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An Accessible Concussion Education Tool that Improves Athlete, Coach and Parent Knowledge and Attitudes

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Abstract

Education initiatives can help improve knowledge, attitudes towards concussion and increase reporting of this 'invisible injury'. While interventions tend to increase knowledge, they display mixed results for attitudes towards concussion, are often lengthy and require an expert to present to a target cohort. This study aimed to develop an easily accessible research-based concussion education tool in the form of an animated video.

Analysis was carried out 215 valid pre and post intervention surveys to determine the effectiveness of the tool on a cohort of Irish adults. Mean concussion knowledge index (CKI) score increased from 19.71 ± 1.91 to 20.65 ± 1.90 ($p < 0.001$) on a 25-point scale, while mean concussion attitude index (CAI) score increased from 58.77 ± 3.83 to 61.17 ± 1.90 ($p < 0.001$) on a 75-point scale, showing the tool's potential as an effective repeatable tool requiring minimum time and resources. While significant mean increases were observed in CKI and CAI for the entire sample, Gaelic football participants (n=43) displayed no significant changes from pre to post intervention CAI scores. A multi-level procedural approach specific to Gaelic games should be developed and tested.

Keywords: Concussion education; Concussion knowledge; Concussion attitudes; Concussion video; Concussion intervention

Abbreviations

CKI: Concussion Knowledge Index; CAI: Concussion Attitude Index; CK: Concussion Knowledge; CA: Concussion Attitudes; RoCKAS: Rosenbaum's Concussion Knowledge and Attitudes Scale; m: mean; SD: Standard Deviation; n: number of participants

Introduction

Concussions are often referred to as an 'invisible injury', due in part to the wide ranging and delayed presentation of signs and symptoms [1]. Unlike other injuries, symptoms generally do not present themselves physically in the way a broken leg or dislocated shoulder would. It is estimated that approximately one third of concussions are not reported due to the inability to recognize concussion signs and symptoms [2]. Underreporting of this injury is also common and it is often associated with not wanting to let coaches or teammates down [3]. The reporting of signs and symptoms are essential for the protection of the injured individual's immediate and long-term health. This could be achieved through concussion education initiatives. Concussion education initiatives attempt to improve participant concussion knowledge (CK) and concussions attitudes (CA) towards concussion, in the hope of increasing reporting and improving actual behaviours towards the injury.

Educational interventions to date have shown increases in CK immediately post intervention, that occasionally returns to baseline levels at one to six-month follow-up testing and equivocal results for CA [4]. Interventions often lack follow-up data, meaning that initial increases in CK and CA may return to baseline [5-7]. It is important to note that the development of these interventions greatly contributes to research and increases the number of concussion educational initiatives parents, athletes and coaches are exposed to. Research has also suggested that individuals who make use of more educational tools are more likely to develop safer CA [8]. Further it has been reported that coaches who implemented three or more tools from the Centre of Disease Control concussion tool-kit record a notably greater increase in CA when compared with those who used two or less tools [8]. Similarly, Kroshus et al. [9] reported that out of the six teams where CA were measured, the team that implemented the most concussion education protocols were the only team out of six to record substantially improved CA scores from baseline levels.

According to the latest concussion management protocols, medical professionals are required to diagnose a concussion [10]. Unfortunately, in amateur sports concussions occur in the absence of trained professionals, giving need for coaches, parents and spectators to be able to identify a suspected concussion and take actions that protect the athlete [11]. Research suggests that there are increased neurological consequences from receiving a second concussion prior to the initial injury healing, giving further weight to the requirement for more concussion education initiatives [12]. Repeated exposures to this injury, and sub-concussive impacts, have been associated with the development of mental health issues as well as the early onset of neurological impairments and neurogenerative diseases [13-15]. Identifying concussions as they occur is essential for protecting athlete safety.

Many interventions are time consuming and may require an expert to present to the target cohort. The aim of this study was to develop an easily accessible concussion education tool in the form of an animated video. It was hypothesized the video would increase CKI and CAI scores immediately post intervention.

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Materials and Methods

This study used a prospective cohort study design, recording participant data at two time-points. This design type was used to quantify changes in CKI and CAI from pre to post intervention. Ethical approval was granted by the Galway-Mayo Institute of Technology Ethics Committee (GMIT270121_RSC), according to The Declaration of Helsinki to carry out study protocols.

Participants

Participants were recruited through email, social media and existing databases. Inclusion criteria for participants stated they had to be aged 18 or over and be an athlete, a coach, or a parent of an athlete. After consent was received from participants, they received an email containing the pre-intervention survey. This survey was completed between 27th of July 2020 and 18th of February 2021. The educational video was embedded at the beginning of the post-intervention survey, that was sent out to participants between 1st of February 2021 and the 26th of February 2021.

Intervention design and content

The educational tool consisted of a short, animated video that is four minutes and 36 seconds in length (link to video: https://www.youtube.com/watch?v=pJhmTr5U0Lk). The video was developed in conjunction with ICON PLC (Limerick, Ireland), with a team of scientific content writers and graphic designers reviewed and suggest edits for the video script and storyboard. Intervention content was informed by the completion of a systematic literature review that examined 25 peer-reviewed studies that tested and analysed the effectiveness of concussion education tools for improving CK and/or attitudes towards the injury [3]. The video was designed to be inclusive of all ages, genders and all contact field-based sports, which accumulated in the creation of a concise script where a question is posed to the viewers, followed by the answer. The questions asked were: 'What is a concussion?' 'Is a concussion serious?' 'What are the implications of a concussion?' 'What should I do if I am concussed?' and 'What is the recovery process?' These questions were answered by defining a concussion, establishing its dangers, listing the signs and symptoms and describing the potential delayed onset of their appearance, explaining the importance of recognizing the injury, potential long-term effects, requirement for a change in culture, removal of a suspected injured athlete from sport and explaining the importance of contacting a medical professional.

Outcomes measured

The pre-intervention questionnaire consisted of a demographics section and a modified Rosenbaum's Concussion Knowledge and Attitudes Scale (RoCKAS) [16]. The demographics section included 32 questions to compare participants across different groups during statistical analysis. The RoCKAS questionnaire contains five sections, totaling 55 questions. CKI index is measured by totaling scores from section one, two and five, using TRUE/FALSE questions and identifying concussion signs and symptoms from distractor signs and symptoms. CAI is measured in sections three and fours, using a five-point Likert scale, where higher scores are awarded for safer answers (one mark awarded for least safe answer, five marks awarded for the safest answer). CKI and CAI scores can range from 0-25 and 15-75 respectively, with the higher scores representing greater knowledge or safer attitudes towards concussion.

The RoCKAS questionnaire tests the validity of participant answers using three questions. If 2-3 questions are answered correctly, the participant's survey is valid and was included for analysis. If a participant answers less that two of these questions correctly their survey was discarded. The questionnaire was initially trialed with 10 participants, where feedback was provided for questionnaire accessibility. Modifications were made to several questions, replacing phrases with colloquial terms for ease of interpretation. For example, 'high-school' was replaced with 'secondary school'. While Rosenbaum and Arnett16 determined fair to satisfactory test-retest reliability when their survey was used by high-school athletes (CKI items, r = 0.67, CAI items, r = 0.79), recent research has questioned the model fit and correlations for attitude items of college student athletes [17]. RoCKAS was still selected to measure outcomes due to being the most common survey to measure changes in CK and attitudes and still being used by research groups since the publication of Chapman et al. [17].

The post-intervention questionnaire consisted of the same RoCKAS survey mentioned above, along with eight exit questions to provide feedback on the animated video and improvements that can be made for future educational tools.

Statistical analysis

Survey data were transferred into a password protected excel file and participants were assigned an identification number to protect their identity. Participant RoCKAS results were totaled pre and post watching the educational video. Statistical Package for the Social Sciences (IBM SPSS, Version 27, Armonk, New York) was used to carry out all remaining statistical analysis. Data were organized into histograms, which were visually inspected for normality, followed by the examination of z-values for skewness and kurtosis. Data were normally distributed for CKI and CAI, with z-scores falling between the ranges of ±3.29. Therefore, parametric tests were carried out for analysis. Missing data analysis was not carried out as participants were unable to progress through the survey if a question was skipped. Paired samples t-test were carried out to determine if differences existed from pre to post intervention. Data are reported as the mean score with standard deviations (±SD). Standard multiple regression analysis was carried out to determine if a model for predicting CKI and CAI could be created. Effect size according to Cohen's d was calculated to determine the differences in size of change between male and female participants. The revised scale for meaningful changes in sport proposed by Hopkins was used to interpret results (d <0.1 = trivial effect size, 0.1 to 0.3 = small effect size, 0.3 to 0.5 = moderate effect size, 0.5 to 0.7 = large effect size, 0.7 to 0.9 = extremely large effect size and 0.9 to 1.0 = nearly perfect effect size). Descriptive statistics were carried out on exit interview questions to understand participant opinions of the animated video.

Results

The pre-intervention questionnaire was completed by 549 participants, of which 229 (58.3%) completed the post-intervention questionnaire. Eight of these participants answered that they did not watch the animated video for question two, and a further six participants answered two or more validity scale questions

Table 1: Participant demographics and paired samples t-test result for changes in mean CKI scores.

	n	CKI Pre	±SD	CKI Post	±SD	Mean Difference	d	p
Participants	215	19.71	1.91	20.65	1.9	0.94	0.49	<0.001
Gender								
Male	149	19.72	1.98	20.69	1.93	0.97	0.5	<0.001
Female	66	19.67	1.76	20.55	1.84	0.88	0.49	<0.001
Age								
18-19	14	19.71	1.06	20.83	2.81	1.12	0.58	0.18
20-24	103	19.74	1.87	20.95	1.91	1.21	0.64	<0.001
25-29	37	19.86	1.87	20.28	1.44	0.42	0.25	0.192
30-34	11	19.1	1.88	21.3	1.6	2.2	1.26	0.051
35-39	9	18.49	2.68	19.89	2.33	1.4	0.56	0.117
40-44	12	20.61	1.85	20.55	2.19	-0.06	0.03	0.921
45-49	16	19.66	2.2	20.21	1.69	0.55	0.28	0.234
50+	15	19.31	2.04	20.01	1.38	0.7	0.41	0.15
Athletes	167	19.69	1.89	20.68	1.94	0.99	0.52	<0.001
Coaches	59	19.89	1.95	20.48	1.97	0.59	0.3	0.023
Parents	50	19.45	2.16	20.11	1.78	0.66	0.33	0.035
Main Sport for Athletes								
Gaelic Football	43	19.64	1.95	20.57	1.86	0.93	0.49	<0.001
Hurling/Camogie	29	19.23	2.03	20.63	2.3	1.4	0.65	0.001
Soccer	28	20.03	1.63	20.79	2.24	0.76	0.39	0.121
Rugby Union	16	19.78	1.89	20.13	2.04	0.35	0.18	0.491
Athletics	13	19.01	2.41	20.49	1.83	1.48	0.7	0.032
Other*	38	20.02	1.69	21.07	1.5	1.05	0.66	0.004
Level of Competition for Athletes								
Recreational	23	19.82	1.9	20.87	1.54	1.05	0.61	0.049
Competitive	122	19.67	1.95	20.65	1.95	0.98	0.5	<0.001
Elite	22	19.63	1.61	20.68	2.31	1.05	0.54	0.026
Parent with concussed child								
Yes	12	19.22	1.22	19.57	1.82	0.35	0.23	0.535
No	38	19.52	2.39	20.28	1.76	0.76	0.37	0.045
Coach who had witnessed a concussed								
Yes	42	19.51	2.16	20.16	1.8	0.65	0.33	0.057
No	17	19.64	1.77	20.27	1.82	0.63	0.35	0.183

incorrectly, resulting in a total of 215 participant data sets were included for analysis.

Of the 215 participants whose data were included, 149 were male and 66 were female, with an average age of 28.6 ± 11.1yrs. ranging between 18yrs. to 72yrs. Participants' changes in CKI and CAI were measured according to gender, age, whether they were athletes, parents or coaches, main sport, level of competition as well as coach and parent experience with concussion.

Concussion Knowledge Index

Paired samples t-test revealed a significant increase in CKI for the entire cohort, increasing from 19.71 ± 1.91 to 20.65 ± 1.90 ($p<0.001$). CKI paired sample t-test results for each comparison group are presented in Table 1. Athletes had the largest increase in CKI (19.69 ± 1.89 to 20.68 ± 1.94; d=0.52; $p<0.001$), while parents (19.45 ± 2.16 to 20.11 ± 1.78; d=0.33; p=0.023) and coaches (19.89 ± 1.95 to 20.48 ± 1.97; d=0.30; p=0.023) were slightly less. Rugby union (19.78 ± 1.89 to 20.13 ± 2.04; d=0.18; p=0.491) and soccer (20.03 ± 1.63 to 20.79 ± 2.24; d=0.39; p=0.121) athletes displayed no significant increase in CKI post-intervention, although they had the highest baseline scores out of the five most participated sports. Parents of children who have previously suffered a concussion (n=12) had non-significant increases in CKI (19.22 ± 1.22 to 19.57 ± 1.82; d=0.23; p=0.535). Competitive athletes saw the lowest increase in CKI scores (19.67 ± 1.95 to 20.65 ± 1.95; d=0.50; $p<0.001$).

Table 2: Participant demographics and paired samples t-test result for changes in mean CAI scores.

	n	CKI Pre	±SD	CKI Post	±SD	Mean Difference	d	p
Participants	**215**	**58.77**	**3.83**	**61.17**	**3.89**	**2.4**	**0.62**	**<0.001**
Gender								
Male	149	58.53	3.81	61.3	4.03	2.77	0.71	<0.001
Female	66	59.32	3.86	60.88	3.56	1.56	0.42	0.008
Age								
18-19	14	58	3.37	60.36	3.61	2.36	0.68	0.049
20-24	103	59.24	3.89	60.5	3.95	1.26	0.32	0.01
25-29	37	59.68	3.88	62.65	3.08	2.97	0.85	<0.001
30-34	11	56.43	3.95	61	3.27	4.57	1.27	0.026
35-39	9	56.89	3.69	60.89	4.65	4	0.96	0.053
40-44	12	57.64	3.2	62.71	3.36	5.07	1.55	<0.001
45-49	16	58.75	3.3	62.38	3.67	3.63	1.04	<0.001
50+	15	57.33	4.05	60.47	5	3.14	0.69	0.027
Athletes	167	58.86	4.06	60.9	3.94	2.04	0.51	<0.001
Coaches	59	58.34	3.92	61.58	3.83	3.24	0.84	<0.001
Parents	50	58.18	3.72	61.9	4.22	3.72	0.94	<0.001
Main Sport for Athletes								
Gaelic Football	43	59.95	3.59	60.42	4.38	0.47	0.12	0.54
Hurling/Camogie	29	58.59	4.16	61.14	3.48	2.55	0.67	0.004
Soccer	28	57.14	3.89	59.54	4.73	2.4	0.56	0.019
Rugby Union	16	59.94	5.23	62.5	2.94	2.56	0.63	0.068
Athletics	13	57.85	3.39	60.54	3.57	2.69	0.77	0.099
Other*	38	59	4.08	61.74	3.32	2.74	0.74	<0.001
Level of Competition for Athletes								
Recreational	23	58.43	4.45	61.17	4.03	2.74	0.65	0.017
Competitive	122	59.29	4.1	61.03	4.02	1.74	0.43	<0.001
Elite	22	56.95	3.02	59.91	3.32	2.96	0.93	<0.001
Parent with concussed child								
Yes	12	57.08	3.42	59.75	4.52	2.67	0.67	0.066
No	38	58.53	3.79	62.58	3.96	4.05	1.05	<0.001
Coach who had witnessed a concussed								
Yes	42	58.62	3.96	60.9	4.21	2.28	0.56	0.002
No	17	58.24	3.67	63.59	3.18	5.35	1.56	<0.001

Concussion Attitude Index

Paired samples t-test (Table 2) revealed a significant increase in CAI for the entire cohort 58.77 ± 3.83 to 61.17 ± 3.89; d = 0.62; p<0.001). Males had higher average post-intervention CAI scores than females (61.30 ± 4.03 *vs.* 60.88 ± 3.56; d = 0.11; p = 0.165), despite having lower pre-intervention scores (58.53 ± 3.81 *vs.* 59.32 ± 3.86; d = 0.21; p = 0.463). Both male and female participants had significant increases in CAI scores with males having a mean difference of 2.77 with a very large effect size (d = 0.71, p<0.001), compared to an increase of only 1.56 for females with a moderate effect size (d=0.42, p<0.001) (Figure 1).

Despite having the largest increase in CKI scores, athletes had the lowest increase in mean CAI scores) (58.86 ±4.06 to 60.90 ±3.94; d = 0.51; p<0.001), compared to coaches and parents (Coaches: 58.34 ±3.92 to 61.58 ±3.24; d = 0.84; p<0.001; Parents: 58.18 ± 3.72 to 61.90 ± 4.22; d = 0.94; p<0.001). Gaelic football athletes displayed the lowest mean increase in CAI score (59.95 ± 3.59 to 60.42 ± 4.38; d = 0.12; p=0.540) with all other sports having a CAI score increase of 2.40 to 2.69 (Figure 2). There was a significant difference observed for hurling/camogie athletes (n = 29) with a mean increase from 58.59 ± 4.16 to 61.14 ± 3.48 (d = 0.67; p=0.004). Competitive athletes recorded the lowest increase in CAI (59.29 ± 4.10 to 61.03 ± 4.02; d = 0.43; p<0.001). Coaches who have previously witnessed concussions occur (n = 42) had lower CAI increases (58.62 ± 3.96 to 60.90 ± 4.21; d = 0.56; p = 0.002, than coaches who have not witnessed a concussion.

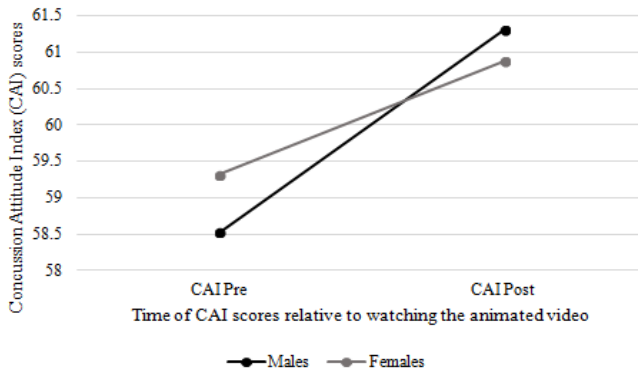

Figure 1: Changes in male and female CAI scores from pre to post intervention.

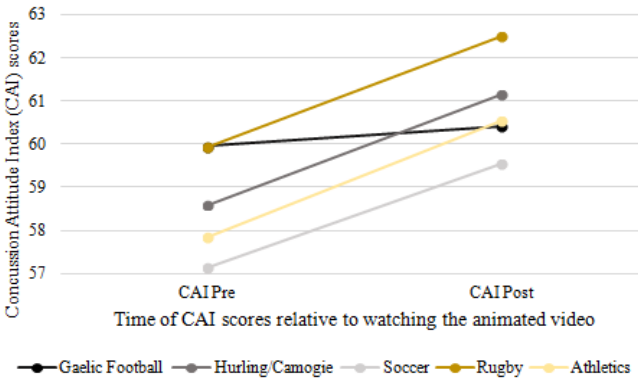

Figure 2: Changes in athlete's CAI scores from pre to post intervention based on their main sport.

Standard multiple regression analysis were also carried out to see if any models could be produced to predict the magnitude of contributing variables to CKI or CAI scores. No meaningful models were produced while trying to determine the predictors (age, previously suffered a concussion, gender, level of competition, main sport, coach and parent) of CKI and CAI scores pre- and post-intervention. Multiple regression analysis results can be observed in Table 3. The post-intervention questionnaire included eight exit questions to determine how the intervention could be improved moving forward. Questions and answers are presented in Table 4.

Discussion

Findings display that a short animated educational video for concussion considerably increases both CKI and CAI scores immediately post intervention, proving the hypothesis. These results satisfy the aim of the study, by creating an easily accessible research informed tool that can be delivered at key stages throughout a sporting season, for example pre-season, mid-season and before a run of important games. The positive responses of participants to the exit questions show the willingness of participants to engage with the video at later date.

Of the five most participated sports in this study, rugby union and soccer athletes displayed the highest mean baseline CKI scores at 19.78 ± 1.89 and 20.03 ± 1.63 respectively. Potential contributing

Table 3: Standard Method Multiple Regression for CKI and CAI.

Model Number	Dependent Variable	Effect size (r^2)	Sig. (p)
1	CKI Pre	0.03	0.667
2	CKI Post	0.048	0.341
3	CAI Pre	0.077	0.075
4	CAI Post	0.032	0.634

factors to these results are increased discussion of the injury by the media, increased exposure to the injury compared to other sports and exposure to education initiatives. In recent years, social media have acted as a platform for highlighting the dangers of concussions in both soccer and rugby union. The lower baseline CKI scores of Gaelic football and hurling/camogie (19.64 ± 1.95 and 19.23 ± 2.03 respectively) may be explained by the amateur nature of these community organizations. At the highest level of Gaelic games competition, athletes are still considered amateurs, despite their training commitments and competing in front of a paying audience. This is reflected in the lack of mandatory concussion education within Gaelic games. A concussion management strategy has existed in Gaelic games since 2007 and has been supplemented with updated concussion guidelines [18]. It has been reported by adolescents that medical professionals were only present at one in every 10 matches and one in every 50 training sessions [19]. As a result, decisions regarding suspected concussions injuries are often the responsibilities of coaches and parents who are not required to participate in mandatory concussion training.

Lack of mandatory concussion training in Gaelic games may also be reflected in the CAI results reported in our study. Of the five most popular sports amongst participants, Gaelic football athletes (n = 43) were the only participants not to have a meaningful change in CAI scores from pre- to post-video viewing. On a positive note, increases in CAI scores were recorded for hurling/camogie athletes, however 57.5% of adolescent Gaelic games athletes have reported suffering at least one concussion [19], with 60% of adolescent players report continuing to take part in a game or practice while experience the symptoms of a concussion [20]. With approximately 4,200 Gaelic games clubs and over 100,000 male athletes participating [21], more effective concussion education approaches must be explored.

While the long-term impact of the educational tool on CKI and CAI scores remain unclear, the short duration, ease of use and repeatability are advantages over many existing educational interventions. This educational tool could be practically applied in a wide variety of settings due to its inclusive design. It could be used as a stand-alone piece, viewed annually or on multiple occasions throughout a sporting calendar. This could also act as an introduction to concussion for training courses and workshops for coaches, athletes and parents, and potentially students, referees and teachers. Hendricks et al. [22] described tackle knowledge, attitudes and training behaviours of youth rugby union coaches, identifying those informal resources could be used as a key target area to educate coaches on tackle technique. In addition, the ability of a coach to teach tackle technique is dependent on their perceived competency of the skill [22]. Perhaps the findings from this study could be implemented in the area of concussion education, with informal concussion educational resources increasing coaches' perceived competency

Table 4: Post-intervention exit questions and answers.

No.	Statement/Question	Answers (% Selected)
1	The time it took the watch the video was:	Just right (86.1%) Too long (13.0%) Too short (0.9%)
2	Do you feel like an animated video is an appropriate way to deliver materials on concussion education?	Yes (90.2%) No (2.8%) Unsure (7.0%)
3	Would you be willing to watch this video again in the future to maintain your knowledge on concussion?	Yes (83.3%) No (2.3%) Unsure (14.4%)
4	Do you feel this intervention would take away from team training time?	Yes (1.4%) No (94.9%) Unsure (3.7%)
5	How do you think this video would be received if presented to your team?	Positively (80.5%) Negatively (1.4%) Unsure (18.1%)
6	Do you think you could recognise a concussion after it has occurred during a game?	Yes (61.4%) No (3.7%) Unsure (34.9%)
7	Do you think you would know what to do if an athlete was concussed during a game?	Yes (67.9%) No (8.8%) Unsure (23.3%)
8	In the absence of a medical professional, if an athlete is suspected of suffering a concussion, which action would you take?	Assess for signs and symptoms and make decision (52.1%) Contact emergency services (42.8%) Unsure/Other (5.1%)

in dealing with a suspected concussive incident. Hendricks et al., [22] also acknowledge the importance of formal training tools and practical sessions for improvement of coaches' knowledge and attitudes. Unlike many other concussion educational pieces, the developed tool does not require a trained individual to present it and has a total run time of less than five minutes. The answers to exit questions reaffirmed the potential for the video as a repeatable tool, perhaps as an annual pre-season booster for CK.

Despite the apparent strengths of the video as an educational tool, considerations need to be made for Gaelic games participants. Perhaps a declarative educational approach alone is not appropriate for a population that may not have received any formal concussion training prior to engaging with this video. A multi-level approach within these communities (e.g. schools and Gaelic games clubs) targeting all those involved in sport may encourage reporting and appropriate management of concussions [23]. The implementation of education materials based on procedural learning alongside existing types of tools may result in more success [24]. Including this video as part of a larger training module with specific activities aimed at improving coaches' and teachers' ability to identify and remove an athlete with a suspected concussion from training or a match may help foster a safer sporting culture within Gaelic games towards concussion. Activities such as role-playing suspected concussive scenarios and outcomes may develop the skills required to identify concussions through procedural learning. Parents could also benefit from a multi-level approach, with 70% of parents worrying about how they handled their most recent concussion event [19]. Providing parents with the skills to implement return to play and education protocols may decrease this worry and improve their ability to aid their injured child's recovery.

Concerns were raised by participant answers to exit question eight, where 52.1% of participants reported that they would assess an athlete suspected of suffering a concussion for signs and symptoms of the injury and then make a decision on whether they should return to play. Only 42.8% of participants reported that they would contact emergency services in this situation, which is the recommended action by the Concussion Recognition Tool 5 (CRT5) in the absence of a trained medical professional [25]. As previously mentioned, O'Connor et al., [19] highlighted that in Gaelic games, adolescents reported medical professionals are present at only one in 10 matches and one in 50 training sessions. The CRT5 is promoted in the concussion guidelines of governing bodies for rugby union, soccer, Gaelic football and hurling/camogie in Ireland [26]. In order to avoid the potential encouragement of non-medical professionals from assessing whether an athlete who is suspected of suffering a concussion is fit to return to play, it is recommended that the most up to date concussion management protocols (SCAT5 and CRT5) are named and explained in-depth in any workshops or training course that this animated video is included in [27,28].

Conclusion

An accessible repeatable concussion education tool in the form of an animated video can improve CKI and CAI scores immediately after viewing. The long-term effects of the video tool remain unknown. This declarative learning tool does not appear to improve the attitudes of those involved in Gaelic football towards concussion. Gaelic games communities could benefit from a multi-level approach to concussion education, leading to a safer sporting environment for athletes as a result. Mandatory concussion education training from Gaelic games governing bodies should be implemented.

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