliver CIs prevention messages and interventions to role-players at all levels of the game.

Conclusion

This study explored the risk perceptions of coaches concerning CIs in the South African Rugby Union (SARU). The research draws attention to the possible dynamics, about which little are known, that occurs in various rugby-playing communities in South Africa. This study reflects on relevant contextual issues that affect local coaches. Firstly, local coaches’ risk-protective and risk-averse behaviours appear to be linked to how they perceive players’ risks of injuries. Secondly, their perceptions of CIs risks are influenced by individual, interpersonal and societal factors and one may view these factors through a socio-ecological model (SEM). Third, a common set of factors seem to influence South African coaches’ perceptions of CIs risks from all SES levels but differences exist between high, middle and low SES coaches as to which factors have a
greater influence on their respective perceptions of CIs risks. These factors fall outside of the common rugby related sports-science parameters and represent the subjective beliefs, behavioural and socio-economic dynamics that are relevant to coaches in the South African context. The socio-economical inequalities in this country mandate that relevant South African sports governing bodies adopt socio-ecological approaches to injury prevention. Since national development of coaches is currently underway in several sports worldwide (12), they should aim to further understand how local coaches' beliefs, attitudes and general socio-cultural context affect their perceptions of injury risk in rugby. With further corroborative work, this multi-factorial approach to CIs prevention may effectively improve future coaches' development nationwide to enhance the quality of physical and psychological safety of sporting experiences for rugby players.

Contributions to research:

• This study provides a structural framework to further study the risk perceptions of South African coaches regarding CIs in rugby.
• The study shows that a plethora of qualitative factors relating to a sporting community can be encapsulated within a framework of a socioecological model
• This study shows that how coaches from various communities and social class perceive the risks of CI's is a critically important prerequisite of catastrophic injuries prevention programmes
• Consistent with the research in other sports, this study corroborates the evidence regarding the value of qualitative studies in sport to attenuate the risks of serious injury and ensure the safety of players.
Bibliography


38. Fields SK, Collins CL, Comstock RD. Sports-Related Violence: Hazing,
92


43. Emery CA, McKay CD, Campbell TS. Examining attitudes toward body checking, levels of emotional empathy, and levels of aggression in body checking and non-body checking youth hockey leagues. Clinical Journal of Sport …. 2009.


57. Spangler MB. Policy issues related to worst case risk analyses and the establishment of acceptable standards of de minimis risk. In Uncertainty in risk assessment, risk management, and decision making 1987 (pp. 1-26). Springer US.


84. Britten N. Qualitative research: qualitative interviews in medical research. BMJ. 1995.


89. Elliott R, Fischer CT, Rennie DL. Evolving guidelines for publication of


93. Kitzinger J. The methodology of focus groups: the importance of interaction between research participants. Sociology of Health & Illness. 1994.

94. Mays N, Pope C. Qualitative research in health care. 1996.


100. McLellan E, MacQueen KM, Neidig JL. Beyond the Qualitative Interview: Data Preparation and Transcription. Field Methods.
101. Tesch R. Qualitative research: Analysis types and software. 2013.


103. Scantling E, Lackey D. Coaches under Pressure Four Decades of Studies. ... of Physical Education. 2005.


125. Keegan RJ, Harwood CG, Spray CM, Lavallee DE. A qualitative investigation exploring the motivational climate in early career...