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A QUALITATIVE EVALUATION OF THE COACHES' AND REFEREES' PERCEPTIONS OF THE *BOKSMART* INJURY PREVENTION PROGRAMME USING THE RE-AIM FRAMEWORK

SUBMITTED

ABSTRACT

Introduction and objectives: Rugby is associated with catastrophic injuries: the most severe and tragic of all injuries. In response to these injuries, the South African Rugby Union (SARU) developed and launched the *BokSmart* nationwide injury prevention programme. To be effective, *BokSmart* must be able to influence the coaches and referees attending the courses. The aim of this qualitative study was to gain insight into the perspectives of coaches and referees.

Methods: Focus groups were the chosen method as coaches and referees often work as a group. In South Africa, team league position closely correlates with socioeconomic status (SES). Thus, 'top' (high SES), 'middle' (mid SES) and 'bottom' (low SES) coaches (n=43 in total) were recruited from junior and senior age groups. Referees (n=7) were recruited in their own group as they work at all league levels (7 focus groups in total). Telephonic interviews were conducted with course trainers (n=14) to verify information gathered during the focus groups. The RE-AIM framework was used to analyse the data.

Results: All coaches and referees agreed that *BokSmart* was capable of reducing catastrophic injuries in players. However, coaches' perceptions were different depending on SES. High SES coaches' felt most of the course information was a waste of their time, and noted difficulties in altering coach and player behaviour. While mid and low SES coaches were more positive about the course, they also had an exaggerated opinion about their gain in knowledge from the course. The barriers that mid and low SES coaches described were more related to the lack of infrastructure that they felt impeded the programme's adoption. Referees felt incapable of policing all *BokSmart* regulations and felt that SARU should provide extra assistance for this. In general, most coaches, referees and trainers felt that the course could be shorter and more practical.

Conclusion: Although there was widespread positivity about *BokSmart's* potential, the barriers identified in this study could be hindering optimal impact of the programme. These barriers may be different depending on the SES or league position of the coach.

INTRODUCTION

Rugby union (henceforth 'rugby') is currently one of the most popular spectator and participation sports globally.[1] In comparison to other popular sports, rugby is associated with an above-average risk of injury to participants and is associated with catastrophic injuries. [1,2] Although the risk of catastrophic injuries has been classified as "acceptable",[3] these injuries have tragic and long-lasting consequences for those involved.[4]

In response to catastrophic injuries, numerous countries have instituted nationwide prevention interventions such as the International Rugby Board's (IRB) *Rugby ready*, Australia's *SmartRugby*, and New Zealand's *RugbySmart* programme [5]. *RugbySmart* [6,7] was effective in reducing catastrophic injuries in the in New Zealand five years after the programme's introduction in 2001. [7] As a result of this success, *RugbySmart* was adapted for South Africa and launched in the country by the South African Rugby Union (SARU) as *BokSmart* in 2009. [8] Using a DVD-facilitated educational session, the implementers of *BokSmart* attempted to directly influence the behaviour of coaches and referees ('researcher intervention' [9]). For coaches, this would include coaching safe versions of the tackle to their players and in referees this would include abandoning a match if there were no medical personnel present. Through these key role players (coaches and referees), SARU is trying reduce catastrophic injuries ('injury prevention intervention' [9]) in players.

Although there qualitative evaluations of a rugby injury prevention programmes exist, [10] no qualitative studies have, to our knowledge, specifically used the RE-AIM framework to qualitatively assess an injury prevention programme. Furthermore, no qualitative research has been performed on *BokSmart* or it's predecessor, *RugbySmart*. While quantitative methods can assess if *BokSmart* has been associated with changes in injury rates or knowledge, these methods do not allow researchers to consider how a programme might be working or not working within the intervention target groups (coaches, referees and players). [11]

Thus, the aim of this paper is to provide a qualitative evaluation of the implementation of the *BokSmart* programme from the perspective of the coaches

and referees (intervention target) using the RE-AIM framework. The RE-AIM framework can be seen as part of the evaluation stages (5 and 6) of the TRIPP (Translating Research into Injury Prevention Practice) framework. TRIPP has been suggested for use in evaluating the ability of research to translate into real world changes in injury prevention (see Chapter 1). [18]

METHODS

BokSmart programme

To achieve its main goal of reducing catastrophic injuries in players through education of coaches and referees *BokSmart* has four main interventions. [8] The most prominent of these interventions is the Rugby Safety Workshops (RSWs), which take the form of a DVD-facilitated course that provides the attendees with the DVD and a printed version of the DVD at no charge. During the RSW, reference is also made to freely available online material (such as physical conditioning programmes) and the dedicated emergency telephone hotline, SpineLine, for rugby-related catastrophic injuries. Since January 2010 it has been mandatory for *all* coaches and referees at all levels to attend an RSW on a biennial basis in order to keep their education current. [8] The RSWs are led and facilitated by SARU-employed 'trainers' who are nominated by their respective administrative regions (referred to as 'union'). The RSW content ranges from coaching drills through to injury management and a serious injury protocol.

The RSW content is updated every two years by SARU in order to keep content current. These updates also include relevant feedback from attendees: 'cycle 1' began in July 2009, 'cycle 2' began in July 2011, 'cycle 3' began in July 2013 and 'cycle 4' will begin in July 2015. SARU receives feedback on the RSWs as they require trainers to get three attendees to anonymously review the course in terms of content, interest in the course, perception of the trainer, and provide an 'overall' rating between 1 (poor) and 5 (excellent).

The average 'overall' course rating by coaches and referees for cycle 2 (2011-2013) was 4.7 for Western Province Rugby Union (WPRU).[12] The lowest RSW rating

was 4.0 and the highest was 5.0. The average 'overall' course rating for cycle 2 for the rest of the country was 4.6 for the all fourteen unions, which included WPRU.

To the lead researcher, who had attended some RSWs and was involved with rugby coaching, these overwhelmingly positive SARU RSW evaluations from attendees did not reflect some of the negative opinions that the researcher had personally experienced. Therefore it was hoped that a qualitative approach might be able to provide some answers to these critical questions.

Study Design

This was a qualitative study, using focus groups and telephonic interviews to evaluate perceptions of attendees (coaches and referees) of the *BokSmart* rugby safety workshop (RSW). Initial perspectives were gained from the coaches and referees during the focus groups. Telephonic interviews were then conducted with the trainers – who facilitate the RSWs – to compare with the focus group findings from coaches and referees. *BokSmart* trainers are well-respected coaches or referees in their particular regions and are employed by SARU to facilitate the DVD-led RSWs in these regions. Before trainers are employed by SARU, they are required to pass through a rigorous screening, training and evaluation process.

There are large disparities in socioeconomic status (SES) among the population of South Africa's that are reflected in rugby-playing populations. [13] It was thought that SES might influence perceptions about *BokSmart* and thus sampling was performed in order to achieve representation from all SES groups. In rugby, SES is also closely associated with league performance. Thus, purposive sampling was used to select participants for one referee and six coach focus groups. The six coach focus groups were chosen to represent the 'top', 'middle' and 'bottom' league (and thus SES) divisions at both the school (juniors: < 19 years of age) and club (senior) age groups. Because referees are required to operate at all league division levels, it was felt that one focus group would sufficiently represent these role players. In summary, the focus groups were bottom school (BS), middle school (MS), top school (TS), bottom club (BC), middle club (MC), top club (TC) and referees (R).

Logistically, it was not feasible to conduct these seven focus groups in all fourteen rugby unions of South Africa. Furthermore, previous RSW evaluation data collected

by *BokSmart* indicated that there were no differences in the quantitative perceptions between the 14 unions. Therefore, the Western Cape region with Western Province Rugby Union (WPRU) as its rugby governing body, was selected as the region to study based on proximity to researchers.

For the recruitment of coaches, a representative from potential clubs and schools in the WPRU was contacted and asked to participate in the study. For clubs was one of the top team coaches, while for schools this would be the teacher in charge of rugby. Only one school – a school that was requested to participate as the top school initially – declined the invitation citing 'lack of time' as their reason. The referees were approached through the WPRU Referees' manager who provided a mixture of experienced and inexperienced referees.

This study was part of a greater evaluation of the *BokSmart* programme, which also included quantitative studies. Ethical approval for the focus groups was granted 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. For the trainers' telephonic interviews and SARU RSW evaluations, data were collected and added to the BokSmart database. Permission was granted by the Human Research Ethics Committee of the University of Cape Town (HREC REF 438/2011) to access this database.

Data collection

Focus groups with coaches and referees

Rugby coaches and referees often work within a school or club structure and therefore we decided that focus groups would be an ideal method to gain insight into the established social norms within their school or club. [14] Focus groups place similar individuals – in this case, from the same school or club – together in a room and ask the group leading questions that are intended to generate debate and discussion among the participants. Through the discussion and debate that result from focus groups, one is able to gain insight into an individual's perspectives within a group structure. Although the SARU RSW evaluations were anonymous, it was felt that if the evaluators might fear repercussions from SARU if they provided negative feedback, which would have affected the evaluation's integrity. Thus, to maintain the integrity and openness of the discussions, the researchers decided not to mention

that the outcome of interest was an evaluation of the *BokSmart* programme. Instead, the researchers stated they wanted to ask prospective focus group attendees their opinions about catastrophic injuries in rugby. This topic was chosen as the prevention and reduction of catastrophic injuries in rugby is the main goal of the *BokSmart* programme, and therefore it was assumed these coaches and referees would mention the RSWs unprompted and without fear of repercussion from SARU. The researchers were concerned that if a group had experienced a catastrophic injury to a player, the questions and discussion could be a sensitive issue for the participants. However, focus groups are deemed appropriate for unlocking honest discussion from participants on sensitive topics. [15]

The focus groups were semi-structured with guide questions. The questions were prepared by JB and CD (experienced qualitative researcher) and approved by the programme implementers (SARU). The questions were then tested at a pilot session that included past and present coaches, referees and players. Based on this pilot, questions were then refined. For example, a question specifically asking if the group had experienced a catastrophic injury to a player was removed as it was deemed too probing. This version of questions was then tested on a group of coaches and edited once more before the final version was approved by all authors and the programme implementers (Supplementary material I). The lead author (JB) was the moderator for each focus group.

After an ice-breaker question, participants were provided with *BokSmart's* definition of a rugby-related catastrophic injury verbally and in writing: "*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 center.*" The actual questions ranged from asking participants about their perceptions toward rugby-related catastrophic injuries, to asking them what they would do to prevent catastrophic injuries if they were in charge of the rugby administration in South Africa. Participants were also posed with a hypothetical catastrophic injury situation and then asked how they would respond to such a situation at their particular school or club. There were between three and 12 coaches at all focus groups. Although a minimum of five coaches or referees were requested for each focus group, the BS only had three teachers involved in rugby

and this was the total number of attendees for this group. Some of the attendees at the senior level were not currently coaching, but were senior players or administrators of the particular club. Most of the junior coaches also refereed – which was expected. There was lively debate between the participants of all groups, except for the BS. Of the coaches and referees, only one group (MS) had a coach (one of the five present) attend the focus group who had not yet attended a *BokSmart* cycle 1 or 2 RSW. This same group was the only group that had experienced a catastrophic injury in a player during a match – the participants mentioned this themselves, without prompting.

Telephonic interviews with trainers

The SARU-employed trainers act as intervention delivery agents of the *BokSmart* intervention and are not under any influence of the researchers. [9] Owing to their interaction with many different groups of attendees, these trainers have a unique and possibly more objective insight into the attendees' perceptions of the RSW and thus add to the opinions gleaned during the focus groups. Trainers run the RSWs individually and thus the researchers felt an interview approach would be more appropriate. Telephonic interviews are more time- and cost-effective and also elicit better responsiveness due to the shorter time demands in comparison to face-to-face interviews.[16] Furthermore, telephonic interviews are easier to use when the participants are geographically disparate. [16] In comparison to the coaches and referees, the nature of the questions to trainers had no risk of being sensitive in nature as the researchers only asked questions relating to perceptions of RSW attendees'. Of the trainers interviewed, one was female and two other trainers mentioned that they mainly taught in rural underprivileged/rural areas (although trainers are used for all areas). This information was volunteered, not asked of the trainers. These interviews were also semi-structured with guide questions that had been prepared by JB and CD. As these interviews took place after the focus groups, the questions were based on some initial data from the focus groups. For example, based on feedback from some coaches about trainers not doing a full course with them, the following question was included for trainers: "Do you always go through all the RSW content?" The full set of questions was trialled telephonically on two former players and the questions refined based on this feedback. The final questions were approved by all authors and programme implementers (SARU). In this case, the

trainers were specifically asked about their RSWs and response to the programme from coaches and referees (Supplementary material II). The questions asked trainers about their best/worst experiences while conducting an RSW, if they thought their RSWs were capable of changing knowledge and behaviour in attendees and if they had any suggestions to improve the RSWs. All 17 WPRU trainers were phoned, but only 14 were available for an interview. Although some trainers are designated to conduct RSWs in lower socioeconomic status areas, they are trained to run RSWs with attendees of all levels and were thus not purposively sampled or stratified. All sessions of the focus groups and telephonic interviews were audio recorded and then transcribed verbatim by a third party. These transcriptions were checked against the audio files for accuracy and edited where necessary (by JB). It was felt by the lead author (JB) that information saturation was reached in both the focus groups and telephonic interviews due to recurring themes.

RE-AIM framework for BokSmart

To organise the data, the perceptions were grouped into the five components of the RE-AIM framework. The RE-AIM framework [17] has been suggested for guidance in developing, implementing and evaluating intervention programmes. The framework component's accepted definitions (Table 1, column 2) [18] suggest the use of quantitative research methods, however it was felt these accepted quantitative definitions could be adapted for this present qualitative evaluation of the coach and referee perspectives of *BokSmart* (Table 1). While the *BokSmart* programme aims to ultimately prevent catastrophic injuries in players, the direct target of the intervention is actually the coaches and referees who attend the RSW ('researcher intervention') [9]. The adapted qualitative RE-AIM framework definitions for this *BokSmart* evaluation were therefore separated into coach/referee and player definitions (Table 1).

Using an editing style of analysis, [19] all transcripts were read through twice before codes were developed, by the lead author (JB), under the general themes of "negative", "positive" and "suggestions for improvement". These codes were then re-organised based on the *BokSmart* qualitative RE-AIM evaluation definitions (Table 1) and presented in the Results section as such. The codes were developed by JB, but checked against the raw data by CD before proceeding. Transcripts were then

coded using Atlas.ti Qualitative Data Analysis Software (Scientific Software Development GmbH, Berlin, Germany).

Table 1. Adapted RE-AIM framework for BokSmart qualitative analysis.

RE-AIM component	Definition [18]	Qualitative definition for coaches and referees	Qualitative definition in players
		Coaches and/or referees (bold text indicates) perception that:	
Reach	<i>Proportion of target population that participated in the population</i>	Both coaches and referees: all coaches and referees have attended the RSW	N/A
Effectiveness	<i>Success rate if implemented as intended: positive outcomes minus negative outcomes</i>	Coaches: learn RSW techniques at the course. Referees: learn safe regulations at the RSW. Both: learn how to manage catastrophic injuries	Both: BokSmart can prevent and reduce catastrophic injuries in players
Adoption	<i>Proportion of people, settings, practices and plans that adopt the intervention</i>	Coaches: capable of coaching players RSW techniques. Referees: capable of employing RSW regulations. Both: capable of managing a catastrophic injury in a player	Both: players use RSW techniques and that players are aware of safer conduct towards other players.
Implementation (Delivery)	<i>Extent to which the intervention is implemented as intended in the real world</i>	Both: Educational trainer-led DVD session is enjoyed. Trainers are well respected.	N/A
Implementation (Content)	<i>Extent to which the intervention is implemented as intended in the real world</i>	Both: The RSW content is interesting and creates lively debate between coaches and referees.	N/A
Maintenance	<i>Extent to which the intervention is sustained over time.</i>	Both: continue to refer to the RSW material and upskill themselves with the BokSmart online content after the RSW	Coaches: players continue to use RSW techniques after the coach/referee initially instructed them.

To improve the internal validity of the study, the coaches and referees codes were developed and organised first before this process was repeated for the trainer's noting similarities and differences between the coaches/referees as the analyses progressed. This step was performed as a means of checking or triangulating the coach/referees' information.[19]

Before the study and for ease of reference, a 'majority opinion' was decided before to indicate more than 70% of the total groups. For the focus groups, this equated to

an opinion being mentioned in five or more of the seven groups. For the trainers, this would equate to 10 or more individuals expressing a particular opinion.

RESULTS

Table 2 summarises the qualitative findings of the present study, using the RE-AIM framework to categorise these findings. The in depth description of these summaries are provided in the sub-headings below Table 2.

Reach in coaches/referees

Only the low SES (BS) coaches and the referees felt that *BokSmart* was missing coaches and referees who were should be attending the RSWs: while the coaches blamed SARU, the referees felt it was the individuals' rather than SARU's fault.

"...we must be careful also not to blame SARU too quickly. I think SARU is doing a good job and they can only do so much. They've implemented the BokSmart [RSW], but the thing is the communities aren't utilising those offers. SARU is advertising the BokSmart thing [RSW] but people aren't taking note of it, so we need to be careful as a community not to blame someone else, rather look at what we are doing first and then if we can actually get to those courses because there are courses offered." (Referee)

The referees could have felt it was not SARU's fault as these teams are unregistered or unofficial teams that do not subscribe to any national federation requirements. However, coaches felt that it was SARU's job to engage these unofficial teams. These unregistered teams generally only exist in the lower socioeconomic areas of the country and this could explain why only low SES coaches raised this as an issue. In contrast to this isolated view, there was a more general opinion from bottom and top SES coaches (BS, BC, TC) as well as referees that other role-players, besides coaches and referees, should be required to attend RSWs. The reason for including these role players were to instil a greater sense of responsibility for player's injuries, in parents of players (BS + R) and players themselves (BS). Some trainers also mentioned that parents should be required to attend the RSW and noted that attendees who were coaches that still also played the game improved their behaviour and also made the *BokSmart* content more relevant for other attendees of the course.

The low SES (BS) coaches also felt that the awareness of *BokSmart* should be increased in the general public through advertising as has been done for other nationwide interventions such as those for preventing HIV/AIDS. The fact that this suggestion was only made by lower SES coaches may imply that the awareness of *BokSmart* is greater in higher SES areas. To increase awareness of the programme, trainers suggested using the big screens at big rugby stadia during matches or in build-ups to big matches on television to increase awareness.

Effectiveness in Coaches and referees

Over two thirds of the coach groups from all SES levels (BS, MS, TS, MC), as well as the referees and trainers mentioned that the RSW increased their *awareness* of catastrophic injuries in players. Furthermore, a catastrophic injury event to one of the MS coach's players gave this coach an increased sense of responsibility for his players and made him more of an active participant in the second RSW he attended:

"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 it [a catastrophic injury to a player] and when I go to a field to play a match I must make sure is it conducive for rugby, is my child safe?" (Coach, middle school)

However, the perception that the RSW had the ability to change attendees' knowledge differed by SES level. The less privileged coaches (BS and MS) were certain that the RSW was able to improve the knowledge of attending coaches/referees. In contrast, the more privileged coaches (TC coaches) felt that attendees did not remember the course information. This difference could be explained by the different perceptions toward the RSW of the coaches from the different SES levels: while the lower SES coaches (MS) felt proud to be attending the RSW, some high SES coaches (TC) described the RSW as a "waste of time" for experienced coaches like them. This was consistent with research in South Africa that showed that high SES coaches are more likely to rely on their coaching colleagues, watching rugby and "their own playing experience" than workshops for coaching information. [20] As rugby was historically viewed as a game for privileged individuals in South Africa, [21] it is likely that playing experience is more common in high than low SES coaches. Trainers confirmed this discrepancy: just over a third indicated that the RSW knowledge gain was better in low SES than in high SES coaches.

"... you can do the course [BokSmart] but it goes in here and out the other side." (coach, top club)

"I mean its more of a safety course, but the people who are new to the game are excited, they learning technical things, they see it as even a form of qualification, they proud of it...I mean if you played rugby your whole life and coached your whole life it [RSW] can be monotonous to a degree." (Trainer)

However, one of the trainers also mentioned that if the pre-existing rugby knowledge of attendees was too low when they arrived at the RSW, the content would be meaningless to them as they would not understand the terms used in the RSW DVD.

Of concern was that the perception of knowledge gain in the lower SES coaches may have been false in some instances. For example, the lower SES (MS) coaches were convinced that they knew the emergency number to contact in the case of a catastrophic injury in a player, but one of the them mentioned "911" which is not prescribed by the RSW and does not exist as a telephone number in South Africa. These MS coaches also stated that the RSW should provide coaches with a set protocol for dealing with a catastrophic injury, even though this is exactly what is described in the RSW already. The lower SES (BS and MS) coaches said they needed physical conditioning equipment, while the RSW provides access to online physical conditioning programmes that do not require any equipment. This discrepancy in perceived and actual knowledge gain from the RSW was despite the MS coaches feeling that they had learnt more in their RSW as a result of having experienced a catastrophic injury to a player previously.

The same group of coaches (MS) also indicated that they would like to learn more and suggested that the RSW should pose a hypothetical catastrophic injury situation to attendees (as was performed in the focus group sessions) to increase knowledge gain. The referees also suggested that the events surrounding a catastrophic injury be shared and discussed so that others might learn from mistakes or possible preventable situations (de-briefing). One of the trainers also suggested this 'de-briefing' to improve knowledge about rugby-related catastrophic injuries.

Effectiveness in players

Despite these mixed feelings about the RSW for coaches and referees, the majority of coaches across all SES (all except TS), as well as the referees thought that *BokSmart* was a good way to reduce, prevent or minimise catastrophic injuries in players. However, they did not mention at which SES level they thought the RSW was effective. Based on previous opinions, it could be assumed that the high SES coaches perceived the effectiveness to be in low SES area. A few of the trainers confirmed this positive perception of the main goal of the *BokSmart* programme:

"I do think that with the programme that they put together [RSW] it's definitely going to help to lessen the amount of catastrophic injuries." (Referee)

"I think the implementation of the BokSmart programme is definitely ... they're definitely trying to help improve the standards at schools and clubs wherever rugby is being played. I do think that with the program that they put together it's definitely going to help to lessen the amount of catastrophic injuries." (Coach, top club)

Adoption in Coaches/Referees

Adoption is a particularly crucial component as the anticipated outcomes of a particular behaviour is an important barrier or facilitator for behaviour change.[22] The low SES (BS) coaches were the only coaching group who showed evidence of adopting RSW techniques and also felt this resulted in a reduction in catastrophic injuries. In contrast, the more privileged coaches (TC) implied that coaching these RSW-techniques was difficult. This difference in adoption could be explained by previously discussed differences in perceptions towards the RSW from the different SES groups: while low SES coaches had positive perceptions, high SES coaches had negative perceptions of the RSW. However, this difference in perceived adoption could also reflect greater self-awareness in the high SES coaches as the RSW techniques are inherently complex due to the nature of rugby. Also, that coaches did not mention coaching RSW techniques does not eliminate the possibility that they are coaching RSW-prescribed techniques unwittingly. For example, one a high SES (TC) coach described doing RSW-prescribed scrummaging training in their players despite mentioning that the RSW information "goes in here and out the other side" ('Effectiveness in coaches'). A few of the trainers supported this notion that low SES coaches were more likely to adopt RSW-prescribed behaviours than high SES coaches. Nonetheless, the majority of trainers

felt that, in general, they had positively influenced their coaches' behaviour during the RSW.

"Being Boksmart [certified] is one thing, but actually being able to coach it is another thing and that's also a big issue...(Coach, top club)

"...you know I had one the other day: there was an injury and the guy [coach] said 'you must stop the game' and I said 'Ja, we've both signed a code of conduct so therefore you must know that the players are more important than the result of the fixture – it's not a world cup final'..."
(Trainer)

Referees also showed evidence of adopting RSW techniques and they mentioned specific instances of delaying the start of games if there were no medical personnel present and also felt capable of removing a player if they thought he was injured, even if the coach did not agree.

All coach groups except for the low SES (BS and BC) coaches stated that knowing how to deal with a catastrophic injury at a practice session was something they did not need to worry about as coaches. This was related to the fact that higher SES teams usually have medical support on duty to deal injuries at training and matches. However, there seemed to be confusion across all coach SES levels (BC, MS and TC) about what the RSW intended coaches to do in the event of a catastrophic injury to a player. Some of the lower SES coaches (BC and MS) thought the RSW intended for them to actually *treat* the catastrophically injured player themselves and thus felt that the RSW did not prepare them with sufficient 'first aid' training for this responsibility. However, the confusion could be explained by differences in resources available to coaches at the different SES levels. This discrepancy was highlighted by a debate among the TC coaches: while some felt that a coach would only get in the way of the medical staff, others who had previously coached lower SES teams stated that this catastrophic injury management responsibility was forced upon coaches at lower levels as they did not have adequate medical support. To correct this confusion, the RSW-prescriptions would have to be tailored based on the SES or league level of the attending coaches. Basing the course on league level would be less discriminatory than SES level. Furthermore, research on how coaches prefer receiving information indicates that aspiring top level coaches require different methods of teaching than other coaches. [23]

All coach groups (except BS) as well as the referees mentioned that they would attempt to stabilise the injured player until the emergency services had arrived on the scene. However, half of the coach groups at middle to high SES levels (MS, MC, TS) specifically mentioned that they would not touch the injured player, although this was for different reasons: a lower (MS) SES coach, who had previously experienced a catastrophic injury to a player, said that he would “run away” from a catastrophically injured player, as he would not know what to do in the situation. This is particularly concerning because the same coach felt that he had learnt a lot from the previous RSW based on his previous injury experience. In contrast, the TS and MC coaches' hesitation in getting involved was related to fear of legal repercussions that are more of a reality at higher, but not lower, SES levels.

The middle SES (MS) coaches felt that just knowing the correct number to call was sufficient to deal with a catastrophically injured player, although they did not mention SpineLine – *BokSmart's* free emergency number for catastrophically injured rugby players that is described during the RSW. This is consistent with the findings in these MS coaches: while they perceived that they had gained knowledge from the RSW, they did not actually exhibit any knowledge gain on the topic of catastrophic injury management.

All coach and referee groups mentioned calling an ambulance in this event, and all except MS coaches mentioned that they would call SpineLine. The BS even mentioned that their players know the number and would call it in the event of a catastrophic injury. However, it was evident that not all group members actually knew the actual SpineLine number (0800678678) even though they said they would call it. There was a suggestion from TC coaches to add the SpineLine number to the *BokSmart* certification cards that coaches are expected to carry with them at all times to increase its awareness and use.

High SES coaches (TS and TC) felt that referees do not or can not enforce *BokSmart* regulations – the referees also mentioned this in their group. For example, RSW prescribes that referees are supposed to check that the coaching staff of both teams have *BokSmart* certification cards and that these certifications are current (not expired) before allowing the match to begin. A coach can only obtain a current

certification card if he/she has attended a RSW within the previous two years. The TC and TS coaches said that they had never had these certification cards checks by referees, and even if they did happen, the punishment for not having one would not be harsh enough to make them worry. The trainers reiterated this lack of policing of *BokSmart* cards and that this could be detrimental to optimal RSW adherence. TC coaches also felt junior and inexperienced referees were less likely to be able to enforce RSW regulations. The reasons that only high SES coaches mentioned this lack of policing of certification cards is unclear – it could either indicate that policing is only performed for lower SES teams or that lower SES coaches are unaware of the lack of policing. The referees confirmed this notion that they were unable to regulate certain RSW prescriptions. A difference in how this issue was perceived by coaches and referees was that some of the referees felt that SARU should not leave it to referees to police the coaches.

"I think it's a little bit unfair to give that [job of assessing whether field/pitch is up to RSW-prescribed standards] to the third team referee. Remember that third team ref is a junior; he's an inexperienced referee to deal with that..." (Referee)

Both low and high SES coaches (BS and TC) felt that RSW regulations, in general, should be randomly assessed by BokSmart or SARU-appointed 'policemen' rather than referees and also not just restricted to match days but also practices as well.

Adoption in Players

The high SES senior coaches (TC) felt that junior (school) players were easier to influence than senior players. This opinion could well have emerged from personal experience as senior coaches have generally progressed from junior to senior teams during their career. If the negative perception of the effectiveness of the RSW has been transferred from the high SES coaches to their players, then the players' perceptions of the RSW could be also be influencing their adoption.

"...a kid is going to trust his coach, I mean at school. I mean you can tell an oke [junior player] to do flipping whatever and the oke [junior player] is going to listen to you..." (Coach, top club)

This was in contrast to low and mid SES coaches who only considered external influences on players as having an effect on their adoption, rather than the players themselves. The high SES coaches also felt that lack of resources would affect adoption in low SES teams. BS and MS coaches felt that rugby players that their

players watched on television and lack of infrastructure negatively influenced players' adoption. With regards to role-models influencing injury prevention behaviour – the FIFA 11 programme has only mentioned the positive effects role-models can have in enhancing adoption, [24] but it is clear from this study that they can also have a negative effect. With regards to infrastructure - while the BS coaches mentioned that they could not teach RSW scrumming techniques without grass fields, the MS mentioned that their players' lack of access to fitness centres limited their adoption. While some of this socioeconomic-related negativity is a reality of the disparities which exist within South Africa, there were instances where underprivileged coaches seemed to be using it as an excuse. For example – only having a sand field to practice on is a valid barrier to not being able to adopt the coaching of RSW scrumming techniques and this barrier could only be removed by providing better resources for this team. However, a lack of an ability to perform physical conditioning is more of a perception than a reality as the RSW provides coaches with a conditioning programme that does not require a gymnasium or any gym equipment. Trainers confirmed this perception of the negative influence of role models on young players, which affected the coach's ability to influence their behaviour, particularly during matches:

“... there was two tackles on Saturday that the guy who tackled had his head on the wrong side, when he got injured... Now, I'm talking about when you busy with u11s and u9s, that's fine in theory to show them how to tackle, where to have your head, but when it comes to the big game, the big guys [international players on TV], the big boys just tackle [with no regard for correct technique] so...as a coach, you coach these things [correct, BS, techniques], but when the players go on the field, they just do their own things sometimes. (Trainer)

There were both negative and positive opinions about player regulations. While coaches across all SES (MS, BC, TC) as well as the referees mentioned that RSW regulations enable coaches and referees to keep their players safer, some mid to high SES senior coaches (MC and TC) also felt that certain RSW regulations were unnecessary. A TC coach mentioned the 'age-banding law' (players participate with fellow players within two calendar years of each other) as an example of an unnecessary law, although there was disagreement among his peers about this opinion. The TC coaches also mentioned that the internationally regulated scrum engagement sequence was endangering their players and that this law needed to be changed to keep their players safer.

Implementation in coaches/referees (delivery)

Mid and high SES coaches felt that making the RSW compulsory created problems in attendees, although their reasons were quite different. Mid (MS) coaches were concerned that coaches developed an inflated sense of their capability as a coach – this lack of self-awareness of mid and low SES coaches was also demonstrated in the effectiveness and adoption of RSW. In contrast, high SES (TS) coaches were concerned that because coaches were not able to attend voluntarily, it was negatively impacting their perception of the RSW. High SES coaches also felt that to achieve its goal of reducing catastrophic injuries, SARU's BokSmart resources would be better invested in improving the poor resources of low SES teams than in delivering a nationwide standard safety course (RSW). However, one of the trainers felt that telling people that course attendance was legislated and compulsory was the only way to get attendees to sit through the RSW. However, just because the RSW is compulsory does not necessarily indicate it is being effective or adopted, as has been indicated in previous sections.

Furthermore, the mid and high SES coaches as well as referees felt that some of the negativity of the RSW was caused because the RSW was advertised as a safety course, which wouldn't interest prospective attendees. To relieve some of this negativity, these groups suggested that the RSW should be advertised as a coaching or refereeing course that showed coaches and referees how to perform their roles in an effective manner that also happened to be safe for the players instead of labelling it as a safety course only.

Having said this, coaches from all SES teams (except BC and TC) felt that the RSW would be largely unnecessary if SARU improved their existing coaching and refereeing courses. Furthermore both coaches (TS) and some of the trainers felt that there would be better engagement and learning at the RSW if attendees were required to attend a good quality coaching or refereeing course as a pre-requisite to attend the RSW. This would also prevent the issue raised by trainers of certain RSW attendees having insufficient knowledge to be able to understand the course content that was raised by some of the trainers. Low to mid SES coaches may not have mentioned this as they possibly see the RSW as more of a coaching course than a safety course.

“... if you are a good coach and you coach properly and you know the correct techniques and everything, it will help, it will go a long way to prevent injuries. So by helping the coaches coach properly - coaching the correct techniques coaching winning rugby - you will prevent injuries. That is my opinion. So the focus should actually be on the coaching courses: level I, II and III that the unions offer because if those were good, well structured, run by the right people, you wouldn't have injuries...well you would still have injuries but it cut down a lot of the injuries.” (Coach, top school)

While high SES (TC) coaches mentioned that the RSW was long in duration, this opinion was not echoed by the low or mid SES coaches. Although this could be related to the opinion of the high SES coaches' opinion that the course was unnecessary for them, about two thirds of trainers expressed that attendees felt that the RSW was too long. Trainers mentioned a variety of sections of the RSW that were perceived to be superfluous by attendees, although these probably differed by SES of the attendees: drills in general (especially ball carrying/evasion), code of conduct and sponsorship sections.

Just over half the trainers specifically mentioned that the RSW was too long for re-certifying attendees – attendees who had previously completed a course. The trainers mentioned that these re-certifying attendees felt entitled do a shortened 'refresher' version of the course, rather than the entire course again two years later. While the low SES (BC) coaches and referees thought the fact that the RSW accreditation only lasted two years was good, one of the trainers suggested that this was too short and even implied he thought SARU did this for financial gain. Given their lack of resources, it is not surprising that low SES coaches wanted more regular training – this is in contrast to high SES coaches who felt the RSW was largely unnecessary for them and that they didn't ever want to do the RSW again. Another trainer thought that coaches really enjoyed the RSW in general, but then said they enjoyed it more when doing the course for the first time rather than a re-certification.

“their [re-certifiers] argument...is that they did a four hour course before [for cycle 1], now they doing another four to five hour course [for cycle 2]...material that's overlapping [with previous cycle's]...can't it be a refresher course where its maybe like two hours for them or less than four hours or even get new material for them, then you just touch on the previous [cycle 1] material...” (Trainer)

All coach groups felt that the RSW training should be more practical in general, including the catastrophic injury management component. They felt that coaches would respond better to practical, rather than theoretical, training. A few of the trainers also mentioned this desire for more practical training for their attendees. This is in contrast to Canadian coaches who, even when presented with a practical option, chose formal courses (such as RSW) as their ideal method of input. [23] Other ideal methods chosen by Canadian coaches included interaction with other coaches and being mentored by a senior coach. The high SES (TC) coaches and trainers also suggested the addition of a practical first aid component for non-rugby players to the RSW who could to assist with first aid at rugby games. Logistically, these suggestions would be very costly for SARU to implement.

"...there's no practical [component to the BokSmart RSW] at all...it was just in the classroom environment...it was just all theory. You know we should be on the field, being shown how this is what you do when you believe there is a neck injury or whatever as opposed to...here's a video..." (Coach, top school)

All trainers who were asked the question (n=13) stated that they went through all the course material that they were required to during their courses. Furthermore, there was a feeling from a few trainers that any negative feelings towards the RSW from attendees were alleviated once they actually sat through the course. However, the TC coaches stated that not all trainers did the full five-hour RSW and sometimes just gave the attendees the material to look at in their own time and were "not the sharpest" implying they were not as well respected as SARU required. Some of the trainers were aware of other trainers not doing a full course:

"I spoke to a guy who's attending cycle 2 course and he said his cycle 1 course was only 1.5 hours...so then you not doing an effective job of it!" (Trainer)

Although these may be isolated cases, the lowest rating for a course in WPRU was 4 out of 5 (5 = 'excellent') indicating that these perceptions are not also being reflected in the SARU review process. This suggested that SARU should consider supplementing the existing review process with a qualitative assessment as well. Although SARU deliberately places coaches and referees together for the RSWs to create lively discussion between these two groups, there was no mention of this actually happening from the coaches or referees. However, a few trainers reported

good discussion between coaches and referees that facilitated learning between the two groups with sections such as the *QuickSmart* quizzes (quiz which tests the attendees' knowledge) and new scrum laws. Two of the trainers stated that there was no lively discussion due to the attendees wanting to not increase the already long course duration. One of the trainers suggested separating the coaches and referees as he felt that a lot of the content was not applicable to the referees.

Implementation in coaches and referees (content)

A third of the trainers described that they had only ever had positive reactions from RSW attendees about the content and that attendees thought the content was really good. While one trainer felt that attendees did not enjoy the safety content specifically, two other trainers described how attendees actually enjoyed this particular content. However, all referees and the majority of coaches, including high SES coaches (but not BC and MC) thought the RSW was teaching them correct techniques for safer rugby. This was despite the negative perceptions of the course previously. A high SES (TS) coach suggested focussing the content of the RSW on the highest risk areas of the game for catastrophic injury (e.g. scrum and tackle) and leave out all other information from the RSW.

"They did highlight in the BokSmart course quite a lot... they went over the tackle quite a bit and they showed that the best way to tackle is often the safest way to tackle. And it worked in a lot of other situations." (Coach, top school)

Maintenance in coaches and referees

Trainers mentioned that the coaches/referees never look at the material again after leaving the course. However, low and mid SES (BS and MS) coaches showed evidence of using the course materials. This was expected based on the difference of opinions of the RSW from high and low SES coaches and the fact that low SES coaches would have less resources. Referees also mentioned using the RSW concussion checklists at matches that are provided during the course. However, the low SES coaches (BS and BC) felt that there should be more regular workshops (e.g. monthly meetings) on topics ranging from practical sessions for dealing with a catastrophic injury through to the latest recovery methods for players so that the coaches could continually up-skill themselves. This was also expected based on their general excitement about the course and lack of resources at this level. Trainer's supported this suggestion of more regular workshops and this option

would also provide the opportunity for coach interaction, which is a preferred method of training.[23] The low and mid SES (BS, MS and MC) coaches also thought that there should be more access to databases and educational resources for coaches. A TS coach felt that the *BokSmart* conditioning programmes, which are freely available online, needed to be advertised better to the general public as the majority of the TS coaches were unaware of them.

"I sometimes put the BokSmart [RSW DVD] in my laptop TV and watching it at the game, then we analyse the wrong and the right things that have been done...then we minimise [catastrophic injuries]..." (Coach, bottom school)

DISCUSSION

This is the first qualitative study to describe the perceptions of an injury prevention intervention, from the perspective of coaches and referees (intervention target), using the RE-AIM framework. The main finding of this study was that the implementation of *BokSmart* elicited both positive and negative perceptions in coaches, but that these perceptions differed by the SES of the coach. *BokSmart* uses coaches and referees as delivery agents for the intervention that is aimed at reducing catastrophic injuries in their players. Thus, any negative perceptions in these intervention targets represent a potential barrier to the success of the programme as was described for a similar intervention in rugby union [10] and ice hockey coaches. [25] Understanding these perceptions, as well as the differences in perceptions, is critical not only to the on-going success of the programme, but also for the design and implementation of similar interventions in future.

In general, the high SES coaches were more negative about the RSW than that the low SES coaches for all components of the RE-AIM framework. The high SES coaches' negativity may have been related to a perception that they were at low-risk of experiencing a catastrophic injury to a player. This assumption of high SES coaches could have been made based on (1) a long period of time involved in the game without experiencing a catastrophic injury, [26] and (2) a comparison to their low SES coach counterparts which would result in a relative perception of low risk. There is some evidence to support this perception of the high SES coaches that low SES coaches are 'high risk' groups for experiencing a catastrophic injury in South

Africa [27]. Risk mitigation in sport suggests that national sport federations should identify and focus on these high risk groups. [2]

However, there is a danger that these high SES coaches are underestimating their true risk of experiencing a catastrophic injury – while the risk is low and acceptable, it is certainly not absent. [3] Ignorance of this fact could compromise optimal management of these rare events, if they occurred. For example, when a catastrophic injury occurred to a professional, 'low-risk', player recently the medically qualified personnel did not react to the situation optimally despite their medical training. [28] Although UK class classifications are different to SES, the present study findings are also contrary to a study on flood risk in the UK that found higher SES individuals had a better awareness of their true flood risk. [26] To improve awareness and knowledge, the suggestion from referees to discuss depersonalised information about catastrophic injury from a “what could have been done better” perspective may be worthwhile to improve reflective learning in coaches and referees. [29] Nonetheless, this perception of low risk of high SES coaches may cause the negative perceptions about the Effectiveness of the RSW – as with their assumed very low risk of injury, they feel the RSW information is not necessary for them. This negativity about the Effectiveness of the RSW in the present study could be underpinning their negativity observed in other RE-AIM components for high SES coaches such as Adoption, Implementation and Maintenance. This relationship between RE-AIM components in the high SES coaches might also explain the positivity of the lower SES coaches as well as referees in all these RE-AIM components.

However, positive perceptions of RE-AIM components may not be sufficient for intervention success. Despite their positive perceptions, the low SES coaches appeared to have a lack a self-awareness that meant their perceptions of Effectiveness and Adoption did not always match their knowledge and behaviour. The only difficulty the low and mid RSW coaches mentioned with adopting RSW techniques was related to their lack of resources which appeared to dominate their perceptions. Furthermore, a greater awareness of catastrophic injury risk – particularly in the coach group that had experienced an injury to a player recently – did not necessarily appear to improve Effectiveness and Adoption of RSW

prescriptions in the mid SES group. The low and mid SES positivity towards the RSW could also have been inflated by their inherent lack of resources and access to materials. Thus, these groups may be positive about any free training and materials that they receive, not just the RSW material.

Making the RSW a practical course could solve some of the issues discussed, although this may not be logistically feasible with an approximate 45,000 coaches and referees that need to be trained on a biennial basis in South Africa. This suggestions is also not supported by international literature describing coaches' ideal methods of training. [23] Another suggestion from the coaches and trainers that may be more pragmatic would be for SARU to add voluntary workshops in between the biennial RSWs which would both up-skill attendees and create a open and direct dialog between policy makers and these intervention targets. This open dialog could manage the coach and referee perceptions towards *BokSmart* – which was critical to the implementation of New Zealand's *Tackling Rugby Safety* injury prevention project. [10] Additionally, these workshops would create more coach interaction, which is another popular methods of training suggested in Canadian coaches. [23]

Limitations

Although BokSmart is a nationwide programme, the present study only examined one of the fourteen rugby unions of South Africa. This means that the studies results are not generalizable to the other fourteen regions although there is no reason to assume that the findings would be very different. Also, although the researchers had planned for a minimum of five coaches per focus group, the low SES (BS) only had three coaches. However, this small rugby coaching staff was a reality of a low SES team and therefore was felt to at least represent this stratification.

CONCLUSION

While there is consensus from coaches and referees that the *BokSmart* programme is capable of reducing injuries in players, SARU needs to be cognisant of SES-related barriers to implementation of the *BokSmart* programme. High SES coaches do not feel they have a true risk of experiencing a catastrophic injury to a player: this false sense of security results in negativity towards the RSW. In contrast, low SES

coaches have more positive perceptions about the RSW, but also appear to have an inflated opinion about the impact that the RSW has had on their injury prevention abilities. A change in these perceptions in high SES coaches would require a continued effort from SARU to involve stakeholders and media [10]. Low SES coaches may require more regular, voluntary workshops, besides the biennial RSW to improve actual injury prevention behaviours.

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Table 2. Summarised findings according to the RE-AIM framework.

RE-AIM component	Summarised qualitative perceptions of implementation in coaches and referees	Summarised qualitative perceptions of coaches and referees of the implementation in players
Reach	Coaches and referees felt that everyone who <i>should</i> be doing the <i>BokSmart</i> RSW is not actually doing it and other role-players such as players should be required to do the course.	N/A
Effectiveness	While there was general consensus that attending the RSW increased their awareness of injuries, it was less clear if it had actually changed their knowledge. Mid SES coaches incorrectly perceived that they gained knowledge from the RSW. The high SES coaches thought that the RSW was a waste of time for experienced coaches as they already knew all the information.	The majority of coaches across all SES (all except TS) as well as the referees thought that <i>BokSmart</i> was a good way to reduce catastrophic injuries in players.
Adoption	Only low SES coaches showed evidence of adopting RSW-prescribed techniques, while higher SES coaches mentioned difficulties in adopting these techniques. The lack of adoption could be related to their negativity towards the RSW or recognition of the complexity of the techniques. Coaches across all SES levels showed confusion in understanding how the RSW intended them behave with a catastrophic injury. Although referees indicated good adoption, they also were incapable of enforcing all RSW regulations.	High SES coaches demonstrated more self-awareness when they mentioned difficulties in getting players adopt the RSW techniques. Low and mid SES coaches were more concerned about international rugby players negatively influencing their players' behaviour. These coaches were also concerned that their lack of resources limited their ability to teach RSW techniques to their players – although this perception may only be a reality for low SES coaches.
Implementation (Delivery)	There was general negativity from high SES coaches about the delivery components of the RSW- they felt that the course should: be shorter, should have better trainers and should be more practical and should not be compulsory. To reduce catastrophic injuries, high SES coaches felt that RSW resources would be better invested in improving conditions of low SES teams. There was a suggestion from some coaches that a high quality coaching or refereeing qualification should be a pre-requisite to attend an RSW. It was evident that some trainers were not doing what was required of them and were not as well-respected as SARU required.	N/A

Table 2 continues on the next page

Table 2 (continued). Summarised findings according to the RE-AIM framework.

RE-AIM component	Summarised qualitative perceptions of implementation in coaches and referees	Summarised qualitative perceptions of coaches and referees of the implementation in players
Implementation (Content)	The majority of coaches (including high SES coaches) thought the RSW content was teaching them correct techniques for safer rugby.	N/A
Maintenance	Low and mid SES coaches as well as referees showed evidence of using the course materials after the RSW. This was despite some trainers' perception that the coaches/referees never look at the material again after leaving the RSW.	<i>No quotes for players</i>