Journal of School Health

JOURNAL OF SCHOOL HEALTH

RESEARCH ARTICLE OPEN ACCESS

Slipping Through the Cracks? Concussion Management in Aotearoa New Zealand Secondary Schools

Danielle Salmon[1] | Marelise Badenhorst[2] | Anja Zoellner[2] | Debbie Skilton[2] | Kate Mossman[3] | Patricia Lucas[2] | Kylie Thompson[2] | Simon Walters[2] | Sierra Keung[2] | Gisela Sole[3]

[1]Injury Prevention and Player Welfare, New Zealand Rugby, Wellington, New Zealand | [2]Sports Performance Research Institute New Zealand, School of Sport and Recreation, Auckland University of Technology, Auckland, New Zealand | [3]Centre of Health, Activity, Rehabilitation Research, School of Physiotherapy, University of Otago, Dunedin, New Zealand

Correspondence: Gisela Sole (gisela.sole@otago.ac.nz)

Received: 8 September 2024 | **Revised:** 27 November 2024 | **Accepted:** 17 December 2024

Funding: This work was supported by Otago Participatory Science Platform.

Keywords: adolescent | concussion | implementation | secondary schools

ABSTRACT

Background: Concussion-related guidelines appear to be inconsistently implemented in secondary schools in Aotearoa New Zealand. The purpose of this qualitative Participatory Action Research study was to describe key school stakeholders' perceptions of their current concussion management processes.

Methods: Seventeen focus groups, two dyad, and nine individual interviews were conducted with stakeholders ($n = 95$) from six secondary schools and healthcare clinics, exploring their perceptions of barriers and facilitators to concussion management. We used thematic analysis to analyze data.

Results: Our analysis identified five overarching and inter-relating themes: Hit or miss, the need for a clear pathway; the school context; aligning attitudes and enacting values; concussion knowledge and education; and complexity of concussion. The effectiveness of concussion management in secondary school settings is shaped by the dynamic interaction of these five themes.

Implications for School Health Policy, Practice, and Equity: These findings highlight the need to develop a context-sensitive framework that can assist schools with real-world implementation of concussion management guidelines, for both sports and non-sports related concussions.

Conclusions: The intent to support students was evident among most stakeholders yet appeared to be limited by lack of structured processes to follow, resources, unfavorable attitudes towards concussion management, and lack of knowledge.

1 | Introduction

Sport and recreation-related concussions are a global health concern and prevalent among children and adolescents [1–4]. In the United States, estimates of concussion prevalence have been reported to range from 3.6% to 7.0% for children ages 3–17 years and from 6.5% to 18.3% for adolescents 13–17 years [4]. Concussions can include a range of symptoms, such as headaches, dizziness, light sensitivity, and fatigue [5]. Students with concussion may have difficulties with concentration, meeting demands of school and sport, and managing their emotions [6–8]. Compared to adults, recovery from a concussion typically takes longer for children and adolescents, with some students taking up to 4 weeks or longer to recover [6, 9, 10]. Premature return to learning and sport/activity can compound recovery while early, efficient, and individualized care is associated with

faster post-concussion recovery [6, 11–13]. Children and adolescents with multiple concussions or persisting symptoms after concussion appear to be at risk for symptoms of depression, poor mental health, and cognitive impairment [14–17]. Timely and effective concussion management is of paramount importance.

Over a 12-month period (2021/2022), the Accident Compensation Corporation (ACC, New Zealand's no-fault personal injury scheme) data showed 37% of all concussion claims were incurred in the age group ≤19 years [18]. Of those claims, 45% were incurred through sports [18]. Rugby union[1] (henceforth rugby) had the highest contribution for sports-related concussions (39%), followed by soccer (football) (9%) and rugby league[2] (7%) [18]. In 2018, New Zealand Rugby (NZ Rugby) developed a community Concussion Management Pathway to support players following this injury [19, 20]. The pathway was implemented and evaluated across four geographically and socio-economically diverse provincial unions (rugby regions). The program focused on supporting players' return to sport, but across all four regions, players often reported facing challenges with returning to learning in school [21].

There has been increasing research surrounding both sports-related concussions, return-to-play (RTP) and return-to-learn (RTL) strategies. For example, in college athletics in the United States, the National Collegiate Athletic Association (NCAA) Concussion Safety Protocol has been implemented, which includes pre-season athlete education, concussion diagnosis, post-injury management, and return to play guidelines [22]. The implementation of this protocol have shown improvements in concussion management, and reduced the risk of repeat concussions [22]. Similarly, the Canadian Guideline on Concussion has been associated with improved awareness and concussion identification [23–25]. Less is known about outcomes specific to RTL and more research is needed on the actual implementation of RTL strategies [26, 27].

What is known from the literature is that RTL should include cognitive rest, academic adjustments, and gradual return to cognitive activities guided by symptoms [6, 11]. Barriers to successful implementation of RTL guidelines include the lack of a primary contact person in the school setting, limited knowledge and education, poor communication between stakeholders, and a lack of resources [28–31]. Despite concussion-related guidelines being available from the New Zealand (NZ) Ministry of Education [32], they appear to be implemented infrequently in schools [21].

Greater understanding is needed of challenges faced by NZ secondary schools in implementing post-concussion RTL and RTP guidelines. The overarching aim of this project was to develop a framework for managing concussions in NZ secondary schools to support safe RTL and RTP for all students. Schools are complex systems with many interrelated "sub-systems," including the people, resources, policy and processes, curricula, and socio-economic and cultural factors [33–35]. The development of a concussion management would require input and co-design from a range of stakeholders and would need to be flexible enough to consider the various contextual considerations for both students and schools. This is particularly important in New Zealand, where self-governing schools have significant control over their own policies and operations [36]. The purpose of this study was to describe key stakeholders' perceptions of the current concussion management processes in their schools in preparation for co-developing a context-sensitive, adaptable framework for NZ schools.

2 | Methods

2.1 | Positioning and Philosophical Assumptions

Individual epistemic differences and difficulties can arise when working as large, interdisciplinary teams [37]. In this team, we represented experienced qualitative researchers (MB, KM, SW), a physiotherapy researcher (GS), indigenous researcher (SK), exercise scientist (DSa), and emerging researchers (AZ, DSk, PL, KT). We therefore integrate different ways of knowing, research methodologies, and disciplinary cultures. We first agreed on the problem and how to address it effectively, then identified team roles and responsibilities, and established clear lines of communication and processes to work as a team in this research [38]. As a collective, we situate this study within a pragmatic paradigm, focused on solving real-world problems in a practical way [39]. As a paradigm, pragmatism is outcome orientated, values the importance of context, and chooses the most practical methods within these contexts to gain useful knowledge [39, 40].

2.2 | Design

This qualitative study forms part of a broader project that collectively follows a Community-Based Participatory Action Research (CBPR) approach [41]. CBPR is a consensus-based approach [39], entailing multidisciplinary partnerships with communities, inviting stakeholders to reflect on challenges they experience and to provide solutions in their context, instead of researchers recommending solutions [42].

2.3 | Participants

In 2021, six socio-economically diverse secondary schools in Auckland and Otago (New Zealand), who had been part the NZ Rugby Concussion Management Pathway initiative, were invited to participate (Table 1). These schools were selected on the basis of diversity of socioeconomic, ethnic, sex, and geographic area of NZ. Auckland (North Island) is the largest New Zealand metropolitan area with 1.7 million people and more than 200 secondary schools; Dunedin (South Island) has a population of 133,000 people and 12 secondary schools. Secondary schools in New Zealand typically serve students from Year 9 to Year 13, ranging in age from approximately 13–18 years. School representatives were asked to forward project information to students who had sustained a concussion and their parents, relevant school administration (sports programme coordinators/directors, heads of school, boarding school staff, coaches, and teachers) and healthcare professionals (nurses, physiotherapists, and medical doctors). The details of those who agreed to participate were forwarded to the research team. Consenting participants were allocated to focus groups or individual interviews based on their role (parent, student, teacher, administrator, sports director or coach, and healthcare professional), and by school.

TABLE 1 | School decile and ethnicity data for 2021.

School	Gender	Decile[a]	Māori (%)	Pasifika (%)	Asian (%)	NZ European (%)	Other (%)	School population
School 1	M	10	12	1	5	75	7	532
School 2	M	7	20	8	6	63	4	895
School 3	F	8	15	5	6	63	10	716
School 4	M/F	6	14	18	20	41	7	3052
School 5	M/F	1	24	72	0	2	2	376
School 6	M	9	14	7	8	65	5	815

[a]Decile: Measures the extent to which students live in low socioeconomic communities. Decile 1 schools are the 10% of schools with highest proportion of students from low socio-economic communities.
Abbreviations: M: male; F: female.

2.4 | Instrumentation

Interview/focus group guides, tailored to respective stakeholder groups, were developed by our interdisciplinary research team (Data S1). Questions explored (a) attitudes, beliefs and perceived responsibilities around concussion; (b) perceptions around how concussion was supported and managed within the school; and (c) suggestions for concussion support in future.

2.5 | Procedure

Individual interviews were conducted when logistics did not enable inclusion of these stakeholders in a focus group (Table 2). Seventeen focus groups (min–max: 3–12 participants, median four participants, median duration 54 min), two dyad interviews (median duration 35 min), and nine individual interviews (median duration 40 min) were conducted with stakeholders ($n = 95$). The combination of both methods of data collection was employed to facilitate maximum inclusion of participants across different stakeholder groups. The focus groups and interviews were held at the respective schools or clinics at a time that was convenient to the participants.

2.6 | Analysis

Audio-recordings were transcribed verbatim using REV transcriptions, verified by research team members, and organized in NVivo V20 (QSR International). Reflexive thematic analysis was used for data analysis [43]. The process started with two researchers familiarizing themselves with the data, by reading the transcripts and making notes about potential codes. Two coders (MB and KM) independently coded a subset of transcripts and discussed the coding of each transcript to test assumptions and discuss meaning. The remaining transcripts were divided and coded by the respective coders. The coders discussed codes until all transcripts were coded, and iteratively organized codes into categories and preliminary themes. Preliminary themes were developed, reviewed and refined until the coders were satisfied the themes were coherent and distinctive. The coders' data understanding was then discussed with the broader research team, and refined until the team was confident the themes comprehensively described the data. Discussions with project members and academic peers were held to consider different perspectives within the analysis and to enhance trustworthiness. Data S1 provides additional details around the methodology.

TABLE 2 | Stakeholder groups included in study.

Stakeholder group	*N* (male/female)
Representatives from regional sports organizations	7 (2/5)
Teachers	20 (8/12)
Sports coordinators	5 (1/4)
School administrators	6 (4/1)
Sports coaches	5 (4/1)
School nurse	1 (1/0)
Parents	7 (2/5)
School boarding house supervisory staff	6 (3/3)
Students (between ages 13–18)	15 (12/3)
Healthcare professionals external to schools	11 (5/6)
General practitioners	3 (3/0)
Physiotherapists	3 (2 /1)
Occupational therapists	1 (0/1)
Nurses	2 (0/2)
New Zealand Rugby medical representatives	3 (2/1)
Total	95 (49/45)

3 | Results

Themes, sub-themes, and illustrative quotes are presented in Table 3. Figure 1 represents the main five themes and how these may act as facilitators for optimal concussion management.

3.1 | Theme 1: Hit or Miss—The Need for a Clear Pathway

This theme describes variable post-concussion student support at schools and the need for structured processes for return to learn, physical activity, and sports. While some students were managed and guided well, others "slipped through the cracks," receiving little or no academic accommodations or guidance (Quote 1). Clear communication lines and a key contact person, acting

TABLE 3 | Themes and illustrative quotes.

Theme	Sub-theme and illustrative quotes
1. Hit or miss—the need for a clear pathway to follow	1.1 Having (or not having) a clear guideline.
	Quote 1: There's a hell of a lot happening that we don't know about. And the thing is, we are dependent on say, it's a voluntary coach, say it's football and it's a parent. So it's really hard to get those lines of communication feeding back through. And if the parent doesn't think they've had a concussion, or deem it necessary. They don't always take them to an A&E. So they probably just slip through the cracks. (*Administrative staff*)
	Quote 2: I'd say it's very vague in terms of… it varies hugely. And often the school may not even know about a concussion that's happened outside school, even if it's within a school sport that has happened after-hours or at a weekend… and so a lot of schools have tried to bring that into their Health and Safety policies, recording accidents that happen within a school setting, but out of school time so then they can't be captured. But often that, again, comes down to individual schools, there's no actual kind of proper guidelines around that. (*Healthcare professional—Nurse*)
	Quote 3: I see a real gap in having the return to learn on the same track as the return to play. The return to play seems to be very clear, but the return to learn is non-existent from my experience. (*Teacher*)
	Quote 4: *Teacher 3*: So once again I would say rugby, there is a system there anyway so once again we refer to systems just like every other sport.
	Teacher 4: But like if it happened in football [soccer], we would want some note from parents to say that it has medically be cleared and you just sort of trust them.
	Quote 5: *Sport Director*: We felt that we got the good protocols in now, but it doesn't wrap around all the sport. That's one of my concerns at the start. You obviously have heard stories of, oh, we concussed. We're like, "Okay, stand down. Let's start the other." But someone else say, "Oh, they're playing for them on the weekend." You're like, "Whoa, whoa, whoa, hang on. We're on concussion protocols and this is going out the window."
	Coach: …you can play in different sports. You stood down from rugby, and you can still play touch and tennis, and all these other sports perhaps.
	1.2 Communication lines and good relationships
	Quote 1: …probably what is lacking, is the communication. That's communication between coaching staff to parents or coaching staff to School House… But I'm… lucky, in that the boys are very open with me. I get in on a Monday morning and they will come and tell me, "Hey, I've got a bit of a head knock", but I don't think anyone's checked him. (*Boarding house manager*)
	Quote 2: Like, does everyone really know? The senior leaders know. And it's put on all their KMAR notes [school's management platform]. I think the big one is what about those that are at a lower level [teachers not in leadership positions]? And I don't think that, communicated as much as to a classroom teacher, about the boy sitting in front of me, is that actually communicated? (*Teacher*)
	Quote 3: And you only see them twice a week. Once at training, if they show up, and during the game. And you're only hearing second hand if they're not right. I just get a text from my manager two hours before kick-off, saying, "She's out. She's out. She's got a head knock. She's got this, she's got that." And then you got to deal with it, (…). So you're relying on them to give you information on if they're okay (*Coach*).
	Quote 4: I think there's a lot of people involved, and everyone does have to work quite cohesively, and I guess trust the judgment of everyone. So, I obviously work directly with, say the concussion, medical side of things, but I'm also the person in the middle that is communicating between the doctors and the coaches. (*Physiotherapist*)
	1.3 Key contact persons (gatekeepers) and role-player's involvement
	Quote 1: So, on J's role, J is generally the first part protocol. She does get the phone calls from the parents saying, oh, he's not going to be in today. Cause he had concussion on Monday. So, she would probably feeds it forward to the deans. (*Teacher*)
	Quote 2: If they have a nurse in school can be a really good link person and the schools I've worked in, we had a good procedure for that, of who the people were to be notified and how to have a concussion register. Then when we got a concussion provider in, they were very good at obviously making that pathway and network in terms of return to learning how that was going to … what that was going to look like. I think often the ones that fell through the gaps were the ones that didn't get that, we weren't necessarily aware of, and yeah, I think awareness and communication are the key things along with parents, obviously pressure for kids to return back quicker and saying, oh yeah, well, we've been to the doctor, their son is all good. None of that whole pattern works. (*Healthcare professional- Nurse*)
	Quote 3: They made a plan for his assessments, just putting more time on them. And that was really good. So, I felt really confident. And what I liked about it is because concussion, you don't quite know. They actually allowed us to make the decision a bit, within reason. And that was awesome. They were just fantastic. (*Parent*)
	Quote 4: I think one thing I've been trying to fight for a couple of years was trying to get the information right with the parents. They say that they take the students, they take their children to the doctors, and we find out from the local clinical portal, they have not taken them at all. So that's one thing that we find out that's quite sad. (*School Nurse*)

(Continues)

TABLE 3 | (Continued)

Theme	Sub-theme and illustrative quotes
2. The role of school context, resources and environment	2.1 Healthcare links and support staff
	Quote 1: The [school] socioeconomic and demographic side of things is generally on that low to middle class family. Their families are out of town and a lot of [the students are] homestays. So, it's probably a really important point to note that, not everyone has that mum and dad team behind them. We've got a few boys that were staying with grandparents and had no phones. (. . .) I found that if players missed their concussion appointment or maybe the [concussion] clinic was full and they couldn't get in, it was often said, you can go to your GP. (. . .) that means a player now needs to be able to get to the GP. They need to be able to pay the GP . . . they need to be able to take time out of school to do this. And the GP needs have an appointment, which is also really hard at short notice. (*Physiotherapist*)
	Quote 2: The school nurses are a big one for me . . . we've built a strong relationship because it's an advantage to both of us, if they know what the house boys are doing, and I can lean on them when I need some help. (*Boarding house manager*)
	Quote 3: And so, I think the best thing that happened was having the concussion clinic that was free to go to. It was always on, same time, same nights. You knew if you had a concussion, you'd be booked in there. You'd see doctors who actually . . . I know all doctors know about concussion, but sports concussion is really specific, especially in this age group. And I feel like when they were seeing [GPs] and we had a couple other doctors in the previous years as well, that we were getting the latest evidence and the best advice moving forward, rather than them going to their [own] GP and just getting cleared because they said they were fine, which we did have one happen last year, which was really frustrating. (*Coach*)
	2.2 Schools' physical environment and resources
	Quote 1: So, I know like I've gone through quite a few whānau teachers because the teachers that I've had keep leaving. So, it's like I can't be bothered telling this teacher a whole other long story because it's just a lot of effort . . . My new teacher just doesn't know anything so I'll just . . . I just tell my other teachers, which they actually not even any of my teachers this year know that I still get headaches every day. (*Student*)
	Quote 2: Another challenge for me is the online learning component of schools, now. There's a lot of complete computer use. And of course, when students get transitioned back from a head injury, they have to limit their stimulation, their reading, their screen time. And so, what is sometimes challenging is how to have them in the school environment, feeling like they're part of learning, but they're not allowed to do some of those activities, but yet they need to be there to be socially connected. They're tired, there's a limit to screen time, limit to reading, all that sort of side of it. And because schools are more device heavy now, and a lot of learning is put on Google Classroom for kids to catch up on, you're creating screen time for people who can't be using their screens very often. (*Teacher*)
	Quote 3: But the other thing would be as well with a lot a technology and a lot of the modern schools being really, really noisy and finding their sensory overload with the student is getting bigger and being able to educate staff and parents that the kids aren't trying to be different, aren't trying to be special, but they do need [ear] plugs or . . . and all that sensory management . . . and getting that more acceptable in the schools. (*Physiotherapist*)
3. Aligning attitudes and enacting values	3.1 School culture and individual attitudes
	Quote 1: I don't know about other schools, but here, it's a bit like, people will share information, especially if it's around care. I think we're quite caring here at the school. Yeah, yeah, we all care, and we want to know if someone's okay or if they're not okay, what can we do to help? (*Administrative staff*)
	Quote 2: Like player F in our grade this year who clearly had concussion, mum doesn't speak English, dad wasn't in the country. Go and see mum. Mum, you got to go to a doctor. The kid who's concussed does the talking and low and behold, the doctor clears him. I'm like, you are not cleared. (*Boarding house staff*)
	Quote 3: You don't want a whole lot of kids going, I've got a headache and I'm not doing my math exam. As well, there's that piss take element that boys would push if given the opportunity . . . (*Teacher*)
	Quote 4: *Interviewer*: What would you like to see from your teachers? What could your teachers do?
	Student: Teachers like not expecting everything so quickly. So not expecting everything to go back to normal the second you go back to school. Maybe just giving us a few days to kind of readjust and everything, and same with the screens, like understanding that sometimes you can't be looking at your screen all the time. (*Student*)

(Continues)

TABLE 3 | (Continued)

Theme	Sub-theme and illustrative quotes
	3.2 Sporting culture and the role of rugby
	Quote 1: Yeah, the bad ones are when you don't actually know about it, the boys don't tell you. Sometimes a coach might get a boy back [on field] who probably shouldn't be going back on either. They're so competitive, the competitive nature of coaches, isn't it? (*Sport director*)
	Quote 2: But another aspect of that too, is the honesty of the parents. I'm always amazed at how many parents will tell you, "Oh no, no. They're fine. They're fine." It's like, "Well, no." Because we have had girls, and this is both at School 0′ and at representative level, where they've said, "Actually, no, they're fine. Oh no, no, no, the doctor, they just sign them off." And it's like, "Well, no. You've got one brain. You've got one chance for this to heal." Yeah, it almost seems, sometimes it'd be over consuming, that they think it is that sign of weakness. (*Teacher*)
	Quote 3: Because often you see coaches who are on the sideline and they're too busy worrying about the actual gameplay, but Teacher [name]'s always really good at scanning to see what's happening and stopping play and not getting into those discussions with girls who don't want to come off the field. And I think that's an ethos that [coach name] has worked really, really hard at building, within that team, as, "You're number one, your welfare's number one, and we have to . . . If you've had a head knock, it doesn't mean you've got a concussion, but we do need to take this seriously." (*Teacher*)
	Quote 4: I think, I don't say this very often, but I think rugby have really got it right, in terms of their return to play. That their, once you kick into that, there's no ifs and buts, it's you're on their pathway and that's just what has to happen. And I think that's really good in terms of guiding some of our stronger individuals and strong appearance in terms of that, "No, this is just what has to happen. We don't have any control over that. That's a much bigger body than us." (*Teacher*)
	Quote 5: Mean rugby player got concussed twice in one game. So, he came to us on a Monday. We noticed his observations didn't really match what the coach had said. So, we visited the coach. He actually clarified with us, he had a concussion, he was blacked out, but the student, from what he had said, he goes, "No, sir, I was all right. No, it's just a head bang. But I'm fine." Anything to avoid being excluded from sport. (*Nurse*)
	Quote 6: I mean, here's a wee example of a girl who was trying to convince me that she was allowed back to play basketball after her concussion. And I just was like, "No. No. Haven't had any authorization from anybody to say you're allowed back," because they're always trying to be back to normal. (*Teacher*)
4. The importance of concussion knowledge and education	4.1 Lack of understanding and need for more concussion education.
	Quote 1: Some teachers, I don't really think they know what a concussion truly is, and the impacts, and the ongoing impact. I think to some of the discussions I've had with teachers, where they say, "Oh, they don't really need a rest. They're just pulling the wool over your eyes. They're just putting it on," or, "Oh, well, how am I meant to try and chunk the work together? We've got an assessment coming . . . " So, it's their understanding around what a concussion is, what it looks like, what it presents like, and what the pathway to recovery actually is. And actually, probably education with the parents as well. (*Teacher*)
	Quote 2: I don't know. I wish as Parent 1 said, I think he said he watched E do her memory test, I think it would be a good insight to all of us parents, teachers, to actually watch something like that, from functioning well to not functioning at all. Probably I haven't seen it, because I just thought I'd sit in the car and wait, but he is a good parent, and goes in. (*Parent*)
	Quote 3: I would just say that, again, probably the breakdown would be when there isn't someone from the health clinic on, on the weekends. And then, it comes back to the dorms and then, if you're sending them home and then, you don't have an educated parent and you're trying to educate them . . . When I say educated, educated on concussion. (*Boarding house staff*)
	4.2 Concussion knowledge as facilitator to the RTL process
	Quote 1: I think the PE teachers are pretty good and like know more about it because they're involved with sport and it's very . . . it is more well known around sport now, but maybe just the senior leadership at school . . . Like some of them probably still won't know much about concussions. (*Student*)
	Quote 2: Most of the time after someone's sustained their concussion and say, they've gone through a concussion clinic, they have an appointment with me in the clinic the next week. We reiterate all the education they would've got from the doctors because generally they don't take it all in and they don't understand the full process. We talk about how we get from where we are now to getting back on the field. And with high school students, I also go through how you get back to being in the classroom. We talk a lot about brain breaks and time off screens, especially now that school is very screen dominant, which is something just to note. So yeah, so they get a bit of a proviso there from me. I will always advise that having any problems at all implementing brain breaks or taking time out of the classroom, to let me know. And if they let me know, I'll get in touch with Director of Sport and make sure that he talks to the head of year and gets that sorted. (*Physiotherapist*)
	Quote 3: So one of the things that I've done is just chunking the information together in really small components, so that they're able to have those rest breaks within the classroom as well, and have that downtime . . . but also allowing them to have that pass to come out of the classroom so they can have a break, an environment that has low stimulus . . . it's that awareness of knowing what you would expect a normal kid to have, in terms of concentration span, really dialing that back and giving them permission that it's actually okay. (*Teacher*)
	Quote 4: Knowing the signs of a concussion, learning how severe they can be, and how important it is to recover fully and not rush yourself. (*Student*)

(Continues)

TABLE 3 | (Continued)

Theme	Sub-theme and illustrative quotes
	4.3 The need for specific guidance of student recovery
	Quote 1: It would be nice to know how many days our kids are expected to stay home. I shouldn't have to try and guess. They say it's before return to play, and not sports blah, blah, blah. But they didn't say to me maybe they shouldn't be going back to the classroom for this many days, or doing half days, stuff like that, ease themself into it. I do believe that's something that needs to be communicated to all parents, because I'm not too sure. I'm not a professional. They don't really give us a timeline of what should be expected for them. I'm sort of chucking them into the deep end. (*Parent*)
	Quote 2: And then again, we're not the experts on what it looks like, and we'll do whatever we're told. If it says [he] needs to actually just only have this much he may need to close his eyes and put his head down or go walk around or whatever it may be. We manage that in the classroom. Just tell us what we have to do. (*Coach*)
	Quote 3: Were informed on what was told to them by the GP because none of us are experts. So it was what the GP had said, what it looked like and what their return to back to learning should be. And so it was made very clear to us that if he starts to feel tired, this is what he gets to do. He needs to limit screen time. And there was, there was set things that we were told. Clear guidelines from the health professional that what we needed to do. (*Teacher*)
	Quote 4: You know they give you the same routine where I find that I don't like that much, because it's sort of a serious injury, but they should be making it more aware to parent. They just say the same thing, but they should be making us think this is a long-term effect as the others has said. But they just want us to watch out for symptoms and if anything changes make sure you call 111 and then that's sort of that. So, that sort of bugs me a little bit every time also. I think that needs to change in New Zealand about concussions is that the way that medical practitioners approach it, because they [the students] are still young and the amount of head knocks they get it does end up long-term effects life-long. And that's something they should say, make us more aware of it rather than giving us the same spiel every time. (*Parent*)
5. The complexity of concussion influences the student's journey	5.1 A challenging condition to identify and manage
	Quote 1: What is severe enough for someone to have concern is part of the issue, which then goes back to the invisible injury. It keeps coming back to a lot of uncertainty around identification and knowing what is that injury that requires further assistance because it's very gray. Very gray area. (*Teacher*)
	Quote 2: I think we got both ends of the extreme in our group. And I think that'd be reasonably representative of the group, at a lower level anyway, where you've got the kids, like I'm sure one student had concussions this year, and you can't prove that he has, but you just know he's had 10 times the contacts of anyone else in the game, and half of them his head is at someone's feet. But he never at least outwardly displayed any symptoms. (*Teacher*)
	5.2 Navigating a concussion journey can be a difficult experience
	Quote 1: She went back to school it early after the first concussion, and she thought she would be right, she thought she'd be fine at school, but it was so busy with lots of girls walking and walking up stairs in the corridors and all that, and she just got very dizzy, and she was wobbly. And it was yeah, and so she had to come home. So, I think in hindsight it was probably too early for her to come back to school. (*Parent*)
	Quote 2: So when he had his mock exams, I think he had two 'non-achieves', hence the reason why he is sitting those exams. And he's had a bit of tuition from . . . after-school tuition from a couple of the teachers as well. So, he's confident that he'll pass them, but he's certainly not confident that he'll get merits, excellences, etc., like he was probably intending. (*Parent*)
	Quote 3: *Student P*: But I couldn't go on any laptops, as soon as I went on a laptop, I would get like a headache and then blurry vision, so I was like "This isn't worth it." So that's when I went and visited a concussion clinic at the summer rehab. *Interviewer*: Yep. *Student P*: And they slowly got me back into school and I was probably doing like normal schoolwork by maybe the seventh week I was at home. And then like I had two more weeks at home then I went back to school. It was a little bit hard to get used to, but it was okay.
	Quote 4: *Interviewer*: What did you learn about this past and experience that can be used to improve? *Student 1*: Making sure I don't rush back to school. Staying off devices and having regular breaks. Regular breaks during classes. And what I found was for a few days, doing next to nothing. *Student 3*: Coming back when I was ready, not when the teachers want me back. Taking time off necessary . . . taking the time to get enough rest and not putting yourself at risk of getting another head knock . . . And then also, just try not to stress about school. *Student 2*: Maybe its not the question, but quite a lot of schoolwork relies on screens and stuff. It would be very easy if you wanted to go unnoticed, and it's hard going from no workload to working regular in one day.
	Quote 5: I think for us, because we're quite thorough, we try to check on every day, just to make sure how they're doing. Especially with their mental health, because I know it does . . . These kids here, they live and breathe rugby. So, if any injury that limits them from the opportunity from becoming a star. So again, mental health does . . . It is real pivotal for these boys. So it's nice having a guidance counselor as well, who we keep in contact with. So, any students that's a bit down or quite sad that any of them missed the squad, they'll . . . Well, guidance counselor, easier to calm things down. (*School nurse*)

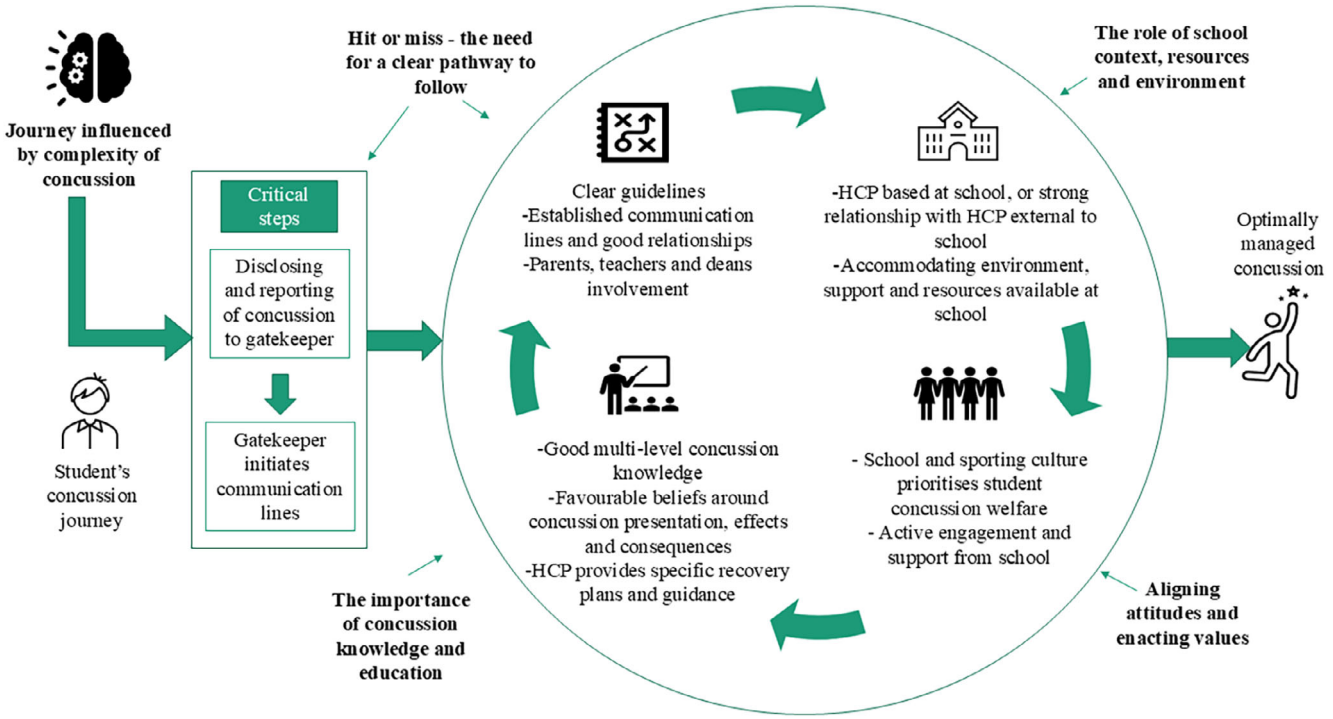

FIGURE 1 | Main themes (in bold) and facilitators to optimal concussion management in schools.

as a gatekeeper to initiate the process, were distinct facilitators (Figure 1).

Sub-theme 1.1. *Having* (*or not having*) *a clear guideline*. School staff reported a lack of policies/guidelines for the management of students with concussion. For schools with policies in place these were often not actioned or disjointed (Quotes 2), with the consequence that concussion often remained unnoticed and inadequately managed. RTP processes appeared to be more effective than "non-existent" RTL (Quote 3). The existing NZ Rugby Concussion Management Pathway was identified as a strong facilitator for medical management and clearance for RTP. For other sports, teachers appeared to rely on a trust model, accepting readiness to RTP based on parents' notes (Quote 4). Scenarios were reported, where students were stood down post-concussion in one sport while still participating in another (Quote 5). Participants voiced the need for consistency in RTP protocols across all sports.

Sub-theme 1.2. *Communication lines and good relationships*. Communication breakdowns were considered significant barriers for post-concussion support. Some described poor communication between the parents, the school, boarding houses or sports teams, including concussion non-disclosure (Quote 1). A process for concussion reporting to inform critical school staff appeared absent in most schools (Quote 2). Where such reporting processes existed, external coaches were often unaware of them (Quote 3) and did not always receive information from the school or healthcare professionals about, for example, their player's concussion stand-down period. Strong relationships across stakeholders facilitated reporting (Quote 4).

Sub-theme 1.3. *Key contact persons* (*gatekeepers*) *and role-players' involvement*. A key school contact person (administrative staff, nurses, deans, or special needs coordinators) that initiated took control, and coordinated communication about the RTL process was perceived vital (Quote 1). The roles played by other stakeholders (parents, healthcare professionals, and boarding house staff) were also important. Their combined actions facilitated and supported the recovery pathway, including the RTL plan, assessment accommodations, and follow-up with students (Quote 2). Involvement in RTL decision-making processes was appreciated by parents and students, enabling a sense of autonomy (Quote 3). RTL plans were facilitated by engaged teaching staff who initiated these plans and monitored the student. Parents taking initiative and responsibility for seeking healthcare and involvement in their child's recovery journey were facilitators. A major barrier reported by teachers and school administrators was lack of parent involvement or parents not being truthful about their children accessing (or not) healthcare (Quote 4).

3.2 | Theme 2: The Role of School Context, Resources, and Environment

The essence of this theme is the determining influence of the school's context and resources on the concussion management process. Healthcare professionals employed or associated with the schools, the school's physical environment and other available supportive resources may all influence concussion management.

Sub-theme 2.1. *Healthcare links and support staff*. Many participants perceived lack of access to a healthcare professional a major recovery barrier. In addition to access challenges, students and parents also reported difficulties around timeframe of the appointment, cost for transport to appointment and perceived poor communication between the school and healthcare

professionals. These barriers were especially evident for schools in lower socio-economic areas (Quote 1). In contrast, nurses, physiotherapists or well-functioning health clinics facilitated access to appropriate healthcare and RTL and RTP plans (Quote 2). Access to NZ Rugby concussion clinics were strong facilitators in some geographical areas (Quote 3).

Sub-theme 2.2. *Schools' physical environment and resources*. Resources to support students post-concussion were identified as either barriers or facilitators. Some schools reported having sophisticated communication platforms or sufficient staff facilitating communication and recovery support. Other schools had limited staff and high teacher turnover rates which created challenges in establishing supportive relationships (Quote 1). Access to school staff was reported as a challenge for player from lower-level sports teams who sustained a concussion.

Not all schools had supportive recovery environments, for example, not being able to modify screen use in the classroom, control of classrooms' light, noise, or availability of quiet rest areas for students with concussion were often lacking. Participants felt educating teachers on these important requirements would assist in the RTL process (Quote 3).

3.3 | Theme 3: Aligning Attitudes and Enacting Values

School culture was perceived important yet often conflicted for concussion management. Although the stated culture and values of the schools or sports teams prioritized and focused on student welfare, this did not always align with stakeholders' concussion attitudes and behaviors.

Sub-theme 3.1. *School culture and individual attitudes*. Participants valued relationships, communication and trust within the school, prioritizing student welfare and safety (Quote 1). Some schools actively supported, arranged, or encouraged parents to ensure that students attended a medical diagnosis assessment with a doctor and other relevant healthcare professionals, such as physiotherapists. This support was particularly important for households where parents were very busy, lived far away, or where language barriers existed.

In schools with boarding houses, a distinct culture of "being a family" was evident. Boarding house supervisory staff (often referred to as "parents") felt that trusting relationships with their students facilitated concussion disclosure and subsequent management. Boarding house staff also acted as mediators between parents who were second-language English speakers and other stakeholders involved in their students' concussion management or supported students with challenging backgrounds to manage their concussion (Quote 2).

Other participants reported lack of trust between teachers and students regarding their recovery. Some teachers felt students were not always truthful about their condition, and used it to avoid class attendance or exams (Quote 3). Conversely, some students reported feeling unsupported by teachers, needing more time/accommodations for their RTL process (Quote 4).

Sub-theme 3.2. *Sporting culture and the role of rugby*. Participants' perception of their schools' attitude towards sports varied and they suggested concussion management and reporting was dependent on the school's or sports team's culture or attitude. Some schools were described as performance- or competition-focused, others valued participation without over-emphasizing the need to win. Pressure to RTP at all costs resulted in non-disclosure or down-playing concussion symptoms by students, coaches and parent (Quotes 1 and 2). In contrast, participants also described parents, coaches, teachers, or teammates that took concussion reporting seriously and were potentially overly cautious in their reporting (Quote 3).

Rugby as a sport was perceived to have an important role in both positive and negative perceptions about concussion management. Many stakeholders thought that rugby was leading concussion awareness by providing a clear structure and process for the management of concussions (Quote 4). However, players also displayed "win at all costs" behaviors, for example, continued to train or play despite having sustained a suspected concussion, especially for important games (Quote 5). Such pressures and behaviors were also evident in other sports (Quote 6). Disparities around the implementation of concussion protocols and the enforcement of stand-down periods were discussed across different sports.

3.4 | Theme 4: The Importance of Concussion Knowledge and Education

This theme encapsulates varying beliefs around the presentation and consequences of concussions, lack of understanding, and need for concussion education. Participants valued specific guidance from healthcare professionals considered experts for the management of concussions.

Sub-theme 4.1. *Lack of understanding and need for more concussion education*. Participants were concerned about general lack of understanding by all stakeholders of the seriousness of concussion, potential long-term consequences, concussion management, recovery, and the RTL and RTP processes (Quote 1). Parents reported feeling unsure and overwhelmed regarding the required steps to support a child that has sustained a concussion, (Quote 2). Lack of access to care, particularly over weekends, was concerning for teachers and boarding house staff, often compounded by parents' lack of knowledge (Quote 3). Concussion education before an incident occurred was suggested as a proactive approach.

Students reported that when concussion recovery information had been shared with them verbally during the medical assessment they found it difficult to retain and then communicate this information with parents or schools. This highlights the importance of having parents or a support person attending the diagnosis appointment. Parents felt that being provided with information around required processes to support their child's recovery, guesswork was reduced, and this increased their confidence.

Sub-theme 4.2. *Concussion knowledge as facilitator for RTL processes*. Having good concussion knowledge was considered an important facilitator for successful RTL. Stakeholders with more concussion exposure, such as physical education teachers and coaches, were considered to have more knowledge

around concussion management and were allies for students' RTL (Quote 1). Similarly, general practitioners (GPs) and physiotherapists who were knowledgeable about concussions facilitated the diagnosis, recovery management and safe RTL and RTP (Quote 2). Some teachers described specific strategies or accommodations for students with concussion, such as the option of paper-based work instead of using online learning devices, low stimulation and chunking work, extensions on assignments, and being attentive to the individual student's support requirements (Quote 3). Teachers reported that students with good concussion knowledge could self-manage their own symptoms, for example, by recognizing when they needed a break. This sentiment was shared by students who believed a symptom-guided approach was most important for RTL (Quote 4).

Sub-theme 4.3. *The need for specific guidance for student recovery*. Teachers, coaches and parents noted that they needed guidance as "they were not concussion experts" (Quote 1). Compared to student- or parent-only communication, specific advice from the healthcare professionals directly to teachers gave confidence about the student's concussion status and required strategies (Quote 2). Guidance from healthcare professionals to teachers was a strong facilitator for RTL management (Quote 3). However, parents and teachers felt that individual-specific guidance for academic accommodations and recovery strategies were often lacking. They found the value of non-specific "generic advice" often had limited practical application (Quote 4).

3.5 | Theme 5: The Complexity of Concussion Influences the student's Journey

The nature, severity and presentation of concussion affect the student's journey, from recognition and reporting, to dealing with the RTL process (Figure 1).

Sub-theme 5.1. *A challenging condition to identify and manage*. The complex nature, "invisibility" and variable symptom presentation and recovery of concussions within-school management are challenging (Quote 1). "Milder" concussions were considered problematic as these students were not always recognized or managed correctly, often resulting in prolonged recoveries. In mild cases, initiation of treatment depended on student disclosure which did not always materialize (Quote 2). Teachers reported that subtle behavior changes or symptoms were not easily identified if they did not know the student well; symptoms could be masked or confused with typical symptom presentation of teenagers, for example fatigue and mood swings.

Sub-theme 5.2. *Navigating a concussion journey can be a difficult experience*. Some students and families had experienced difficult RTL processes, challenging symptom presentations when dealing with the fast school pace (Quote 1). The cognitive impacts of concussion often resulted in poorer academic performance during assessments and required extra tuition (Quote 2). The exposure to screens was a major challenge for students, both socially and academically. Overall, students found clear, gradual RTL plans benefitted their recovery (Quote 3). Supportive teachers, family and friends were perceived to have a pivotal role in facilitating the recovery process. When students were asked what advice they would give peers with a concussion, the consensus was to take the recovery slowly (Quote 4). Teachers and coaches also noted that a concussion diagnosis and the need for rest and removal from sports could negatively impact students' mental well-being. In this respect, guidance counselors were identified as valuable in providing support (Quote 5).

4 | Discussion

We explored key stakeholders' perceptions of current concussion management processes in NZ secondary schools. Five main themes were developed from the data: (1) hit or miss—need for a clear pathway to follow; (2) the role of school context, resources, and environment; (3) aligning attitudes and enacting values; (4) the importance of concussion knowledge and education; and (5) the complexity of concussion influence the student's journey. Participants described highly variable concussion management in their respective schools. Cognitive, emotional, and physical consequences of concussions interfere with adolescents' educational performance [44]. A supportive environment, a tailored recovery plan, and students communicating and self-managing their symptoms were identified as important. Stakeholders reported that best-practice principles were not always implemented or maintained due to several challenges.

Lack of or inconsistently implemented guidelines were reported; most concussions were managed on a "case-by-case" basis. While an individualized approach is important for concussion management processes [6], an implementation plan and framework is necessary to ensure processes are in place [13, 29, 45]. Successful concussion policy implementation can contribute to enhanced concussion awareness and improved concussion identification in schools [46]. "Brain 101" in the United States consists of a web-based guide on effective practices in concussion management [47]. Similarly, "Get Schooled on Concussions" was developed for teachers to manage concussions in the classrooms [48]. Despite the availability of high-quality evidence-based guidelines for RTP and RTL [5, 6], lack of implementation of RTL protocols in schools appears to be common internationally [29, 30, 49, 50].

Underlying tenets of effective concussion management include students' willingness to disclose their suspected concussion symptoms and effective communication between all stakeholders [30, 51, 52]. Strong relationships and communication between teachers and students are associated with better student outcomes [53]. Similarly, within healthcare, clear inter-disciplinary roles and effective communication are core competencies for patient-centered collaborative practice [54]. Maintaining these relationships and building new relationships with relevant stakeholders may be important, in addition to the "nuts and bolts" of getting a policy in place, or establishing reporting lines. Lack of clear communication pathways between students, parents, the school, and healthcare professionals and of defined stakeholder roles are likely to hamper the RTL and RTP processes [30].

In our study, several participants reported a disconnect between school stakeholders, citing a high staff turnover of teachers, volunteers, and coaches as a major contributor. To minimize this disconnect, pre-determined lines of communication should be developed to facilitate the engagement of all relevant stakeholder

groups as part of an implementation framework to prevent students from "slipping through the cracks." [30, 31, 55].

A precursor to effective communication is having sufficient concussion knowledge [52]. Some school staff felt frustrated with the lack of parent engagement or when not being sent formal notification about a student's suspected or confirmed concussion. Parents identified their own lack of knowledge regarding concussion management as a challenge, also expressing similar frustration when teachers were unaware of concussion symptoms and the required academic accommodations, as reported elsewhere [56, 57]. Schools' concussion policies should include the provision of education across multiple stakeholder groups, including teachers, staff, parents, coaches, and students [45]. Challenges such as a lack of clear guidelines for content, strategies for sustainability of the education delivery and the need for long-term evaluation of outcomes must be considered [58].

Knowledge alone does not predict favorable concussion behaviors [59, 60]. Attitudes around concussions are also important to initiate and sustain a process [61–63]. Although participants reported cultures within their school that fostered relationships and student welfare, the translation of these for concussion support varied. For example, the onus of reporting a concussion to the school relies on the student and parent. However, students were often reluctant to disclose their symptoms, or parents downplayed the seriousness of the incident or expedited their child's RTP. Non-disclosure of a concussion delays or prevents early formal diagnosis, access to healthcare and school's plans to support students which can results in a prolonged recovery. Knowledge of risks associated with concussion and post-concussion processes may facilitate favorable attitudes towards disclosure, and address unfavorable cultures in sport that drive playing with injury, winning at all cost, and not putting student welfare first [61, 64–66].

Post-concussion referral to appropriate healthcare professionals is critical for diagnosis and recovery [6, 45]. In this study, efficient access to healthcare professionals was identified as key facilitator for concussion management. Some schools had a physiotherapist or nurse based at the school. A diagnosis by a medical doctor is required to access funded concussion healthcare in NZ, yet such access is currently unequitable [21, 67–69]. Some students had timely access to concussion clinics through NZ Rugby Concussion Management Pathway [19, 70]. For others, access to GPs was delayed or lacking, alternatively, some GPs were reported to have had insufficient concussion knowledge and expertise, as found elsewhere [68, 69, 71]. Strategies to enhance healthcare professionals' concussion expertise, inter-disciplinary care, and equitable access to trained clinicians are needed.

4.1 | Implication for School Health Policy, Practice, and Equity

Under the 1989 Tomorrow's Schools reforms, NZ schools became self-managing [36], decentralizing decision-making and providing schools with control over their operations and policies [36]. While this autonomy allows schools to tailor concussion management to local needs, it also presents challenges. Without a national framework, schools face difficulties establishing and maintaining consistent protocols. Limited government involvement further complicates effective policy enactment [36], leading to disparities in resources, expertise, and practices across schools. It was thus important to select schools from diverse socioeconomic levels (in 2021, defined by school decile levels, Table 1).

Unlike more centralized systems in other countries where a top-down approach might facilitate standardized guidelines, backed by national support and resources [72], NZ's self-managing model needs to strike a balance between autonomy and the need for evidence-based protocols and resources, particularly in student well-being. School leaders need to ensure school policies and guidelines are published, implemented, and sustained [73].

The findings of this study suggest that a concussion framework should be simple, easy to follow, robust, but flexible and adaptable, particularly due to the complex and individual-specific nature of concussion. Framework sustainability will depend on human resources (administrators, teachers, coaches, and healthcare access), physical resources (e.g., quiet rooms for rest periods), and adaptability of teaching and learning for academic accommodations. We specifically selected schools with different ethnicity diversity, as outlined in Table 1. Geographic, cultural, and community-specific factors need to be considered.

Clear channels of communication between parents, students, and school and sport staff should be established as part of this framework. Our findings highlight that it is important to identify a key school contact person acting as gatekeeper to inform relevant school stakeholders of a student's suspected concussion. Teachers should be well positioned to identify changes in a student's academic performance and behavior, thereby recognize potential undiagnosed concussions, besides assist students' RTL processes and recovery [74]. Our findings also suggest that education for teachers about concussion and management should be improved. A supportive school environment is needed to improve students' confidence to report their symptoms [49,75]. Parents and coaches also play a critical role in cultivating favorable disclosure behaviors, emphasizing the need for a culture change around concussion disclosure [62,76].

A large number of pediatric and adolescent concussion is not sports-related [2]. In our study, students with a rugby-related concussion had access to NZ Rugby's concussion clinics, but those sustained in other sports or non-sports related incidences reported sub-optimal access to GPs. In NZ, GP consultations are critical for access to government-funded concussion rehabilitation, particularly for students developing persistent symptoms [77]. Further work is required at local and national levels to improve access to affordable healthcare following concussions [67]. At school level, relationships with healthcare providers should be established to provide oversight for students while waiting for GP appointments. School nurses can play an important role in concussion management, but dedicated efforts are required to establish this role within the school's policy and processes [78–80].

Education of all stakeholders across the school system is necessary. Students should be empowered and educated to enhance their willingness and ability to report and self-manage

their symptoms. Fostering trusting relationships between students and their teacher, parents and coaches would enhance buy-in and support for students recovering from their concussion. Finally, no framework will be successful without disclosure. Changing attitudes and beliefs, and overcoming challenges with the reporting of concussion should remain the key priority.

4.2 | Limitations

We recruited participants from schools with students from diverse ethnicities and socioeconomic levels, but based only within urban areas. Further engagement is needed with diverse cultural communities to develop a framework that is adaptable to individual schools' contexts in terms of the people they serve and available resources.

5 | Conclusion

Our findings suggest optimal concussion management is inconsistent in NZ secondary schools with many students "slipping through the cracks," highlighting a need to develop and implement specific frameworks. Participants emphasized the importance of good communication, strong relationships between stakeholders, and access to and guidance from healthcare professionals for concussion management in schools. These factors were often identified as challenges or distinct barriers. The desire to support students was unanimous, yet the practical application was limited by resources, unfavorable attitudes, and lack of knowledge. The results from this study will guide the development of a management framework to support the implementation of concussion guidelines in schools and support the safe RTL and RTP for all students, regardless of their concussion mechanism.

Acknowledgments

This work was supported by the Otago Participatory Science Platform, Dunedin, NZ and the NZ Rugby Foundation. We would like to thank the five participating schools and medical clinics for their support for this study, and all the participants who volunteered to take part. Open access publishing facilitated by University of Otago, as part of the Wiley - University of Otago agreement via the Council of Australian University Librarians.

Ethics Statement

Ethical approval for the study was obtained from the University of Otago Human Ethics committee (HE21/004). Written informed consent was obtained from all participants prior to the interviews, including parents/caregivers for students aged < 16years.

Conflicts of Interest

The authors declare no conflicts of interest.

Endnotes

[1] Rugby union and rugby league are two different forms of rugby each with their own set of rules and characteristics. Rugby union has 15 players while rugby union has 13. Rugby league tends to be a faster paced game with more open space and fewer players to contest possession of the ball. While rugby union tend to be more physical with more tackling for possession of the ball.

[2] Ibid.

References

1. J. van Ierssel, M. Osmond, J. Hamid, M. Sampson, and R. Zemek, "What Is the Risk of Recurrent Concussion in Children and Adolescents Aged 5–18 Years? A Systematic Review and Meta-Analysis," *British Journal of Sports Medicine* 55, no. 12 (2021): 663–669, https://doi.org/10.1136/bjsports-2020-102967.

2. J. Haarbauer-Krupa, K. B. Arbogast, K. B. Metzger, et al., "Variations in Mechanisms of Injury for Children With Concussion," *Journal of Pediatrics* 197 (2018): 241–248.e1, https://doi.org/10.1016/j.jpeds.2018.01.075.

3. A. Theadom, S. Mahon, P. Hume, et al., "Incidence of Sports-Related Traumatic Brain Injury of All Severities: A Systematic Review," *Neuroepidemiology* 54, no. 2 (2020): 192–199, https://doi.org/10.1159/000505424.

4. J. Haarbauer-Krupa, L. A. Lebrun-Harris, L. I. Black, et al., "Comparing Prevalence Estimates of Concussion/Head Injury in U.S. Children and Adolescents in National Surveys," *Annals of Epidemiology* 54 (2021): 11–20, https://doi.org/10.1016/j.annepidem.2020.11.006.

5. J. S. Patricios, K. J. Schneider, J. Dvorak, et al., "Consensus Statement on Concussion in Sport: The 6th International Conference on Concussion in Sport–Amsterdam, October 2022," *British Journal of Sports Medicine* 57, no. 11 (2023): 695–711, https://doi.org/10.1136/bjsports-2023-106898.

6. M. Putukian, L. Purcell, K. J. Schneider, et al., "Clinical Recovery From Concussion–Return to School and Sport: A Systematic Review and Meta-Analysis," *British Journal of Sports Medicine* 57, no. 12 (2023): 798–809, https://doi.org/10.1136/bjsports-2022-106682.

7. T. C. Valovich McLeod, A. J. Wagner, and C. E. W. Bacon, "Lived Experiences of Adolescent Athletes Following Sport-Related Concussion," *Orthopaedic Journal of Sports Medicine* 5, no. 12 (2017): 232596711774503, https://doi.org/10.1177/2325967117745033.

8. A. N. Wan and A. S. Nasr, "Return to Learn: An Ethnographic Study of Adolescent Young Adults Returning to School Post-Concussion," *Journal of Clinical Nursing* 30, no. 5–6 (2021): 793–802, https://doi.org/10.1111/jocn.15617.

9. G. A. Davis, V. Anderson, F. E. Babl, et al., "What Is the Difference in Concussion Management in Children as Compared With Adults? A Systematic Review," *British Journal of Sports Medicine* 51, no. 12 (2017): 949–957, https://doi.org/10.1136/bjsports-2016-097415.

10. D. J. Thomas, K. Coxe, H. Li, et al., "Length of Recovery From Sports-Related Concussions in Pediatric Patients Treated at Concussion Clinics," *Clinical Journal of Sport Medicine* 28, no. 1 (2017): 56–63, https://doi.org/10.1097/JSM.0000000000000413.

11. J. D. Carson, D. W. Lawrence Md, S. A. Kraft Md, et al., "Premature Return to Play and Return to Learn After a Sport-Related Concussion: Physician's Chart Review," *Canadian Family Physician* 60, no. 6 (2014): e310–e315.

12. A. P. Kontos, K. Jorgensen-Wagers, A. M. Trbovich, et al., "Association of Time Since Injury to the First Clinic Visit With Recovery Following Concussion," *JAMA Neurology* 77, no. 4 (2020): 435–440, https://doi.org/10.1001/jamaneurol.2019.4552.

13. K. McAvoy, B. Eagan-Johnson, R. Dymacek, S. Hooper, M. McCart, and J. Tyler, "Establishing Consensus for Essential Elements in Returning to Learn Following a Concussion," *Journal of School Health* 90, no. 11 (2020): 849–858, https://doi.org/10.1111/josh.12949.

14. A. A. Ledoux, R. J. Webster, A. E. Clarke, et al., "Risk of Mental Health Problems in Children and Youths Following Concussion," *JAMA Network*

Open 5, no. 3 (2022): e221235, https://doi.org/10.1001/jamanetworkopen.2022.1235.

15. G. Manley, A. J. Gardner, K. J. Schneider, et al., "A Systematic Review of Potential Long-Term Effects of Sport-Related Concussion," *British Journal of Sports Medicine* 51, no. 12 (2017): 969–977, https://doi.org/10.1136/bjsports-2017-097791.

16. K. Russell, R. Walld, J. M. Bolton, D. Chateau, and M. J. Ellis, "Incidence of Subsequent Mental Health Disorders and Social Adversity Following Pediatric Concussion: A Longitudinal Population-Based Study," *Journal of Pediatrics* 259 (2023): 113436, https://doi.org/10.1016/j.jpeds.2023.113436.

17. K. Wilmoth, A. Tan, T. Tarkenton, et al., "Early Psychological Symptoms Predict Concussion Recovery Time in Middle and High School Athletes," *Journal of Clinical and Experimental Neuropsychology* 44, no. 4 (2022): 251–257, https://doi.org/10.1080/13803395.2022.2118676.

18. Accident Compensation Corporation, *Concussion/TBI Dataset* (New Zealand: Accident Compensation Corporation, 2022), https://catalogue.data.govt.nz/dataset/acc-concussion-tbi-data/resource/bd83401b-459b-4c51-9f15-d6b3b8c0c6b4.

19. D. Salmon, J. Romanchuk, I. Murphy, et al., "Infographic. New Zealand Rugby's Concussion Management Pathway," *British Journal of Sports Medicine* 54, no. 5 (2020): 298–299, https://doi.org/10.1136/bjsports-2019-100950.

20. D. Salmon, J. Sullivan, J. Romanchuk, et al., "Infographic. New Zealand rugby's Community Concussion Initiative: Keeping Kiwi Communities RugbySmart," *British Journal of Sports Medicine* 54, no. 5 (2020): 300–301, https://doi.org/10.1136/bjsports-2019-100949.

21. D. Salmon, S. Walters, J. Brown, et al., "Managing Concussion in the Real World: Stakeholder Perspectives of New Zealand Rugby's Concussion Management Pathway," *International Journal of Sports Science and Coaching* 19, no. 4 (2023): 1515–1530, https://doi.org/10.1177/17479541231218518.

22. M. McCrea, S. Broglio, T. McAllister, et al., "Return to Play and Risk of Repeat Concussion in Collegiate Football Players: Comparative Analysis From the NCAA Concussion Study (1999–2001) and CARE Consortium (2014–2017)," *British Journal of Sports Medicine* 54, no. 2 (2020): 102–109, https://doi.org/10.1136/bjsports-2019-100579.

23. Parachute, "Canadian Guideline on Concussion in Sport," 2017.

24. F. Damji and S. Babul, "Improving and Standardizing Concussion Education and Care: A Canadian Experience," *Concussion* 3, no. 4 (2018): CNC58, https://doi.org/10.2217/cnc-2018-0007.

25. G. Macartney, W. Chen, M. Vassilyadi, et al., "Effect of the ParachuteTM Awareness for Players Program on the Acquisition of Concussion Knowledge and Attitude in Children Who Play Soccer," *Canadian Journal of Neuroscience Nursing* 39, no. 1 (2019): 14–22.

26. A. M. Kemp and K. H. O'Brien, "Critical Elements of Return to Learn for Students With Concussion: A Scoping Review," *Journal of Head Trauma Rehabilitation* 37, no. 2 (2022): E113–E128, https://doi.org/10.1097/HTR.0000000000000695.

27. L. L. Thompson, V. H. Lyons, M. McCart, S. A. Herring, F. P. Rivara, and M. S. Vavilala, "Variations in State Laws Governing School Reintegration Following Concussion," *Pediatrics* 138, no. 6 (2016): e20162151, https://doi.org/10.1542/peds.2016-2151.

28. P. Wildgoose, D. Diep, A. Rendely, N. Kuwahara, and J. D. Carson, "Barriers to and Facilitators of Return to Learning Following a Sport-Related Concussion: Perspectives of Female Secondary School Students," *Canadian Family Physician* 68, no. 3 (2022): 203–210, https://doi.org/10.46747/cfp.6803203.

29. D. Anderson, J. M. Gau, L. Beck, et al., "Management of Return to School Following Brain Injury: An Evaluation Model," *International Journal of Educational Research* 108 (2021): 108, https://doi.org/10.1016/j.ijer.2021.101773.

30. J. Fetta, A. Starkweather, R. Huggins, T. Van Hoof, D. Casa, and J. Gill, "Implementation of Return to Learn Protocols for Student Athletes With Sport and Recreation Related Concussion: An Integrative Review of Perceptions, Challenges and Successes," *Journal of School Nursing* 39 (2021): 18–36, https://doi.org/10.1177/10598405211056646.

31. G. A. Gioia, A. E. Glang, S. R. Hooper, and B. E. Brown, "Building Statewide Infrastructure for the Academic Support of Students With Mild Traumatic Brain Injury," *Journal of Head Trauma Rehabilitation* 31, no. 6 (2016): 397–406, https://doi.org/10.1097/HTR.0000000000000205.

32. New Zealand Ministry of Education, Supporting Learners With Acquired Brain Injury Inclusive Education. (2019). Accessed September 20, 2023, https://inclusive.tki.org.nz/guides/brain-injury/.

33. M. Hawkins and C. James, "Developing a Perspective on Schools as Complex, Evolving, Loosely Linking Systems," *Educational Management Administration & Leadership* 46, no. 5 (2017): 729–748, https://doi.org/10.1177/1741143217711192.

34. A. Hulme, S. McLean, G. J. M. Read, C. Dallat, A. Bedford, and P. M. Salmon, "Sports Organizations as Complex Systems: Using Cognitive Work Analysis to Identify the Factors Influencing Performance in an Elite Netball Organization," *Frontiers of Sports and Active Living* 1 (2019): 56, https://doi.org/10.3389/fspor.2019.00056.

35. M. Walton, "Applying Complexity Theory: A Review to Inform Evaluation Design," *Evaluation and Program Planning* 45 (2014): 119–126, https://doi.org/10.1016/j.evalprogplan.2014.04.002.

36. C. Wylie, "New Zealand—Steering at a Distance and Self-Managed Schools," in *Educational Authorities and the Schools: Organisation and Impact in 20 States*, eds. H. Ärlestig and O. Johansson (Cham: Educational Governance Research. Springer International Publishing, 2020), 351–369, https://doi.org/10.1007/978-3-030-38759-4_19.

37. R. Freeth and U. Vilsmaier, "Researching Collaborative Interdisciplinary Teams: Practices and Principles for Navigating Researcher Positionality," *Science and Technology Studies* 33, no. 3 (2020): 57–72, https://doi.org/10.23987/sts.73060.

38. N. Schiess, V. Kulo, J. L. Dearborn, S. Shaban, C. E. Gamaldo, and R. M. E. Salas, "Cross-Cultural Chronotypes: Educating Medical Students in America," *Malaysia and the UAE. MedEdPublish* 9 (2020): 5, https://doi.org/10.15694/mep.2020.000005.1.

39. M. Savin-Baden and C. M. Major, *Qualitative Research: An Essential Guide to Theory and Practice* (England, UK: Routledge, 2013).

40. D. L. Morgan, "Pragmatism as a Paradigm for Social Research," *Qualitative Inquiry* 20, no. 8 (2014): 1045–1053, https://doi.org/10.1177/1077800413513733.

41. D. Salmon, M. Badenhorst, S. Keung, et al., "Designing, Implementing and Evaluating a Framework for Managing Concussions in New Zealand Secondary Schools: A Study Protocol," *New Zealand Journal of Physiotherapy* 51 (2023): S1–S9, https://doi.org/10.15619/nzjp.v51i3.276.

42. B. Smith and A. C. Sparkes, *Routledge Handbook of Qualitative Research in Sport and Exercise* (New York: Routledge, 2016).

43. V. Braun and V. Clarke, *Successful Qualitative Research: A Practical Guide for Beginners* (Thousand Oaks, CA: SAGE Publications, United Kingdom, 2013), https://books.google.com/books?id=EV_Q06CUsXsC&pgis=1.

44. R. Lowry, J. K. Haarbauer-Krupa, M. J. Breiding, S. Thigpen, C. N. Rasberry, and S. M. Lee, "Concussion and Academic Impairment Among U.S. High School Students," *American Journal of Preventive Medicine* 57, no. 6 (2019): 733–740, https://doi.org/10.1016/j.amepre.2019.08.016.

45. L. K. Purcell, G. A. Davis, and G. A. Gioia, "What Factors Must Be Considered in "Return to School" Following Concussion and What Strategies or Accommodations Should Be Followed? A Systematic Review," *British Journal of Sports Medicine* 53, no. 4 (2019): 1–15, https://doi.org/10.1136/bjsports-2017-097853.

46. L. D. Hachem, G. Kourtis, S. Mylabathula, and C. H. Tator, "Experience With Canada's First Policy on Concussion Education and Management in Schools," *Canadian Journal of Neurological Sciences* 43, no. 4 (2016): 554–560, https://doi.org/10.1017/cjn.2016.41.

47. A. E. Glang, M. C. Koester, J. C. Chesnutt, et al., "The Effectiveness of a Web-Based Resource in Improving Postconcussion Management in High Schools," *Journal of Adolescent Health* 56, no. 1 (2015): 91–97, https://doi.org/10.1016/j.jadohealth.2014.08.011.

48. Get Schooled On Concussions, "We Take the Guesswork Out of Return to Learn for Teachers Post-Concussion!" Accessed August 26, 2024, https://www.getschooledonconcussions.com/.

49. K. Sarmiento, Z. Donnell, E. Bell, and R. Hoffman, "From the CDC: A Qualitative Study of Middle and High School professionals' Experiences and Views on Concussion: Identifying Opportunities to Support the Return to School Process," *Journal of Safety Research* 68 (2019): 223–229, https://doi.org/10.1016/j.jsr.2018.10.010.

50. K. P. Snedaker, J. P. Lundine, A. H. Ciccia, M. N. Haider, and K. H. O'Brien, "Gaps in Concussion Management Across School-Aged Children," *Brain Injury* 36, no. 6 (2022): 714–721, https://doi.org/10.1080/02699052.2022.2034954.

51. S. Mylabathula, C. Macarthur, A. Guttmann, A. Colantonio, and C. Tator, "Development of a Concussion Public Policy on Prevention, Management and Education for Schools Using Expert Consensus," *Injury Prevention* 4 (May 2022): 453–458, https://doi.org/10.1136/INJURYPREV-2021-044395.

52. J. Register-Mihalik, C. Baugh, E. Kroshus, Z. Y. Kerr, and T. C. V. McLeod, "A Multifactorial Approach to Sport-Related Concussion Prevention and Education: Application of the Socioecological Framework," *Journal of Athletic Training* 52, no. 3 (2017): 195–205, https://doi.org/10.4085/1062-6050-51.12.02.

53. F. Xie and A. Derakhshan, "A Conceptual Review of Positive Teacher Interpersonal Communication Behaviors in the Instructional Context," *Frontiers in Psychology* 12 (2021): 708490, https://doi.org/10.3389/fpsyg.2021.708490.

54. E. Suter, J. Arndt, N. Arthur, J. Parboosingh, E. Taylor, and S. Deutschlander, "Role Understanding and Effective Communication as Core Competencies for Collaborative Practice," *Journal of Interprofessional Care* 23, no. 1 (2009): 41–51, https://doi.org/10.1080/13561820802338579.

55. S. Mylabathula, C. Macarthur, S. Mylabathula, A. Colantonio, A. Guttmann, and C. H. Tator, "Concussion Public Policy in Elementary and High Schools in Ontario, Canada: A Cross-Sectional Survey to Examine Implementation Compliance, Barriers, and Facilitators," *Journal of School Health* 93 (2022): 14–24, https://doi.org/10.1111/josh.13245.

56. L. E. Dreer, M. T. Crowley, A. Cash, J. A. O'Neill, and M. K. Cox, "Examination of Teacher Knowledge, Dissemination Preferences, and Classroom Management of Student Concussions: Implications for Return-To-Learn Protocols," *Health Promotion Practice* 18, no. 3 (2017): 428–436, https://doi.org/10.1177/1524839916650865.

57. T. Rice and R. Curtis, "Parental Knowledge of Concussion: Evaluation of the CDC's "Heads up to Parents" Educational Initiative," *Journal of Safety Research* 69 (2019): 85–93, https://doi.org/10.1016/j.jsr.2019.02.007.

58. K. D. Mallory, L. Saly, A. Hickling, H. Colquhoun, E. Kroshus, and N. Reed, "Concussion Education in the School Setting: A Scoping Review," *Journal of School Health* 92, no. 6 (2022): 605–618, https://doi.org/10.1111/josh.13156.

59. K. Ferdinand Pennock, B. McKenzie, L. McClemont Steacy, and L. Mainwaring, "Under-Reporting of Sport-Related Concussions by Adolescent Athletes: A Systematic Review," *International Review of Sport and Exercise Psychology* 16 (2020): 66–92, https://doi.org/10.1080/1750984X.2020.1824243.

60. R. K. Martin, T. J. Hrubeniuk, C. D. Witiw, P. MacDonald, and J. Leiter, "Concussions in Community-Level Rugby: Risk, Knowledge, and Attitudes," *Sports Health* 9, no. 4 (2017): 312–317, https://doi.org/10.1177/1941738117695777.

61. Z. Y. Kerr, J. K. Register-Mihalik, S. W. Marshall, K. R. Evenson, J. P. Mihalik, and K. M. Guskiewicz, "Disclosure and Non-Disclosure of Concussion and Concussion Symptoms in Athletes: Review and Application of the Socio-Ecological Framework," *Brain Injury* 28, no. 8 (2014): 1009–1021, https://doi.org/10.3109/02699052.2014.904049.

62. J. J. Milroy, D. L. Wyrick, K. L. Rulison, L. Sanders, and B. Mendenhall, "Using the Integrated Behavioral Model to Determine Sport-Related Concussion Reporting Intentions Among Collegiate Athletes," *Journal of Adolescent Health* 66, no. 6 (2020): 705–712, https://doi.org/10.1016/j.jadohealth.2020.01.027.

63. J. Register-Mihalik, L. A. Linnan, S. W. Marshall, T. C. V. McLeod, F. O. Mueller, and K. M. Guskiewicz, "Using Theory to Understand High School Aged Athletes' Intentions to Report Sport-Related Concussion: Implications for Concussion Education Initiatives," *Brain Injury* 27, no. 7–8 (2013): 878–886, https://doi.org/10.3109/02699052.2013.775508.

64. C. A. Foster, C. D'Lauro, and B. R. Johnson, "Pilots and Athletes: Different Concerns, Similar Concussion Non-Disclosure," *PLoS One* 14, no. 5 (2019): e0215030, https://doi.org/10.1371/journal.pone.0215030.

65. Z. Y. Kerr, J. K. Register-Mihalik, E. Kroshus, C. M. Baugh, and S. W. Marshall, "Motivations Associated With Nondisclosure of Self-Reported Concussions in Former Collegiate Athletes," *American Journal of Sports Medicine* 44, no. 1 (2016): 220–225, https://doi.org/10.1177/0363546515612082.

66. D. Salmon, M. Badenhorst, S. Walters, et al., "The Rugby Tug-Of-War: Exploring Concussion-Related Behavioural Intentions and Behaviours in Youth Community Rugby Union in New Zealand," *International Journal of Sports Science and Coaching* 17, no. 4 (2022): 804–816, https://doi.org/10.1177/17479541211047661.

67. L. Poloai, M. Fulcher, and D. Reid, "The Accuracy of Coding for Sports-Related Concussion in New Zealand: An Observational Study," *New Zealand Journal of Physiotherapy* 51, no. 2 (2023): 100–105.

68. D. Salmon, M. Badenhorst, É. Falvey, et al., "Time to Expand the Circle of Care–General Practitioners' Experiences of Managing Concussion in the Community," *Journal of Sports Sciences* 40, no. 19 (2022): 2102–2117, https://doi.org/10.1080/02640414.2022.2130586.

69. M. Dalton, O. Galea, R. Blyth, et al., "Aotearoa New Zealand Physiotherapists' Perspectives of Potential Expanded Roles for Sports-Related Concussion Management: A Qualitative Study," *New Zealand Journal of Physiotherapy* 52 (2024): 113–125, https://doi.org/10.15619/nzjp.v52i2.390.

70. D. Salmon, J. Brown, S. Walters, et al., "Managing Concussion in the Real World - Stakeholders' Perspectives of New Zealand Rugby's Concussion Management Pathway," *International Journal of Sports Science and Coaching* 19 (2023): 1515–1530.

71. C. Stuart, D. Reid, A. Theadom, M. Fulcher, and N. Hardaker, "Knowledge and Management of Sport-Related Concussion in Primary Care in New Zealand," *New Zealand Medical Journal* 135, no. 1548 (2022): 31–41.

72. J. Howland, J. Campbell, R. Thomas, et al., "An Evaluation of Post-Concussion Return to School Guidelines: A Survey of Massachusetts School Nurses," *Journal of School Nursing* 39, no. 6 (2023): 422–430, https://doi.org/10.1177/10598405211032210.

73. K. Allen, A. Reupert, and L. Oades, "Implementing School Policy Effectively," in *Building Better Schools with Evidence-Based Policy: Adaptable Policy for Teachers and School Leaders* (London, UK: Routledge, 2021), 1–9, https://doi.org/10.4324/9781003025955.

74. M. L. Ha, T. M. Kasamatsu, T. C. V. McLeod, J. K. Register-Mihalik, and C. E. W. Bacon, "Teachers' Perceived Knowledge and Confidence

Regarding Adolescent Concussion Management," *Journal of Education and Learning* 9, no. 5 (2020): 27, https://doi.org/10.5539/jel.v9n5p27.

75. C. Mutch and S. Collins, "Partners in Learning: Schools' Engagement With Parents, Families, and Communities in New Zealand," *School Community Journal* 22, no. 1 (2012): 167–187.

76. D. Warmath, A. P. Winterstein, and S. Myrden, "Parents and Coaches as Transformational Leaders: Motivating High School athletes' Intentions to Report Concussion Symptoms Across Socioeconomic Statuses," *Social Science & Medicine* 2022, no. 292 (2021): 114559, https://doi.org/10.1016/j.socscimed.2021.114559.

77. ACC Sportsmart, "Concussion: ACC Sportsmart," 2017. Accessed November 22, 2023, https://www.accsportsmart.co.nz/concussion/.

78. C. A. Rains and B. Robinson, "School Nurses and Athletic Trainers Team Up on Concussion Management," *NASN School Nurse* 25, no. 5 (2010): 234–238, https://doi.org/10.1177/1942602X10376672.

79. M. L. Weber Rawlins, T. R. Snedden, M. C. Kay, T. Valovich Mcleod, and C. E. Welch Bacon, "School nurses' Perceptions of Concussion Management for Secondary School Student-Athletes," *Brain Injury* 34, no. 5 (2020): 665–672, https://doi.org/10.1080/02699052.2020.1739334.

80. C. E. Welch Bacon, M. C. Kay, M. L. Weber, D. K. Tierney, and T. C. Valovich McLeod, "School Nurses' Perceived Challenges With Concussion Management Procedures in the Secondary School Setting," *SAGE Open Nursing* 4 (2018): 4, https://doi.org/10.1177/2377960818798437.

Supporting Information

Additional supporting information can be found online in the Supporting Information section.