

## COPYRIGHT NOTICE



**FedUni ResearchOnline**  
<http://researchonline.federation.edu.au>

This is the peer-reviewed version of the following article:

**Kemp, J., Newton, J., White, P., Finch, C.** (2015) Implementation of concussion guidelines in community Australian Football and Rugby League – The experiences and challenges faced by coaches and sports trainers. *Journal of Science and Medicine in Sport*, In Press.

Which has been published in final form at:  
<http://doi.org/10.1016/j.jsams.2015.03.010>

Copyright © 2015 Journal of Sports Medicine. Published by Elsevier. This manuscript version is made available under the CC-BY-NC-ND 4.0 license  
<http://creativecommons.org/licenses/by-nc-nd/4.0/>

1 **Implementation of concussion guidelines in community Australian Football and**  
2 **Rugby League – the experiences and challenges faced by coaches and sports**  
3 **trainers.**

4 **Abstract**

5 **Objectives:**

6 While guidelines outlining the appropriate management of sport-related concussion have  
7 been developed and adapted for use within community sport, **it remains unknown how they**  
8 **are experienced by those responsible for implementing them.**

9 **Design**

10 **Longitudinal study.**

11 **Methods:**

12 111 coaches and sports trainers from community-level Australian Football and Rugby  
13 League teams completed pre- and post-season surveys assessing their attitudes towards  
14 using concussion guidelines. Participants also provided post-season feedback regarding  
15 their experiences in using the guidelines.

16 **Results:**

17 71% of participants reported using the guidelines in the preceding season. Post-season  
18 attitude was related to pre-season attitude **( $p=0.002$ ), football code ( $p=0.015$ ), and team role**  
19 **( $p=0.045$ ).** An interaction between team role and guideline use ( $p=0.012$ ) was also found,  
20 with coaches who had used the guidelines, and sports trainers who had not, reporting more  
21 positive post-season attitudes towards using the concussion guidelines. Implementation  
22 challenges included disputing of decisions about return-to-play by players, parents, and  
23 coaches, and a perceived lack of time. Recommendations for improved guideline materials  
24 included using larger fonts and providing for witnessing of advice given to players.

25 **Conclusions:**

26 This is the first study to examine the implementation of concussion guidelines in community  
27 sport. Training of coaches/sports trainers needs enhancement. In addition, new education  
28 should be developed for parents/players about the importance of the return-to-play advice  
29 given to them by those who follow these guidelines. Information provided by those who  
30 attempted to use the guidelines will assist the refinement of implementation and  
31 dissemination processes around concussion guidelines across sports.

32 **Keywords:**

33 Brain concussion; Football; Implementation; Community participation; Concussion guidelines

34

## 35 Introduction

36 Concussion, a form of mild traumatic brain injury, is associated with a range of symptoms  
37 including headache, dizziness, nausea, vomiting and impaired memory.<sup>1, 2</sup> Repeated,  
38 subsequent concussions can also lead to longer term adverse health impacts, particularly if  
39 the subsequent concussion occurs before the individual has recovered fully from their initial  
40 injury.<sup>3</sup> Unfortunately, a large number of sport-related concussions occur each year across a  
41 range of sports, with recent evidence suggesting that the incidence of sport-related  
42 concussions is rising.<sup>4</sup> In a recent population-based study from Victoria, Australia, the  
43 number of hospitalizations for sports-related concussions increased by 61% over a nine year  
44 period,<sup>4</sup> while a significant increase in the number of reported concussions in the Australian  
45 National Rugby League was reported between 1998 and 2010.<sup>5</sup> Furthermore, in elite soccer  
46 players, experiencing a concussion increased the risk of sustaining a different subsequent  
47 sports injury by up to 70% in the following year, most probably due to altered neurological  
48 and cognitive function.<sup>6</sup>

49 Recognition of the potential longer-term health impacts associated with sustaining single or  
50 multiple concussions, and the increasing incidence of this injury in sport, have prompted the  
51 development of guidelines outlining how to appropriately recognise and manage sport-  
52 related concussions.<sup>1, 7, 8</sup> Unfortunately, the extent to which these guidelines have been  
53 formally adopted by team personnel is unknown, although the knowledge, attitudes, and  
54 actual behaviours of the personnel working directly with injured players (i.e., coaches, sports  
55 trainers, sports medicine support staff) appears to influence how effectively they use these  
56 guidelines.<sup>9-12</sup> Concerns have also been raised about the extent to which the guidelines can  
57 be translated to non-elite, community-level sporting contexts<sup>13</sup>. **Thus, unless factors that**  
58 **influence the uptake and use of concussion guidelines are addressed from the outset, it is**  
59 **highly unlikely that these guidelines will be implemented effectively by team personnel,**  
60 **particularly in community sport**<sup>9, 12, 14</sup>.

61 To better understand the factors that influence concussion guideline uptake, recent research  
62 has begun to focus on the knowledge and attitudes of the team personnel tasked with  
63 implementing concussion guidelines. With respect to knowledge, gaps have been identified  
64 with respect to team personnel's understanding of how to recognise concussion symptoms  
65 and what actions should be taken following concussions.<sup>11, 15, 16</sup> For example, a recent study  
66 in community-level Australian Football (AF) and Rugby League (RL) found that fewer than  
67 half of the surveyed sports trainers and coaches recognised the increased risk of  
68 subsequent concussion following the initial episode of concussion, and <25% realised that  
69 younger players are at greater risk of concussion.<sup>11</sup> In an earlier Australian study in Rugby  
70 Union, there was little evidence of awareness of concussion guidelines or appropriate return-  
71 to-play procedures following concussion.<sup>17</sup>

72 While knowledge gaps are often identified, attitudes towards concussion guidelines tend to  
73 be positive, at least among those anticipating using concussion guidelines in the coming  
74 season.<sup>10</sup> What remains unclear, however, is whether attitudes towards concussion  
75 guidelines change over time once team personnel have actually had a chance to use them.  
76 A negative experience with using the guidelines, for instance, could reduce the likelihood  
77 that the guidelines would be utilised in future instances, especially if they are perceived as  
78 being difficult to implement or not relevant to the specific sporting context in which they are  
79 being applied.

80 The aims of this study were therefore to: i) describe the experiences of, and challenges  
81 encountered by, coaches and sports trainers who attempted to use concussion guidelines  
82 over a playing season in community football.; and ii) identify factors associated with more  
83 favourable post-season attitudes towards the concussion guidelines. These results provide  
84 insights into how the guidelines could be improved to ensure their wider adoption in  
85 community sport settings.

86

## 87 **Methods**

88 Individuals were eligible to participate in this longitudinal study if they were aged 18+ years  
89 and registered as a coach or sports trainer at a community AF or RL club in Australia. To be  
90 included in the data reported in this paper, participants must have completed the nationwide  
91 baseline (pre-season) survey, which has been previously described.<sup>10, 11</sup> In total, 617  
92 community AF and RL coaches and sports trainers completed the baseline survey at the  
93 start of the 2012 playing season out of an eligible national population of approximately  
94 100,000 community AF and RL coaches. At baseline, the survey respondents were invited to  
95 provide their contact details so that they could be recontacted at the end of the season to  
96 report their actual use of the concussion guidelines (3<sup>rd</sup> Concussion Consensus  
97 Statement)<sup>18</sup>. After the 2012 playing season, an email invitation to complete an online post-  
98 season survey was sent to everyone who had provided their consent to be contacted  
99 (n=510). The time between the pre-season and post-season survey was 26 weeks. Of these,  
100 111 AF and RL coaches and sports trainers completed the follow-up (post-season) survey,  
101 representing a follow-up response rate of 22.0%.

102 Both baseline and follow-up surveys were administered via Qualtrics, an online survey  
103 platform. Completion of the online survey(s) was taken as indication of informed consent.  
104 Consistent with the baseline survey,<sup>10</sup> the semi-structured follow-up survey (which included  
105 a combination of multiple choice and open-answer questions) contained items measuring the  
106 central theory of planned behaviour constructs (i.e., intention, attitude, subjective norm, self-  
107 efficacy) as well as an extension to this theoretical framework (i.e., personal norm).<sup>19, 20</sup>  
108 However, as reflected in our aims, only results pertaining to the attitude construct are  
109 reported in the main body of this paper. Results pertaining to the other constructs of theory  
110 of planned behaviour (intention, subjective norm, self-efficacy and personal norm) are  
111 contained in a supplementary file (Appendix A). For both surveys, attitude was assessed  
112 using nine items scored on 7-point Likert scales ranging from strongly disagree (1) to  
113 strongly agree (7). Items were summed to form an overall attitude scale that could

114 theoretically range from 7 to 63, with higher scores indicating a more positive attitude  
115 towards using the concussion guidelines. At follow-up, respondents were also asked  
116 whether they had used the concussion guidelines during the **current, recently completed**  
117 season and, if so, were asked to complete open-ended questions seeking additional  
118 feedback about: (i) how they had used the guidelines; (ii) any problems experienced in using  
119 the guidelines or how they could be improved; and (iii) elements about the guidelines that  
120 were found to be useful.

121 Statistical analyses were conducted using SPSS version 21.0. For the first study aim,  
122 participants' qualitative feedback about using the guidelines were coded into common  
123 themes relating to experiences when implementing the guidelines and the difficulties and  
124 positive aspects of using the guidelines. **Thematic codes were generated by one reviewer**  
125 **(JK) where a set of procedures was followed using an inductive identification of themes.**  
126 **Once codes were generated, response data was allocated to each code by the same**  
127 **reviewer (JK). A second reviewer (PW) then independently allocated each response to the**  
128 **same codes. Any disagreements in code generation or allocation were resolved by a third**  
129 **reviewer (JN).** For the second study aim, analysis of co-variance (ANCOVA) was conducted  
130 to explore the factors associated with post-season attitudes to the guidelines (dependent  
131 variable), after confirming data normality assumptions. The independent variables were use  
132 of the guidelines during the preceding season (as reported at baseline), football code (AF vs.  
133 RL), and team role (coach vs. trainer), with the pre-season attitude score acting as a  
134 covariate. First order interactions between the independent variables were also analysed.

135 Ethics approval for this study was obtained through the Monash University Human Research  
136 Ethics Committee (number HREC CF12/1178 – 2012000575).

137

138 **Results**

139 Of the 111 respondents who completed both the baseline and follow-up surveys, 79 (71%)  
140 reported using the guidelines during the intervening AF and RL season. Table 1 reports the  
141 themes identified and common responses, and shows that amongst the 79 respondents who  
142 had used the concussion guidelines during the season between the baseline and follow-up  
143 surveys, the implementation experiences were generally similar across team roles and  
144 sporting codes. Implementation challenges included disputing of decisions about return-to-  
145 play by players, parents, and coaches, and a perceived lack of time. Recommendations for  
146 improved guideline materials included using larger fonts and providing for witnessing of  
147 advice given to players.

148 Pre- and post-season attitude scores (mean and 95% confidence intervals) for sports  
149 trainers and coaches are shown in Figure 1. Post-season attitudes towards using the  
150 concussion guidelines were significantly predicted by pre-season attitude ( $F(1,64) = 10.68$ ,  
151  $p=0.002$ ), sporting code ( $F(1,64) = 6.19$ ,  $p=0.015$ ), and team role ( $F(1,64) = 4.17$ ,  $p=0.045$ ).  
152 Thus, post-season attitude scores were higher among those: (i) with more positive (i.e.  
153 higher) pre-season attitude scores; (ii) associated with AF (as opposed to RL); and (iii) who  
154 were a sports trainer (as opposed to a coach). There was also a significant guideline use by  
155 team role interaction effect ( $F(1,64) = 6.73$ ,  $p=0.012$ ), indicating a different effect of attitude  
156 on guideline usage between coaches and trainers. Specifically, sports trainers had a more  
157 positive post-season attitude towards the guidelines if they had not used the guidelines  
158 during that season, whereas coaches had a more positive attitude towards the guidelines if  
159 they had used the guidelines during the season (Figure 1).

160 Insert Figure 1 about here.

## 161 **Discussion:**

162 To our knowledge, this is the first study to examine post-season attitudes towards sports  
163 concussion guidelines amongst team-based staff with the responsibility for ensuring that  
164 concussion guidelines are followed. In so doing, it provides critical evidence that could be



165 leveraged to encourage the continued use of these guidelines within community-level sport,  
166 particularly AF and RL. After all, coaches and sports trainers are unlikely to be enthusiastic  
167 adopters of concussion guidelines if their previous attempts at using them had been negative  
168 <sup>21</sup>.

169 Responses to the open-ended questions provided novel insights into potential barriers  
170 towards the use of concussion guidelines in community sporting contexts in Australia. A  
171 number of participants, for example, spoke of time constraints when using the guidelines.  
172 Many coaches and sports trainers also mentioned the pressure they felt from players and  
173 parents to allow premature return to play. A lack of support from some coaching staff in  
174 keeping affected players off the field was also cited as a potential barrier to guideline usage  
175 by sports trainers. In addition, some trainers suggested that the attitudes of coaches may be  
176 a barrier to effective implementation of the guidelines. These issues have the potential to  
177 create a negative experience for those using the guidelines, thereby reducing the likelihood  
178 that they would use the guidelines again. Appropriate measures should therefore be put in  
179 place to provide adequate support to those using concussion guidelines in community-level  
180 sporting teams. One approach would be to develop programs aimed at educating team  
181 support staff, players, and parents about the importance of adhering to the guidelines  
182 without challenging the legitimacy of their use or the person tasked with implementing the  
183 guidelines.

184 Several suggestions were provided for improvements to the actual design of the guideline  
185 materials to facilitate their implementation in community sporting contexts. For instance,  
186 increasing the size of the font in which information on the guidelines is presented could  
187 make it easier for older people to read and understand the guidelines on the sideline.  
188 Similarly, providing a specific section on reporting forms for return-to-play decisions to be  
189 witnessed could remove ambiguity about the nature and intent of those decisions, should  
190 they be disputed by parents or players at a later time.

191 A key finding from our study was that higher post-season attitudes towards the guidelines  
192 were reported by coaches who had used the guidelines and sports trainers who had not  
193 used the guidelines during the preceding session. This was after adjustment for other  
194 significant factors, such as pre-season attitude score, football code, and the team role of the  
195 respondent. These results are likely to reflect the different role that coaches and sports  
196 trainers have within the context of community team sport, as well as the training they receive  
197 in relation to concussion <sup>11</sup>. While coaches oversee game and training activities and  
198 contribute to decisions about when players are able to return to play after injury, they are not  
199 generally involved in assessing symptoms of concussion or evaluating the nature and extent  
200 of player injuries. Thus, it is likely that their training would not include many of the aspects  
201 inherent in the concussion guidelines, which essentially cover concussion recognition and  
202 treatment management. This could explain why their attitudes towards the guidelines  
203 improved after they had been directly exposed to their use during a playing season. In  
204 contrast, sports trainers have the major role of recognising and assessing player injuries,  
205 managing first aid, and referring players for medical treatment. <sup>22</sup> Their training would include  
206 coverage of concussion principles and they would be more likely to see a role for themselves  
207 in implementing concussion management guidelines at the start of a season. They could be  
208 expected to be less positive about concussion guidelines, however, if they have tried to  
209 implement them but found difficulties when attempting to do so.

210 Increasingly, it is being recognised that successful sports injury prevention requires not only  
211 the development of evidence-based guidelines outlining appropriate management practices  
212 but also the formulation of strategies aimed at maximising the dissemination and  
213 implementation of these guidelines among target populations. <sup>12, 21, 23</sup> For example, in 2013,  
214 the AFL developed guidelines written specifically for players and parents. These guidelines  
215 are aimed at educating players and parents about the importance of adhering to the  
216 guidelines and promoting a shared responsibility for managing concussion between the  
217 athlete, coach/sports trainer, parents and medical doctor. Despite this, there are few

218 examples of how to effectively implement injury prevention guidelines in community sport.<sup>24</sup>  
219 Moreover, effective injury prevention in community sport requires the implementation of a  
220 range of complementary and supportive activities across all levels of the sports delivery  
221 setting.<sup>24, 25</sup> Implementation of, and adherence to, injury prevention initiatives such as the  
222 concussion guidelines remains a challenge for all community level sport in the absence of  
223 consideration of these influences.<sup>9</sup> This can only be addressed through the development of  
224 programs/interventions that are specifically tailored to the end-user group<sup>26</sup> together with  
225 appropriately targeted strategies to support the delivery of such programs/interventions.<sup>12, 27</sup>

226 As with all research, several limitations were associated with this study. Only 22% of those  
227 who agreed to complete the follow-up survey actually completed it. As such, the study  
228 findings may not accurately reflect the broader group of AF and RL coaches and sports  
229 trainers charged with using the concussion guidelines in community football, leading to  
230 response bias in our findings. It is likely that the group of respondents are likely to be more  
231 compliant and adherent to the use of guidelines than the broader population of coaches and  
232 sports trainers. The sample size of this study also precluded the analyses of attitudes  
233 between coaches and trainers separately. Future studies with larger samples may identify  
234 additional associations between guidelines usage and other factors for each group. In  
235 addition, coaches and trainers were not asked how many times they used the concussion  
236 guidelines. Variations in the use of the guidelines may have impacted on positive or negative  
237 attitudes towards their use. Finally, no RL respondents offered responses to the open ended  
238 questions regarding positive experiences. It is unclear whether they had no positive  
239 experiences or were less likely to report them. This requires evaluation in new studies.  
240 Future studies would provide valuable insights into factors that, if targeted, may improve the  
241 effectiveness of the implementation of concussion guidelines.

## 242 **Conclusion**

243 In conclusion, this study found that post-season attitudes towards the use of concussion  
244 guidelines among community-level AF and RL coaches and sports trainers varies across  
245 football code and according to direct exposure to their use during the preceding playing  
246 season. The study also identified potential barriers to the use of current concussion  
247 management guidelines, and provided some suggestions for how to improve the packaging  
248 of such guidelines to ensure their increased adoption in community sport settings.  
249 Collectively, these findings suggest that the sustained implementation of concussion  
250 guidelines **may** not be achieved if these guidelines are associated with poorly designed  
251 materials or do not address potential barriers to their use.

252

### 253 **Practical Implications:**

- 254 • Attitudes towards the concussion guidelines in community-level Australian Football  
255 and Rugby League varied between coaches and trainers, and between football  
256 codes.
- 257 • There are many barriers to the effective use of the concussion guidelines in  
258 community football.
- 259 • Education for coaches and trainers within community football needs to be tailored to  
260 the football code, and the personnel if the concussion guidelines are to be  
261 implemented in a sustained and effective way.

262

### 263 **Acknowledgements:**

264 This study was funded by a Victorian Sports Injury Prevention Research Grant through the  
265 Department of Planning and Community Development Sport and Recreation Victoria. CFF  
266 was supported by an NHMRC Principal Research Fellowship (ID: 1058737). The Australian  
267 Centre for Research into Injury in Sport and its Prevention (ACRISP) is one of the

268 International Research Centres for the Prevention of Injury and Protection of Athlete Health  
269 supported by the International Olympic Committee (IOC).

270 The research presented in this paper was part of the work undertaken for a Victorian Sports  
271 Injury Prevention Research Grant from the Department of Planning and Community  
272 Development, Victoria, Australia. That project's larger chief investigator team included all co-  
273 authors of this paper as well as Paul McCrory, Michael Makdissi, Gavin Davis, Michael  
274 Ewing, Alex Donaldson, Angela Clapperton, John Sullivan, Willem Meeuwisse and Carolyn  
275 Emery.

276

277 **References:**

- 278 1. McCrory P, Meeuwisse WH, Aubry M, et al. Consensus statement on concussion in sport: the  
279 4th International Conference on Concussion in Sport held in Zurich, November 2012. *British Journal*  
280 *of Sports Medicine*. 2013;47(5):250-8.
- 281 2. Pearce AJ, Hoy K, Rogers MA, et al. Acute motor, neurocognitive and neurophysiological  
282 change following concussion injury in Australian amateur football. A prospective multimodal  
283 investigation. *Journal of Science and Medicine in Sport*.
- 284 3. Harmon KG, Drezner JA, Gammons M, et al. American Medical Society for Sports Medicine  
285 position statement: concussion in sport. *British Journal of Sports Medicine*. 2013;47(1):15-26.
- 286 4. Finch CF, Clapperton AJ, McCrory P. Increasing incidence of hospitalisation for sport-related  
287 concussion in Victoria, Australia. *Medical Journal of Australia*. 2013;198(8):427-30.
- 288 5. Savage J, Hooke C, Orchard J, et al. The Incidence of Concussion in a Professional Australian  
289 Rugby League Team, 1998&#x2013;2012. *Journal of Sports Medicine*. 2013;2013:7.
- 290 6. Nordstrom A, Nordstrom P, Ekstrand J. Sports-related concussion increases the risk of  
291 subsequent injury by about 50% in elite male football players *British Journal of Sports Medicine*.  
292 2014;48(19):1447-50.
- 293 7. Frémont P, Bradley L, Tator CH, et al. Recommendations for policy development regarding  
294 sport-related concussion prevention and management in Canada. *British Journal of Sports Medicine*.  
295 2014.
- 296 8. Putukian M, Raftery M, Guskiewicz K, et al. Onfield assessment of concussion in the adult  
297 athlete. *British Journal of Sports Medicine*. 2013;47(5):285-8.
- 298 9. Donaldson A, McCrory P, White PE, et al. Translating guidelines for the diagnosis and  
299 management of sports-related concussion into practice. *American journal of Lifestyle Medicine*. In  
300 press.
- 301 10. Newton JD, White PE, Ewing MT, et al. Intention to use sport concussion guidelines among  
302 community-level coaches and sports trainers. *Journal of Science and Medicine in Sport*. (0).
- 303 11. White PE, Newton JD, Makdissi M, et al. Knowledge about sports-related concussion: is the  
304 message getting through to coaches and trainers? *British Journal of Sports Medicine*. 2014;48(2):119-  
305 24.
- 306 12. Provvienza C, Engebretsen L, Tator C, et al. From consensus to action: knowledge transfer,  
307 education and influencing policy on sports concussion. *British Journal of Sports Medicine*.  
308 2013;47(5):332-8.
- 309 13. White PE, Shee AW, Finch CF. Independent appraiser assessment of the quality,  
310 methodological rigour and transparency of the development of the 2008 international consensus  
311 statement on concussion in sport. *British Journal of Sports Medicine*. 2014;48(2):130-4.
- 312 14. Finch CF, McCrory P, Ewing MT, et al. Concussion guidelines need to move from only expert  
313 content to also include implementation and dissemination strategies. *British Journal of Sports*  
314 *Medicine*. 2013;47:12-4.
- 315 15. Mrazik M, Bawani F, Krol AL. Sport-related concussions: knowledge translation among minor  
316 hockey coaches. *Clinical Journal of Sport Medicine*. 2011;21(4):315-9.
- 317 16. McLeod TCV, Schwartz C, Bay RC. Sport-related concussion misunderstandings among youth  
318 coaches. *Clinical Journal of Sports Medicine*. 2007;17(2):140-2.
- 319 17. Hollis SJ, Stevenson MR, McIntosh AS, et al. Compliance with return-to-play regulations  
320 following concussion in Australian schoolboy and community rugby union players. *British Journal of*  
321 *Sports Medicine*. 2012;46(10):735-40.
- 322 18. McCrory P, Meeuwisse W, Johnston K, et al. Consensus Statement on Concussion in Sport:  
323 the 3rd International Conference on Concussion in Sport held in Zurich, November 2008. *British*  
324 *Journal of Sports Medicine*. 2009;43(Suppl 1):i76-i84.
- 325 19. Ajzen I. The theory of planned behavior. *Organizational behavior and human decision*  
326 *processes*. 1991;50(2):179-211.

- 327 20. Newton JD, Newton FJ, Ewing MT, et al. Conceptual overlap between moral norms and  
328 anticipated regret in the prediction of intention: Implications for theory of planned behaviour  
329 research. *Psychology and Health*. 2013;28(5):495-513.
- 330 21. Finch CF. A new framework for research leading to sports injury prevention. . *Journal of*  
331 *science and medicine in sport / Sports Medicine Australia*. 2006;3:3-91.
- 332 22. Donaldson A, Finch CF. Identifying context-specific competencies required by community  
333 Australian Football sports trainers. *British Journal of Sports Medicine*. 2014;46:759-66.
- 334 23. Finch CF. No longer lost in translation – the art and science of sports injury prevention  
335 implementation research. . *British Journal of Sports Medicine*. 2011;45:1253-7.
- 336 24. Cusimano MD, Chipman M, Donnelly P, et al. Effectiveness of an educational video on  
337 concussion knowledge in minor league hockey players: a cluster randomised controlled trial. *British*  
338 *Journal of Sports Medicine*. 2014;48(2):141-6.
- 339 25. Finch CF, Donaldson A. A sports setting matrix for understanding the implementation  
340 context for community sport. *British Journal of Sports Medicine*. 2010;44:973-8.
- 341 26. Donaldson A, Finch CF. Planning for implementation and translation: seek first to understand  
342 the end-users' perspectives. *British Journal of Sports Medicine*. 2012;46:306-7.
- 343 27. Donaldson A, Poulos RG. Planning the diffusion of a neck-injury prevention programme  
344 among community rugby union coaches. *British Journal of Sports Medicine*. 2014;48(2):151-9.

345

346 **Table 1: Implementation experiences and challenges experienced by Australian Football and Rugby League coaches and sports**  
 347 **trainers. Common themes are listed below the table, with the number of participants identifying each theme reported.**

Team role	Situations in which the guidelines were attempted to be implemented and adopted implementation strategies	Implementation difficulties	Positive experiences with the guidelines and their implementation
<b>AF Coach (n=19)</b>	<ul style="list-style-type: none"> <li>• Used to inform decision to remove players from field<sup>1</sup></li> <li>• Used to inform when players could return to play<sup>2</sup></li> <li>• Used to enable referral to medical practitioner<sup>4</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Not having SCAT cards<sup>9</sup></li> <li>• Parents disputing decisions made by coaches<sup>8</sup></li> <li>• Most reported no problems</li> </ul>	<ul style="list-style-type: none"> <li>• Clear and concise<sup>16</sup></li> <li>• Simple<sup>16</sup></li> <li>• Able to give to players and parents to help justify decision making<sup>17</sup></li> </ul>
<b>AF Sports Trainer (n=30)</b>	<ul style="list-style-type: none"> <li>• Used SCAT2 guidelines<sup>7</sup></li> <li>• Used to change club policy to follow Australian Football League guidelines<sup>6</sup></li> <li>• Ensured laminated copy of</li> </ul>	<ul style="list-style-type: none"> <li>• Parents and players resisting the decisions made<sup>8</sup></li> <li>• Players resisted the implementation of guidelines during the game<sup>8</sup></li> <li>• Small font on guidelines was hard for</li> </ul>	<ul style="list-style-type: none"> <li>• Simple<sup>16</sup></li> <li>• Clear and concise<sup>16</sup></li> <li>• Brief<sup>16</sup></li> <li>• Provides “clear direction”, “framework”, “guidelines”,</li> </ul>



	<p>guidelines in all first aid kits<sup>7</sup></p> <ul style="list-style-type: none"> <li>Used to inform decision to remove players from field<sup>1</sup></li> <li>Used to inform when players could return to play<sup>2</sup></li> <li>Used to educate players and club officials<sup>5</sup></li> </ul>	<p>older trainers to read<sup>10</sup></p>	<p>“step-by-step guide”<sup>16</sup></p> <ul style="list-style-type: none"> <li>Provides reassurance about correct decision making for player health<sup>17</sup></li> <li>Helps validate decisions to players<sup>17</sup></li> </ul>
<b>RL Coach (n=17 )</b>	<ul style="list-style-type: none"> <li>Used to inform decisions to remove players from field<sup>1</sup></li> <li>Used to inform when players could return to play<sup>2</sup></li> <li>Used to inform junior players and parents about when to return to play<sup>3</sup></li> </ul>	<ul style="list-style-type: none"> <li>Difficult being the person making the decision; would help to have someone with higher qualifications at the game<sup>14</sup></li> <li>Needs a box for a witness to sign when you have made a decision to remove player so player cannot question your decision later on<sup>15</sup></li> </ul>	<ul style="list-style-type: none"> <li>None given</li> </ul>
<b>RL Sports</b>	<ul style="list-style-type: none"> <li>Used to inform decisions to remove</li> </ul>	<ul style="list-style-type: none"> <li>Trying to decide if a “head-knock” is</li> </ul>	<ul style="list-style-type: none"> <li>None given</li> </ul>

---

<b>Trainer</b>	players from field <sup>1</sup>	actually a concussion <sup>11</sup>
<b>(n=13 )</b>	<ul style="list-style-type: none"> <li>• Used to inform when players could return to play<sup>2</sup></li> <li>• Used to inform junior players and parents about when to return to play<sup>3</sup></li> <li>• Used to refer to medical help<sup>4</sup></li> <li>• Used to ask doctor when safe for a player to return to play<sup>4</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Trying to decide if a cut to the head is a concussion<sup>11</sup></li> <li>• Players refusing to answer questions after a head-knock<sup>12</sup></li> <li>• Players refusing to leave field after a head-knock<sup>12</sup></li> <li>• Parents not understanding seriousness of concussion and not supporting the decision<sup>13</sup></li> <li>• Coaching staff not supporting decision and letting player back onto field<sup>13</sup></li> </ul>

---

348 AF = Australian Football; RL = Rugby League; SCAT2 = Sport concussion assessment tool 2.

349 **Themes identified**

350 <sup>1</sup> Inform decision making regarding player removal from game n=18

351 <sup>2</sup> Inform decision making regarding player return to play n=10

- 352 <sup>3</sup> Inform parents and junior players about decision making n=1
- 353 <sup>4</sup> Inform when appropriate to refer to medical practitioner n=11
- 354 <sup>5</sup> Education tool for club officials and players n=7
- 355 <sup>6</sup> Used to change club policy n=2
- 356 <sup>7</sup> Practical strategies used n=4
- 357 <sup>8</sup> Parents and players resisting decisions made n=8
- 358 <sup>9</sup> Not having resources available n=3
- 359 <sup>10</sup> Practical issues such as small font n=2
- 360 <sup>11</sup> Difficulty in deciding if injury was concussion n=4
- 361 <sup>12</sup> Player refusing to co-operate when concussed n=1
- 362 <sup>13</sup> Lack of support from players, coaches, parents n=9
- 363 <sup>14</sup> Feeling insecure about qualifications to make decisions n=5
- 364 <sup>15</sup> Concerns regarding need for written documentation of decisions made n=1

365 <sup>16</sup> Guidelines were clear, concise and simple n=27

366 <sup>17</sup> Provides framework to justify decision making n=18

367

368

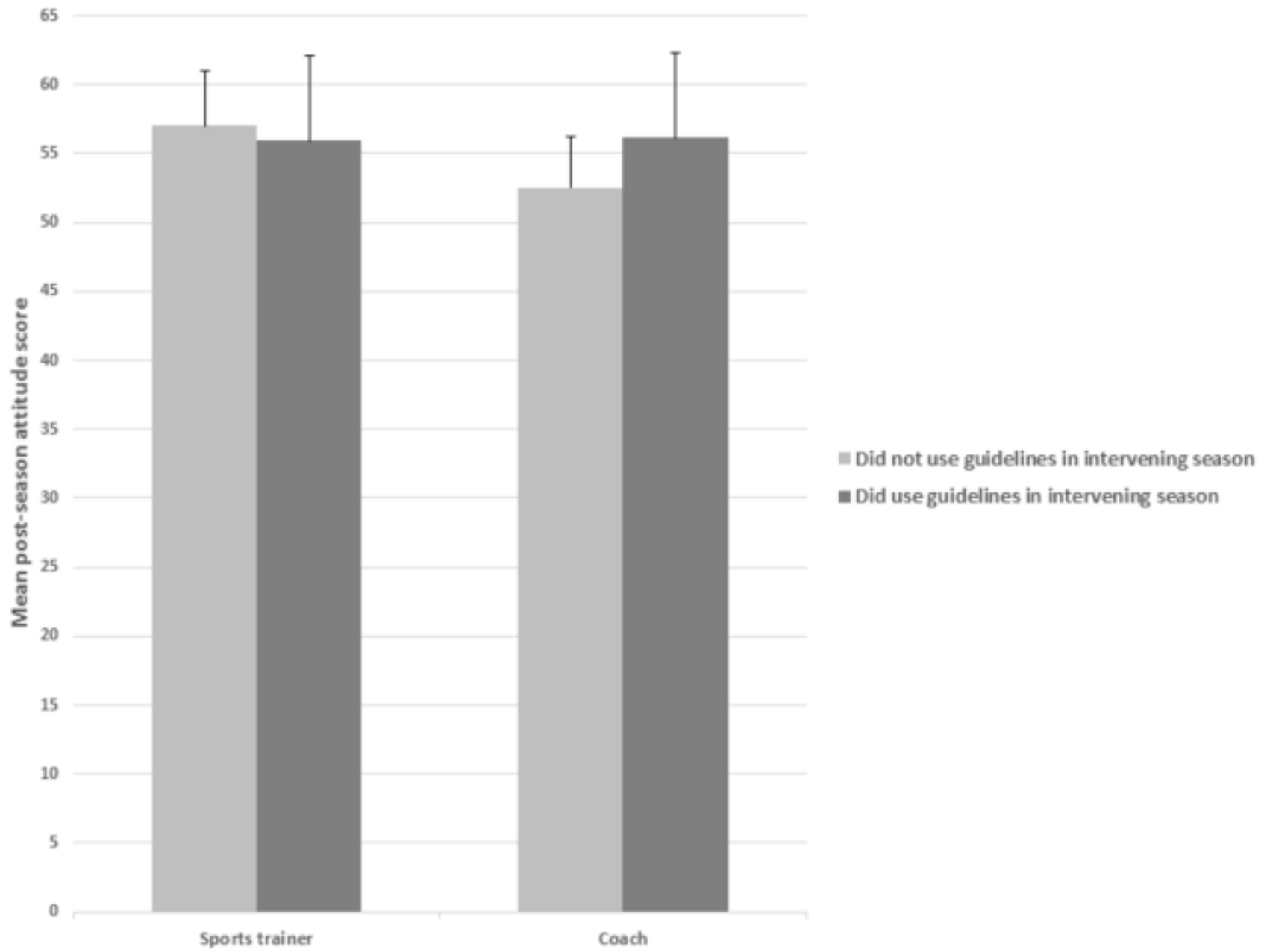
369 **Figure Legends**

370 Figure 1. Relationship between mean post-season attitudes towards concussion guidelines  
371 and experience in using them in the intervening season in coaches and sports trainers from  
372 Australian football and Rugby League (sports combined).

373

Figure(s)

[Click here to download high resolution image](#)



**Appendix A: Results of univariate analysis exploring factors associated with post-season theory of planned behaviour constructs with respect to the guidelines**

<b>TPB construct at follow-up</b>	<b>Pre-season TPB score (<math>F_{1,64}(p)</math>)</b>	<b>Team role (<math>F_{1,64}(p)</math>)*</b>	<b>Sporting code (<math>F_{1,64}(p)</math>)*</b>
Intention	0.603(0.727)	0.614(0.437)	1.190(0.280)
Subjective Norm	0.916(0.537)	4.135(0.050)	0.165(0.688)
Self-efficacy	2.475(0.022)	0.059(0.811)	1.131(0.300)
Personal Norm	1.387(0.214)	0.558(0.459)	0.137(0.714)

TPB = theory of planned behaviour