



Participation in an
Active and Healthy Life:
Valuing the
Participant Voice

30th ACHPER International Conference

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EDITED
Conference Proceedings

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Partners



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The focal point of School Sport Australia activities has been the interstate competitions offered at both Primary and Secondary levels. These are the culmination of state based programs and offer the gifted and talented students the opportunity to participate in higher levels of sporting competition.

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The AFL Schools programs aim to enhance the presence of Australian Football in schools by driving participation, education and fan development outcomes. It achieves this in various ways but importantly by way of influencing, motivating and supporting teachers to champion our code, developing best practice AFL themed curriculum resources that motivate, engage and educate students whilst achieving educational outcomes and providing participation opportunities to schools and their students.



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Message from the Conference Co-Chairs



Message from Shane Pill and Rick Baldock

On behalf of the Conference Organising Committee of the 30th International Conference of the Australian Council for Health, Physical Education and Recreation, we commend the proceedings of the Canberra conference to you. The theme of the 2017 Conference, Participation in an Active and Healthy Life: Valuing the Participant Voice, reminded us to strive for student centred, strength-based educative perspectives in our health, physical education and sport teaching. The papers forming the 2017 Conference Proceedings speak to contemporary challenges and triumphs occurring across ACHPER's focus areas – health, physical education and recreation/sport.



We are indebted to the colleagues who have rallied to the call to organise the conference. In particular, the Conference Organising Committee: Rebecca Kelley, Ashleigh Marshall, John Williams and ACHPER staff Alison Turner, Rhiannon Dodd, Chelsea Modra, Gayle Rogers and Megan Mattin. Our thanks especially go to Dr John Williams who's support was invaluable to the planning, implementation and ultimate success of the conference. Thanks are also extended to those who assisted Dr Williams on the Academic/Scientific Committee in reviewing abstracts and papers that have resulted in these conference proceedings.

We are delighted to have attracted international and national keynote speakers to present across ACHPER's focus areas, and other international, national and local experts were enticed to present at the conference. Thank you for your support. It made possible a diverse program catering for the academic interest and the practical purposes of the wider profession in one conference - academics, teacher educators and school teachers 'side-by-side' at a conference is quite special in professional development/learning. The ACHPER International Conference is distinctive in Australia and overseas in bringing teachers, sport, health and recreation professionals and academics together in shared professional learning. Many of our international conferees highlighted this aspect of the conference as also unique in their experience.

On behalf of the Conference Organising Committee, we trust your stay in Canberra was enjoyable and that your attendance at the conference was personally and professionally rewarding. We look forward to you joining us at the 2019 Biennial ACHPER International Conference, which will once again be conducted in Canberra.

Message from the Academic Program Chair



Message from Dr John Williams

It gives me great pleasure to introduce the conference proceedings from the 30th International Australian Council for Health, Physical Education and Recreation (ACHPER) Conference. This conference included just short of 30 presentations and in excess of 50 theoretical and practical workshops or symposia. Many of these presentations are represented in the following proceedings with more papers forthcoming in a soon to be published special edition of the peer reviewed *Learning Communities: International Journal of Learning in Social Contexts*.



The breadth and scope of the papers included here show the diverse nature of health and physical education (HPE) in Australia and the equivalent subject area overseas. Domestically, the HPE key learning area is at an important juncture through the recent adoption of the *Australian Curriculum for Health and Physical Education*. As a consequence of this innovative and long awaited curriculum each of the papers is grouped according to its five propositions. Through addressing these propositions, each article makes an important step towards meaningful change and a move away from what could be broadly termed traditional ways of 'doing' HPE. This 'sea change' demonstrates clear intent towards meeting the goals of the *Melbourne Declaration on Educational Goals for Young Australians* and helps make our curriculum both contemporary and relevant. Of course, ACHPER represents more than just HPE, and this wider focus is also reflected in the papers.

As Chair of the Academic Program Committee I would like to thank the authors for choosing to submit their respective paper or papers to this conference. By supporting the conference in this way each author is contributing to ACHPER's strategic priority of advocacy for HPE and related fields. I would also like to extend my gratitude to the entire Academic Program Committee for their sustained effort in helping manage the review process. I also wish to express my gratitude to our team of national and international reviewers for their expertise and attentiveness in reviewing each article. All of the reviewers did this work around their own busy schedules and it would not have been possible to have produced the quality of work evident here without their highly valued input. Thank you also to Alison Turner, ACHPER National Executive Director, for her continuous support throughout this process and to the conference Co-directors Dr Shane Pill and Rick Baldock for their direction and expert advice. Finally, a special thank you to Rhiannon Dodd, ACHPER Event Coordinator and Communications Administrator, for her diligence, patience and attentiveness in managing the administration of the review process. We hope that you enjoy the papers presented within these proceedings.

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Keynote Speakers



Sean Slade, ASCD (USA)

Sean Slade is the Director of Outreach at ASCD, focusing on promoting and expanding the ASCD Whole Child approach across the United States and globally. During his more than two decades in education, Slade has written extensively on topics related to the whole child and health and wellbeing, and he has been at the forefront of promoting and using school climate, connectedness, resilience, and a youth development focus for school improvement. He has been a teacher, head of department, educational researcher, senior education officer and director. He has taught, trained and directed education initiatives

in Australia, Italy, Venezuela, the United Kingdom, and the United States.

Professor Donna Cross, University of Western Australia and the Telethon Kids Institute (AUS)

Professor Donna Cross is a Winthrop Professor with the Faculty of Medicine, Dentistry and Health Sciences at the University of Western Australia and the Australian Telethon Kids Institute. Donna has been awarded over \$18m in competitive grants addressing child and adolescent health and well-being which has supported 52 applied school and community-based research intervention projects investigating ways to enhance the social and emotional development and reduce bullying (including cyberbullying) and other anti-social behaviour among children and adolescents. She currently leads eight 3-5 year research projects that aim to enhance student wellbeing, especially their social competence, and other skills to reduce all forms of anti-social behaviour and mental health harms especially among vulnerable school-age children and adolescents. In 2012, Donna received the award for WA 'Australian of the Year' for her services to children's health and wellbeing.



Professor Philip Morgan, University of Newcastle (AUS)

Professor Morgan is deputy director of the University of Newcastle Priority Research Centre for Physical Activity and Nutrition and lecturer in the School of Education.

Professor Morgan's research program includes a large body of work examining the impact of targeted school and community-based interventions to promote physical activity and healthy eating in child, adolescent and adult populations. He has published more than 200 peer reviewed journal publications, and served as an invited expert on numerous government and non-government committees focusing on obesity, physical activity and physical education. He served on the ACARA expert panel for the HPE Australian Curriculum. His contributions to research, teaching and community service have been recognised with more than 30 awards including the Scopus Young Researcher of the Year Award for Australasia and the Australian Award for University Teaching Excellence from the National Office for Learning and Teaching.

Keynote Speakers



Professor Peter Hastie, Auburn University (USA)

Professor Peter Hastie is a Wayne T. Smith Distinguished Professor in the School of Kinesiology at Auburn University in the United States. His area of specialty is Sport Education, having written numerous research papers and books examining the model. His latest text, *Sport Education: International Perspectives*, provides a new way of summarising the research on Sport Education beyond those reviews currently in academic journals. Professor Hastie is a co-editor of the journal *Physical Education and Sport Pedagogy*, and is on the editorial board of a number of journals including the *Journal of Teaching in Physical Education*. In his spare time, he

enjoys adventure activities and travelling, particularly to Africa where he teaches at an orphanage in Kenya, and to Uganda to visit the two boys whom he sponsors.

Professor Damian Farrow, Victoria University (AUS)

Professor Damian Farrow holds a joint appointment with Victoria University and the Australian Institute of Sport as a Professor of Skill Acquisition. Damian is responsible for the provision of evidence-based support to Australian coaches seeking to measure and improve the design of the skill learning environment. He has worked with a wide range of elite Australian Sporting Programs including Netball, Swimming, Cricket, Tennis, Rugby Union and numerous AFL teams. A former physical education teacher, tennis coach and current U11 netball coach, Damian's research centres on understanding the factors critical to developing skill and sport expertise, with a particular interest in the role of decision making and practice methodology. He



is a co-editor of the texts *Applied Sport Expertise* and the *Handbook of Sport Expertise* and has co-authored a number of general interest sports science books including the popular *Run Like You Stole Something*.

Gayelene Clews, Performance Psychologist, Olympian, Author and Educator (AUS)



Olympic Psychologist, former elite athlete, coach and educator, Gayelene Clews, is passionate about helping people excel in all aspects of life. Growing up in outback Australia in a family of eight, the former world number one triathlete represented her country in two sports while she was the only mother on the professional circuit. Clews has coached athletes to medals in world championships and as the Australian Olympic Team Psychologist to Women's Water Polo, she contributed to the team's exciting Olympic gold medal.

In 2015, Gayelene released her ground breaking book "*Wired to Play: The Metacognitive Athlete*" on minimising symptoms of mental illness, by using the opportunities available through sport and exercise to build resilient, self-aware and connected communities. Her research and interviews with many of Australia's and World's elite athletes and coaches, together with her insights gained through 15,000 professional consultations, enables Clews to present a very powerful argument for the critical role sport and exercise play in mental health, wellbeing and academic success. Her recommendations for mental wellness have received unified praise across both Olympic and Professional sports and in the field of education. Her insights and use of sporting analogies provides a platform to raise awareness on key strategies for building mind wealth. Strategies that can be taught to all.

24th Fritz Duras Memorial Lecture



Professor Richard (Dick) Telford AM

ACHPER is pleased to announce that the 24th Fritz Duras Memorial Lecturer for the 30th ACHPER International Conference will be Professor Richard (Dick) Telford AM. Professor Telford has fond memories of being taught by Dr Duras from his early days at Melbourne University, making him the perfect choice for this prestigious event in the conference program.

Professor Telford is one of Australia's most renowned sport scientists with a background in sporting performance as a former Australian Rules Footballer, cricket player and coach and distance running coach for numerous athletes.

For the past 10 years, Dick has spent his time back in his initial area of interest – physical education, physical activity and their roles in child health and development. As the Research Director of the Lifestyle of our Kids (LOOK) longitudinal intervention study, his team of experts have released over 30 publications in peer reviewed journals.



Dick's other achievements include:

- was made a Fellow of Sports Medicine Australia in 1988;
- in 1990 was made a Fellow of the American College of Sports Medicine;
- became a member of the Order of Australia (AM) for his contributions to sport and sport science in 1992;
- inducted into the Australian Sporting Hall of Fame in 2014; and
- voted Australian Athletics Coach of the Year in 2014.

Dick is also currently undertaking a part-time Professional Fellowship with the University of Canberra Research Institute for Sport and Exercise (UCRISE).

Are we delivering the most relevant skill acquisition content in senior secondary physical education courses?

Kain Noack

St Ignatius College, Adelaide

Abstract

Skill acquisition has long been an important course component of secondary school physical education courses. The content delivered within skill acquisition units has been designed to provide students with knowledge and understanding as to what motor skill is, how is it acquired and what factors influence and determine the learning process. Interestingly much of what has been taught has remained largely the same over a significant number of years. The information presented to students about the acquisition of skills has been predominantly based in psychology grounded in cognitive learning theory (CT). This theory has had a distinct focus on cognition, where information is processed and controlled by a central mechanism; the brain. To explain this, we use the metaphor of the brain acting like a computer. Interestingly though, as a physical education (PE) practitioner, modern 'game centred' pedagogical approaches such as Teaching Games for Understanding (TGfU), Game Sense (GS) and Play Practice are grounded in a different psychological learning theory; Ecological Dynamic Systems theory (DST). This theory shifts the learning perspective, where a performers direct interaction with their immediate environment shapes the learning process, rather than the brain being the sole central figure. Instead, the connection and coupling with the environment becomes the focus. Therefore, it can be argued that the content currently delivered to senior secondary physical education students doesn't reflect how practitioners are encouraged to teach the subject. In other words, the theory does not reflect the practice. Inspired by recent studies from academics in the skill acquisition and teaching and pedagogy spheres, this paper argues that in an effort to better prepare and educate our future PE teachers, sporting participants and coaches of all levels, perhaps we need to re-consider what skill acquisition theory we deliver to our senior secondary students.

Introduction

Learning Theory and Psychology

The theory behind the acquisition of motor skills was originally founded from a branch of experimental psychology (Newell, 1991). To understand how motor skills are learned, I argue that we must understand the different learning theories that have shaped it over the years. There are two main learning theories that have shaped skill acquisition. These are;

- Cognitive Theory (CT)
- Ecological (Dynamic) Systems Theory (DST)

Cognitive theory has been traditionally taught when delivering skill acquisition to high school physical education (PE) students. When one looks at skill from the current cognitive theory perspective one gets a motor learning theory that is focused on the process of establishing a 'motor program', commonly referred to as a 'technique' (Pill, 2011). Cognitive theory (CT) defines skill from an internal central nervous system (CNS) hierarchical, ordered

perspective. In other words, CT can be explained by the metaphor that our brains act like a computer and control everything in an ordered, step by step manner. Behaviour becomes viewed as an internal 'linear process'. This means that to acquire a skill you must go through a series of ordered steps to get to the end result of producing a coordinated action. This also means that the theory is 'action focused', that is, the end result of skill learning is to produce a specific technique. It is that technique that we define as 'the skill' (Schmidt, 2008).

The CT allows us to explain skill acquisition as the 'order' and 'sequence' of information. It allows us to focus on the "end result" being a fixed, replicated action. However, many of the sports that we play and the movements we are required to produce within sports are not ordered and sequenced. The games we play are complex and dynamic. A player never replicates the same movement in a typical invasion sport in exactly the same way because the environment is constantly changing (Davids et al., 2012). Players, therefore must constantly adapt their decision making and actions within the playing environment. This is where DST (Bernstein 1967; Davids et al., 2102; Chow et al., 2016) provides an explanation and supports the dynamic, 'non-linear', nature of the games and sports.

In DST, skill acquisition is explained as a much more intricate and complicated process than simply learning to order the control of body movements. In DST we see a shift away from focusing solely on the physical mechanics, that is, the 'action' of the performance and instead focus on explaining performance as a 'goal-orientated outcome' as a result of perception-decision making coupling. Central to this thinking is the idea that each individual must develop their own unique way of moving in order to achieve the same goal/result. Each performer has their own set of unique characteristics, physiological and psychological, which in turn interact with game information in a dynamic or continuous environment (Araujo & Davids, 2011; Davids et al., 2012). Put simply, motor skill can be considered as the ability to reposition the body in appropriate ways so that successful interaction can occur with the surroundings (Davids et al., 2012).

Therefore, in contrast to CT, a DST explanation considers movement/performance as a part of the means to an end result, rather than the 'end' in itself. A DST explanation; "intentionally captures perception and action as intertwined processes underpinning individual differences in movement behaviour" (Davids et al., 2012, p.112).

That is, the acquisition of 'skill' emerges as a consequence of the constant engagement and interaction between learners and their environment. In this contemporary approach how we 'perceive' information changes. Rather than responding to perceived stimuli, we instead recognise that perception and action are intertwined. Information and movement are constantly evolving together, rather than one dictating the other. How this perception-action coupling interact is dependent upon a wide range of individual internal and external factors, such as cognitive maturation, age, gender, fatigue levels, previous experience, and practice types. Therefore, motor programs must be adaptable, not rigid and fixed. They must be able to be modified to meet the demands of the task at a particular point in time. Or, they can be adaptable to the point where completely new actions or behaviours may emerge as a result of the changing environment (Araujo, Davids, Chow & Passos 2009; Davids et al. 2012).

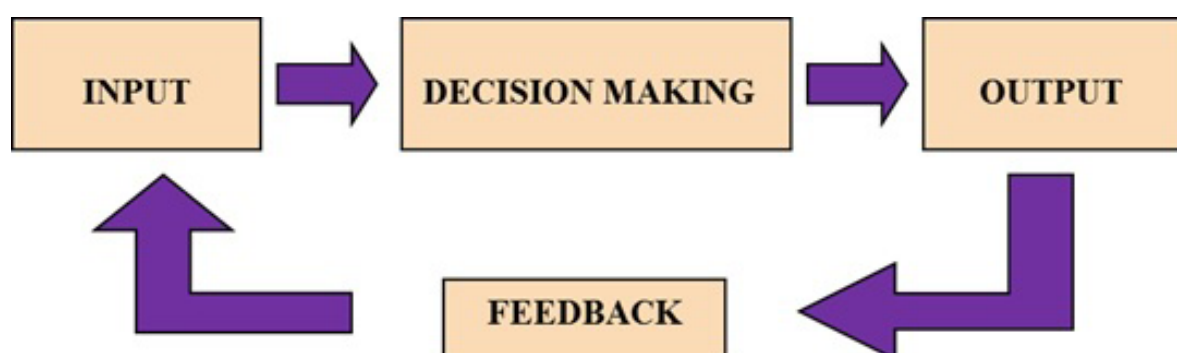
In summary, a DST perspective is that a learner will produce skill as a result of their direct interaction with the environment, as they too are a part of the environment. They are constantly receiving and providing information internally and externally from their surroundings and therefore their movements are constantly responding, adjusting and adapting to this. A CT perspective is that skill is produced in response to the environment. I argue that this CT perspective is simplistic and linear, however, it is my experience that the CT perspective is traditionally what has been taught in senior years PE skill acquisition curricula, particularly when discussing information processing models.

Discussion

Information Processing Metaphors

The information processing model (IPM) (Figure 1) has long been used as a method to explain how external information is internally processed to produce an action. The IPM has some important key information in it such as the role of our senses in gathering information, the concept of perception, and the importance of experience and long term memory storage, in an effort to acquire skill. However, the IPM does have some flaws. In particular, it's a linear process. It highlights the idea that we respond to our environment, rather than with the environment. It separates action and perception. That is, in the IPM we must perceive first to be able to produce an action. In the IPM perception is 'indirect', where we supposedly collect 'snapshots' of information and then make judgements from that information. As a result, it separates the learner from the environment (Fajen, Riley & Turvey, 2008).

Figure 1. The Information Processing Model



Source: ACHPER SACE PE Workbook

The traditional IPM informed by CT perspectives has as the end-result of the model the action itself (i.e. the technique is the 'skill'). I argue that the connection between the external and internal environments of a performer is far more complex and intertwined than the IPM represents. In comparison, DST suggests that there is a direct intertwined action-perception relationship. One doesn't directly influence the other. Rather than the 'processing' side of skill acquisition being seen as the ideal representative model of skill acquisition, an alternative way is to model it using DST and the concept of a 'perceptual-motor workspace' (Button, Chow & Rein, 2008).

The concept of a perceptual workspace suggests each workspace is continually being shaped and altered by the interaction of an individual's genes, perceptions, and intentions, as well as physical constraints, surrounding information, and system dynamics (Chow et al., 2016). Because performance parameters are not static and fixed, we should view the workspace as undulating and ever-changing. Therefore, in the perceptual-motor workspace, we don't perceive and then act but instead perception is occurring constantly (there is a constant 'flow' of information). In this case the learner can be likened to an 'explorer' of the environment, rather than simply being a 'responder' to it as in the CT perspective (Renshaw et al., 2010). DST explains that perception and action are constantly interacting with one another. This means that at any one time there are potentially multiple movement solutions available to the performer. According to Chow et al (2016), "The topology of the workspace alters accordingly to reflect the flow of information and of new experiences" (p. 67).

Imagine a cricketer catching a ball. If one were to use an explanation informed by the IPM one would say that one perceives (collect a 'snapshot of information' of) the ball and then catches it. However, a DST perspective suggests

that it is not that simple an explanation. As the ball continues to move closer towards the performer there is a constant 'online' flow of new information (such as height, speed, spin, direction) and as such the performer must constantly adjust and readjust their body actions (do they catch fingers down, fingers up, do they have to move forwards, backwards, sideways etc.). The performer might also be required to take other factors into account such as weather conditions (is the sun in their eyes), their own ability and experience, even their level of fatigue. It is a constant ongoing activity until the ball strikes the hands of the player.

Action and Memory

Another CT concept often taught in senior secondary PE classes, specifically linked to the role of memory, has been Schema theory. Schema theory was a theory proposed by Schmidt (1975) who theorised that when we practice and play the brain remembers what it did and can then recall this information in the future. However, while the memory does store information that we can retrieve and use in the future, there are some flaws in the Schema theory (Schmidt, 1975). In particular, it is an action-directed memory. While it can be argued that motor programs are established and retained in the long term memory, Schema theories don't adequately explain how new movement responses can be created in a specific moment in time. To illustrate this point, think of some of the new cricket shots that have been created since the introduction of T20 cricket. Schema theory is unable to explain why more functional and adaptive movement patterns emerge during the 'moment'.

Unlike Schema theory, the DST concept of 'affordances' (Gibson 1977, Fajen et al., 2008, 2011) describes 'goal-directed' memory, and therefore describes how new functional and adaptive actions can emerge within a moment. In short, affordances are opportunities for action. They describe the environment in terms of the behaviours that are possible at a given moment under a given set of conditions. Affordances capture the tight coupling between perception and action (Fajen et al., 2008, 2011). Gibson (1979) claimed that perception "is not a static process (we see and we react), but a dynamic one. So we must perceive in order to move but we must also move in order to perceive" (in Warren, 1990, p.23). If we relate this concept of affordances back to our perceptual-motor workspace we can introduce the concept of 'solution manifolds' because the perceptual-motor workspace can be described as a dynamic, abstract map of all the potential movement solutions available to a learner. The arrangement of the workspace changes to reflect the flow of information and of new experiences.

The concept of 'solution manifolds' suggest that within the workspace (landscape), the performer may search for and discover several areas where successful task solutions (affordances) are closely aligned. We call these regions solution manifolds. These are comprised of a cluster of related movement patterns that are effective at accomplishing a task goal. For example, a soccer goal keeper may intercept a shot on goal by either catching the ball with two hands, one hand, or parry it away with a closed or open hand (Chow et al., 2016). Ultimately the outcome is the same; to stop the ball, but how it is stopped can be manipulated by a variety of closely aligned movement patterns within the solution manifold. Solution manifolds can be large or small. For example, a small adjustment in the use of the wrists can see a golfer hit the ball with either a fade or draw. It is a subtle modification. On the other hand, there may be a greater variety of movement solutions available for a given task, such as an AFL player taking a shot on goal and the different ways in which he or she can kick the ball, given the specific environmental circumstances (e.g. distance from goal, angle, amount of defensive pressure, time available etc.). Therefore, when the concept of long term memory is discussed (as it traditionally is in senior secondary PE courses), DST suggests concepts such as affordances and solution manifolds (goal directed memories), with practice, allows for

the development of pattern recognition to occur over time. Pill (2015) explains that:

Even though every 'moment' in a game is unique, you may have experienced this 'pattern of behaviour' before and can therefore make predications (decision-making ability) based on the accuracy of your pattern recognition. Better pattern recognition equals better decision making, faster pattern recognition equals faster decision-making, without denying the inherent complexity of the moment (S. Pill, personal communication, October 22, 2015).

As a result of pattern recognition development a more skilled performer is observed. Over time, through effective practice, these mental representations (patterns) become more intricate and complex, therefore resulting in better performance. Unlike the Schema theory where memory is said to be 'action-focussed'; that is, one 'remembers' a fixed technique, pattern recognition/mental representation integrates all components (both internal and external environments), so that multiple pieces of information can come together to form a memory. In other words, from an ecological perspective, memory can be viewed as a pattern of behaviour, rather than a fixed store of movement information.

Bernstein's (1967) Degrees of Freedom (DoF) is another useful DST construct that can be used to discuss learning progression, with a focus on the 'action component' of the skill. Put simply, DoF refers to the flow of movement within an action. As practice occurs the interaction between internal and external systems regulates the degree of freedom a learner demonstrates. Initially the flow of the movement coordination appears as 'freezing', that is a stilted, restrictive series of movements. Over time the movement coordination is able to become more 'free', and then eventually reach the point where the skill can be 'exploited' (Bowes, 2014). When exploited, imagine a performer in sync with his/her environment. Think of a surfer riding a wave. They produce instinctive, creative and adaptable movements that match the flow and energy of the wave. In other words, as a learner practices, their movement coordination initially begins as a stilted and disjointed movement. This is because the learner is attempting to find some level of balance and stability in the movement. Imagine trying to hit a golf ball for the first time. Body movements are disjointed and un-sequenced and there is a lack of flow and fluency. As one continues to practice however, and becomes more attuned to his/her environment, stability starts to occur and over time the movement begins to 'free up', allowing for a more fluent and coordinated movements to emerge.

The Learning Journey

The DST concepts related above are not common in senior years PE curriculum (Bowes, 2014). Additionally, in senior secondary PE we have not traditionally used DST perspectives to discuss the learning journey, which has been explained in terms of 'stages of learning' (Fitts 1964). Informed by a CT perspective, the stages of learning are a developmental process through the Cognitive, Associative and Autonomous stages (Littlewood et al, 2006). Briefly, the stages are explained as:

- Cognitive Stage – The emphasis is on developing an understanding of a motor program, determining what is to be done and how to do it. This stage consists of a high degree of trial and error, requiring significant input from external sources (coach).
- Associative Stage – Also known as the 'practice' stage, the focus is on refining the motor program. Errors become less frequent and smaller, and they start to develop their own 'internal' feedback mechanisms.

- Autonomous Stage – The performer can now perform the motor program ‘automatically’, that is, without thought. This then allows the performer to now allow for more cognitive work to be focussed more on the tactics and strategy of the game. The performer can now distinguish between relevant and irrelevant cues.

However, while it is widely accepted that learning is a developmental process and a period of purposeful practice is required to progress from one stage to the next, this model is weighted to the perspective that the development of learning is primarily ‘technique (action) focussed’ (Light, 2013). It isn’t until the autonomous stage where other factors such as responding to tactics becomes more evident in this developmental model. In addition to this, the model implies that at the cognitive stage practitioners decontextualise and decompose skill; that is, ‘break it down’ to a point where it no longer is representative of how it should be used in a game environment (Chow et al., 2016; Light 2013; Pill & Younie 2015). In contrast, Newel (1985) proposes that there are three ‘ecological’ stages of learning that transition from early to late learning. The ecological model of the learning journey proposes the following three stages;

- Coordination Stage – In this stage an ‘approximate’ movement pattern is developed to achieve a task goal. Chow et al. (2016) explains; “at this stage a learner seeks to harness existing intrinsic information to find stable and preferred movement solutions to specific motor problems. However, this search for ‘functional coordination’ only allows for a basic level of performance to meet the task, as the performer is trying to assemble and coordinate various body parts to produce an overall functional movement” (p. 165);
- Control Stage – In this stage performers can flexibly adapt a stable movement pattern to appropriately fit changing performance environments (e.g. altering the weight of a pass). Therefore, during this stage, tasks are designed with greater complexity, where learners are now faced with more information and must manage numerous movement possibilities. In short, learners start to modify movements to specifically meet the ever changing environment they are placed in (Chow et al., 2016); and
- Skill Stage – In this stage more complex task constraints are imposed to increase the challenge of game play, in an effort to help advanced learners refine and demonstrate already well established skills in a variety of game situations (Tan et al., 2012). Increases in task difficulty (e.g. playing size, player numbers, attacker-defender dyads) will challenge skilful performers to increase their attunement to information or to manipulate an already existing information-movement coupling for successful task completion (Chow et al., 2016).

The three ecological stages of learning reflect goal-based outcomes, rather than action-based ones. In this way, learners connect with the technical and tactical components of ‘skill’ from the beginning, unlike the cognitive approach which is action focussed to start with. The ecological stages explanation also encourages the development of a range of movement possibilities at all stages.

Learning, Performance and Feedback

For a long time, senior years PE has measured learning achievement by immediate performance. For example, assessment of practical units (sports) within the SACE PE course consists of the use of ‘performance checklists’ (SACE, 2016). These checklists have a significant motor program execution component to them, that is, there are a variety of techniques that students are asked to develop and execute. Therefore, using CT to explain this, much of the pedagogical focus is on improving immediate ‘technical’ performance. In such an environment, feedback is provided in an effort to reduce errors and improve the action/output component of the skill within a relatively short time frame (20 hours). Learning achievement is often defined (by senior years PE teachers) by the acute/short term

performance improvements in the athletes. That is, learning and performance have both traditionally been focussed on the development of an actual motor program. This has traditionally been developed in structured, 'errorless' environments. As Schmidt (2008) explains, the most efficient way to learn a prescribed motor program is by rote drill practice.

However, research now shows that instability at 'critical' or 'transition' points actually improves learning (Chow et al., 2016; Lee 2012). Therefore, allowing opportunities for learners to 'fail' can actually assist in the learning process provided the learner is adequately guided via developmentally appropriate practice and instruction constraints (Chow et al., 2016). Ericsson (2016) refers to the need for 'purposeful practice' where learners must be extended beyond their comfort zones, and 'deliberate practice' where the intention of activity is focused on improving performance. Therefore, learning may be better measured by the retention of performance over longer time frames, as preferred practice methods may initially see learners 'struggle' as they are placed in practice environments that push the challenge point of their ability (Lee 2012; Schmidt 2014). Common secondary PE blocked practice methods which may see rapid improvement due to high amounts of external feedback may not lead to the retention of performance and thus not accurately reflect learning in the longer term; particularly once that immediate feedback is removed from the practice environment and/or the practice environment is changed.

Research is now suggesting that even novices can start to develop preferred internal feedback mechanisms if they are provided with practice environments that allow for the exploration of goal directed outcomes, and that this is vitally important to the learning process (Chow et al., 2016). In addition to this, research by Wulf et al (2007) and Lohse et al. (2012) also indicated that the 'focus of attention' provided by practitioners when issuing external feedback should have an external focus, rather than internal one. This is a significant shift away from what practitioners are traditionally used to. In the past, with an 'action-focussed' mindset, and a desire to want to immediately correct performance, many practitioners would provide feedback which is often internally 'mechanically directed' - such as "keep your elbow high". Instead, it is now suggested external foci can enhance the learning of the performer. For example, "I want you to hit the ball through this sector" focusses on the goal of the movement and not initially the mechanics that achieve the goal. It has therefore been proposed that not only does an external foci create more efficient movements but can also enhance the accuracy of the desired outcome. (Lohse et al., 2012; Schmidt & Lee 2014; Wulf et al., 2007)

Conclusion

Senior secondary physical education courses that include skill acquisition as a key course component, need to look to reconsider their content. Much of the current skill acquisition content in senior PE syllabuses continue to be focussed on cognitive theory (CT) concepts. The suggestion by this author would be to also include some dynamic systems theory (DST) content. This theory does complement much of the game centred pedagogical approaches endorsed by universities world-wide who train future physical education practitioners and coaches. However, both theories have their flaws. CT focusses on skill as a linear, cognitive (internal, CNS) driven process with an action focussed outcome, that is the production of a fixed movement. As a result, not enough attention is paid to the performers interaction and direct connection to the environment. Rather, the performer is seen as a responder to the environment. Alternatively, DST, focusses on an intertwined connection between action and perception where the performer is an explorer of the environment whereby functional and adaptable movement responses are formed in an effort to meet specific task goals. However, it can be argued, that DST does not give enough attention to the

important role that cognition plays in skill development. As a result, in the short term, it is important that students be exposed to both theories.

Another alternative is to find a theory that assists in integrating both theories, rather than presenting them as opposing views. Action Specific Perception Theory is another theory from the ecological domain that has the potential to do this. However, while this theory is relatively new, and greater research and investigation is required by this author, it may be a possible longer term solution in the future which better explains the intricacies and complexities of motor skill acquisition.

Either way, our senior secondary PE practitioners should be encouraged to engage in, investigate and question the various motor learning theories that are used to explain the acquisition of skill rather than to simply maintain the 'status quo'. Greater professional learning in this area is an important focus if practitioners are to further develop their own knowledge and skills and to better align the 'theory' and 'practice' of motor skill acquisition.

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Uncovering the health work of teachers in Northern Territory government schools

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Abstract

What is health work? While a variety of definitions could be made for the term 'health work' in relation to schools and teaching, this research refers to health work as the diversity of health promotion and health education tasks that teachers may perform as part of their teaching duties. Far too little scholarly attention has been paid to exploration and analysis of the sociocultural context of provincial and remote schools in the Northern Territory and the impact that practice, environment and partnerships may have on the investment of teacher time and resources in health outcomes. Using the Health Promoting Schools model, as a conceptual framework for scholarship, this research questions the nature of health work being undertaken by teachers in Northern Territory Government (NTG) schools, the types of health work they do, how much time they spend doing it, and its perceived importance to student health. Document analysis and a Likert style survey gathered data, which suggests that NTG teachers spend a large amount of their time involved in health work. Teachers perceived this work to be of high importance to the health and learning of their students. It also revealed that whilst teaching health curriculum was considered of high importance, the largest amount of health work performed in the participating schools is of a pastoral care nature, linked to wellbeing and caring discourses. This research provides much needed data on NTG teachers' descriptions of the health work they perform, in a range of schools, whose contexts differ greatly from mainstream schools in the rest of Australia.

Introduction

Increasing concern about the health of children and young people in Australia, has led to national preventative health partnerships with the education sector (National Health & Hospitals Reform Commission, [NHHRC], 2009; National Preventative Health Taskforce, 2009). Whilst the Commonwealth is responsible for developing infrastructure and managing the roll-out of health programs, states and territories are responsible for delivering a range of preventative health programs and initiatives in school settings including the teaching of mandatory health education outcomes in the Australian Curriculum for Health and Physical Education. The implementation of health education, including preventative health programs and initiatives, is the work of schools and teachers (Rossi, et al, 2016). Hence there is a need to understand the nature of health work being undertaken by teachers in Australian schools.

Considerable uncertainty surrounds the capacity of schools to achieve health-related outcomes for their students. Although health promotion advocates suggest that 'schools can make a difference' (St Leger 2006, p. iii), they nonetheless argue that health-related outcomes have been modest, progress slow and sustainability difficult. This is mainly due to health promotion having: low priority and low status; insufficient teacher training; lack of resources; ad hoc support from health services; and significant gaps between policy and practice (Basch, 2010; Marks, 2010; Mohammadi, Rowling & Nutbeam, 2010; Rowling, Booth & Nutbeam, 1998). Thus, the place of health promotion

within schools remains debatable given that educational outcomes are the core business of schools (O'Sullivan, 2004; St Leger, 2006).

In contrast to the debate in Australian mainstream schooling, the NTG recognises that the relationship between health and education in the work of schools is of vital importance. Health is identified as a critical prerequisite for education, with poor health found to be an obstacle that impacts on student learning (ACIL Allen Consulting, 2014; Gilleskie & Harrison, 1998). Educational goals in NTG schools include the provision of support and services for students experiencing emotional, physical, and cognitive vulnerability (Department of Education [DoE], 2015). The 2016 - 2018 Department of Education NT Strategic Plan, states that its remit is to “deliver improved services that better meet the needs of children, young people and their families” (DOE NT, n.d., p.2) and indicates that many fundamental elements need to come together to enable improved educational outcomes for students. This critical relationship between health and education is identified in NTG school policies and initiatives, with current data still showing unacceptable levels of disadvantage in health, and significant gaps in this critical area between the Indigenous and non-Indigenous population. Within the Australian context of this data, the term ‘Indigenous’ is used to describe Aboriginal and Torres Strait Islander peoples of Australia.

Health Work in NTG Schools

Critical to our understanding of the complex field of education in NTG schools, is an examination of the interface between practice, environment and partnerships, influenced by the strong relationship between the NT government and its Department of Education. NT demographics and policy contexts make the territory a particularly complicated site for education, due to expectations that schools and teachers will overcome health, education and economic disadvantage. In the NT, there are 152 government schools providing education services to over 33,000 school aged students, with 73% of schools located in remote and very remote locations and 47% of students enrolled at these locations (DoE, 2015). Education programs in the NT are delivered by over 4,300 staff working in schools and supported by over 770 staff providing systems and support services (DoE, 2015). In contrast to other States and Territories in Australia, Indigenous students make up 40.4% of all full-time NT students (Australian Bureau of Statistics, [ABS], 2013).

At the heart of understanding the work of teachers and schools within the NT, is the knowledge that overcoming Indigenous disadvantage is a priority at all levels of government – federal, territory and local. In 2008 the Council of Australian Governments (COAG) introduced the National Indigenous Reform Agreement with six agreed targets to “close the gap in Indigenous disadvantage by improving outcomes between Indigenous and non-Indigenous Australians in the areas of life expectancy, health, education and employment” (Council of Australian Governments, [COAG], 2008, p. 3). These targets are a priority for the NT as 30% of the Territory's population is Indigenous (which is the highest proportion of Indigenous people in Australia), and over half of this Indigenous population (58%) in the NT, live in very remote areas (Department of Health Northern Territory, [DoH NT], 2013).

The NT context is unique and the work of NTG schools is exacerbated by their geographical isolation and the cost of delivering quality education services to these schools. All NTG schools are in provincial, remote or very remote locations (Steering Committee for the Review of Government Service Provision, [SCRGSP], 2013), with 53% of NTG schools classified as lowest on the National Index of Relative Socio-economic Disadvantage (DOE NT, 2013). The remoteness of a school increases costs associated with personnel (school and teaching staff), infrastructure

(including staff housing), curriculum delivery, travel, and teacher induction (DOE NT, 2014). The geographical isolation of these schools also affects teacher turnover and there is a need for experienced teachers who will stay for longer periods of time, and who are experienced in English as an additional language or dialect (EAL/ EAD). Research by McRae et al. (2000) suggests that many teachers in NTG schools are early career teachers just starting their teaching careers with little or no previous experience teaching students, let alone disadvantaged students in remote localities.

The implementation of health education, including preventative health programs and initiatives, is the work of schools and teachers in the NT, but the rise of 'wellbeing' discourse across school sectors nationally and internationally has heightened interest in teachers' work in curricula, extra-curricular and the less tangible caring work (McCuaig, Ohman & Wright, 2013; Rossi, Pavey, Macdonald & McCuaig, 2016).

Furthering Research on Health Work Performed in NTG Schools

The proliferation of potentially competing purposes and responsibilities for schooling and teachers, informed a successful Australian Research Council (ARC) Grant (Macdonald, Rossi, Mangan & McCuaig, 2013-2015), that seeks to examine the capacity of teachers to deliver health work in Australian schools. The NT data will contribute to research in this field, as it will be exploring the health work expectations and practices of teachers across a range of NTG schools and exploring the sociocultural context of provincial and remote schools in the Northern Territory. Focus will be on the impact that practice, environment and partnerships may have on the investment of teacher time and resources in health work, providing some clarity around what constitutes, facilitates and constrains teachers' health work. The inspiration for the focus on NTG schools, results from the researcher having over 15 years' experience teaching Indigenous students and working in low socio-economic status (SES) schools in provincial, remote and very remote Northern Territory locations.

The research questions for this research were:

1. Do NTG teachers perform health work from each of the three HPS framework domains?
2. How much time is committed to performing health work in NTG schools?
3. How prepared are teachers to undertake health work in NTG schools?
4. What external agencies do teachers utilise to undertake health work in NTG schools?

Method

The Health Promoting Schools (HPS) framework was chosen as a conceptual framework for scholarship as it offered a way to examine the interface between practice, environment and partnerships in health work. The concept of HPS was created in the 1980's by the World Health Organization (WHO) to shift the focus of health education from the behavior of the individual, to a recognition and development of schools as healthy settings (Mūkoma & Flisher, 2004). The HPS framework is a social model of health that seeks to strengthen health promotion and education initiatives and strategies within school communities to promote health and wellbeing for students in the school setting (Banfield et al., 2015; WHO, 1996). This framework seeks to encourage holistic practices in schools, which integrate comprehensive interventions to develop supportive environments conducive to promoting student health, considering the school physical and social environment and developing relationships with community (Stewart-Brown, 2006).

Of interest to this research is whether NTG teachers' health work occurs across the three domains of the HPS framework: practice, environment and partnerships, in their health promotion and health education work. Practice refers to teaching and learning, the curriculum, which is expected in schools. Environment refers to the political, structural, human and symbolic organisation and ethos of schools. Partnerships refer to relationships within the school and the wider school community. The framework demonstrates the complex relationships, which exist between each of the domains, which are integrated and interactive in nature as they impact on, and influence each other.

The Cochrane systemic review of the HPS framework used in 67 eligible studies, found that overall the HPS framework was effective at improving some aspects of student health (Langford, et al, 2015). The review explored interventions such as nutrition, physical activity, tobacco, alcohol, drugs, violence, sexual health, mental health and wellbeing, bullying, hand-washing, safety, body image, sun safety and oral health (Langford, et al, 2015). In contrast to the work of Langford, et al. (2015), the research described in this paper focuses on categories of health work without specific identification of the types of interventions in each of the categories.

Using the HPS framework, as a conceptual framework for scholarship, this study explores the alignment between the health work teachers in NTG schools perform and the domains of the HPS framework they work in.

Participants

The research involved three NTG schools (N = 3) located in provincial (n = 2) and remote (n = 1) localities (see Table 1). Cluster sampling was used to select schools based on their locality, school type (special school for students who require specialised and individualised education programs, secondary school and combined school) and staff size. All teachers, principals and executive staff in each school were given the opportunity to participate in the research, representing a sample group of respondents for a type of school and location. The schools were all visited during the same school week in Term 4, to enable the data from the teacher questionnaire to consider a 'point in time' in the school year.

The respondents (N = 74) were teachers (n = 67), principals (n = 3) and executive staff (n = 4) and the average age was 40 years, 30% male and 70% female. The data showed that 46.5% of respondents had 1 – 6 years teaching experience (1 – 3 years 25.4% and 4 – 6 years 21.1%) while 29.6% reported teaching for between 7 and 18 years. In contrast, the smallest proportion of respondents (23.9%) had been in the teaching profession for 19 years or more.

Each participant was provided with participant information about the study, and in turn provided informed consent prior to completing the questionnaire. Ethics approval was granted by the University of Queensland, approval #2016001103 and research approval was granted by the NT Department of Education.

Table 1. Characteristics of schools participating in the study

Characteristic Feature	Site 1	Site 2	Site 3
Location	Provincial	Provincial	Remote
Region	Darwin	Palmerston and rural	Palmerston and rural
Type of school	Special school	Secondary School	Combined school
Number of students	136	566	122
Percentage of Indigenous students	40%	38%	63%
Number of teachers	34	36	11
Number of Principals and executive staff	3	3	1

Source: Myschool website, 2015

Teacher Questionnaire

The questionnaire used a set of 38 multiple choice and open-ended questions developed and field tested by the research team of Macdonald, Rossi, Mangan & McCuaig (2013-2015), through a small pilot study. The questionnaire was modified for the NT context to include questions on Department of Education NT health-related policies and use of outside providers in the school. The NT specific questionnaire was then piloted with non-participant teachers in the NT, to ensure its clarity and suggestions for improvement were considered and adjustments made.

The questions were designed to be explicit and capture teacher perspectives of their health work in the school at a point in time. It is important to note that teachers were not asked to create their own health-related work categories. The eight categories provided in the questionnaire were identified from the HPS framework domains as discrete categories (see Table 2).

Table 2. Health-related work category in each HPS Framework domain

Practice	Teaching health as part of the curriculum Leading physical activity as part of the school curriculum Pastoral Care
Environment	Extra-curricular food and nutrition School health policy compliance Extra-curricular physical activity or sport
Partnerships	Communicating with parents Health screening and referrals

Teachers, school executive staff and principals, participated in the survey which sought to capture what teachers do, that might be considered health work and/or practices; how this work occupies their time; their perceived knowledge, confidence and skills to do so; the impact on their work and personal wellbeing; their reading of Department of Education NT health-related policies; and their use of outside providers in the school. The questionnaire, provided to teachers in hard copy, gathered demographics including the teachers' school (encoded), year level/role in school, qualifications, age, gender and years teaching.

The data was collected via paper surveys at Site 1 and Site 2 during a 30-minute segment of their regular weekly staff meeting. The aim in conducting the questionnaire in this manner was to engage with as many teachers in the schools as possible and be available to answer any questions in relation to the text in the questions. The principals

of these schools recommended a regular staff meeting as the best method for collecting this data. At Site 3, due to a last minute cancellation of the staff meeting, the principal informed staff of the research, distributed the paper survey to all staff, then collected and returned the paper survey responses.

Data Analysis

The survey data was analysed using SPSS software to organise the data and run frequency and constants. A reliability analysis was conducted to measure the internal consistency of the questionnaire and reliability of instruments to use for further analysis. The data was analysed in relation to the approximate amount of time teachers were involved with health-related work in each health-related work category. It was also analysed in relation to how each health-related work category was rated (from highest to lowest) in terms of teachers' perceived expertise, satisfaction, confidence and perceived importance to the health of the students.

Findings

There was an overall response rate of 69% with an 85% response rate from Site 1, 72% response rate from Site 2 and a much lower response rate of 30% from Site 3. Results indicate that although the questionnaire guided teachers in their thinking by utilising health-related work categories provided in the questionnaire, they instinctively knew what these categories were. The data identified that teachers in these school sites perform health work in each of the categories across all three domains of the HPS framework. Findings indicate that there is not an even amount of time or importance placed on all eight health-related work categories, although Site 3 identified that all the categories were of high importance to the health of students.

In the week surveyed, the respondents reported spending on average 20 hours of their time involved in health-related work. Table 3 shows the average teacher time spent on health-related work per week across the three sites.

Table 3. Teacher time spent on health-related work per week

7	Pastoral care	Communicate with parents	School health policy adherence	Screening and referrals	Extra-curricular physical activity	Leading physical activity	Teaching health education	Extra-curricular food & nutrition
Average time spent per week								
Site 1	17 hours 30 mins	1 hour 50 mins	7 hours	1 hour	1 hour	2 hours 20 mins	10 hours 40 mins	2 hours
Site 2	4 hours 45 mins	1 hour 40 mins	40 mins	44 mins	2 hours	1 hour 50 mins	2 hours 40 mins	40 mins
Site 3	53 mins	30 mins	1 hour	11 mins	31 mins	35 mins	28 mins	38 mins
Minimum time spent per week								
Site 1	20 mins	0 mins	10 mins	0	0	0	0	0
Site 2	0	0	0	0	0	0	0	0
Site 3	0	15 mins	20 mins	0	0	0	0	0

In analysing the data from the questionnaires, teachers spent less time teaching health as part of the curriculum (4 hours and 48 minutes), compared to pastoral care (6 hours and 43 minutes) but identified teaching health education very similar in importance. Teacher's level of expertise (41%) and confidence (59%) to perform this work was low in comparison to pastoral care and communicating with parents (see Table 4).

Table 4. Combined summary matrix: 1-8, highest to lowest

Category	Site	Importance			Satisfaction			Expertise			Confidence		
		1	2	3	1	2	3	1	2	3	1	2	3
Teaching health education	1	1	2		6	6	5	5	6	2	3	4	4
Pastoral care	2	2	1		3	1	1	7	2	1	7	2	2
Screening and referral	3	7	1		9	8	2	8	8	2	8	8	5
Communicating with parents	4	6	1		1	5	3	1	1	5	1	1	3
Extra-curricular food & nutrition	5	5	1		4	4	4	6	7	1	4	7	1
School health policy adherence	6	8	2		7	7	7	4	5	2	6	6	3
Leading physical activity	7	4	1		2	3	6	3	4	4	2	5	5
Extra-curricular physical activity	8	3	2		5	2	3	2	3	3	5	3	6

The overall questionnaire results indicate that teachers in these three school sites spent a large amount of their time (64%) involved in health-related work. A large proportion of this time is providing pastoral care (6 hours and 43 minutes), which correlates with teacher's perception that it is also of high importance to the health of a student (93%). Pastoral care also scored highly in relation to teacher's perceived expertise (46%), confidence (63%) and satisfaction (72%) to conduct this work in schools. Similarly, leading physical activity as part of the school curriculum also scored highly in importance (87%), perceived expertise (45%), confidence (62%) and satisfaction (70%) but on average teachers only spent 1 hour and 54 minutes performing this work in a school week.

In contrast, teachers reported feeling less confident in teaching health education (59%), conducting extra-curricular physical activity or sport (58%), school health policy compliance (49%) and health screening and referrals (39%). Teachers spent on average 2 hours and 29 minutes performing school health policy compliance but still identified this as important to the health of students (81%). Teachers identified that their level of expertise (41%) and confidence (49%) to adhere to school health policy was low, which correlated with the lowest level of satisfaction (48%) to perform this health work. In support of these findings and a possible reason for a low level of expertise is that only 53% of teachers surveyed had read any of the health-related departmental policies listed in the questionnaire.

Results also indicate that only 42% of teachers surveyed used any of the external service providers listed in the questionnaire (see Table 5). Of the external service providers listed, Health Promoting School Nurses (15%), health promotion professionals (14%) and medical – doctors, nurses, therapists (14%) were utilised the most by teachers.

Table 5. External service provider usage

External service providers used	42%
Health promoting school nurses	15%
Health promotion professionals	14%
Medical – Doctors, nurses, therapists	14%
Sporting associations or private sports companies	13%
Police, fire and rescue services	11%
Mental health and wellbeing agencies	11%
Counsellors (outside of DECS)	9%
Drug support agencies	8%
Family Planning	5%
External service providers not used	50%
No response	8%

The most striking result to emerge from the statistical analysis of the survey data is that teachers in these NTG schools spend on average 20 hours per week undertaking a range of health-related work. This is high considering that on average, Australian primary teachers engage in 21.775 contact hours with students per week and Australian secondary school teachers engage in 19 contact hours with students per week (OECD, 2014). Interestingly, teachers in these schools perceive that this work is of high importance to the health of their students.

Discussion

The results of this research in NTG school sites support the conclusion stated by Rossi, et al. (2016), that the data from their research is transferable across the teaching profession in Australia. The survey data from the NT research indicates very similar results to Rossi, et al. (2016) in the types of health work performed by teachers, perceived levels of importance, satisfaction, expertise and confidence.

There was however, significant difference between the two studies in relation to how much time teachers spend undertaking a range of health-related tasks. Rossi, et al. (2016), indicate in their findings that from an SES perspective there were no significant differences in the time spent undertaking health work in low SES schools and that on average, participants in their research from different SES areas spent approximately a quarter of their time each week, 9.25 hours engaged in health-related work.

In contrast, the statistical analysis in the NTG research, indicates that teachers in the NTG school sites spent 54% of their time (20 hours per week) undertaking a range of health-related work. The difference between the averages of the NT data and that of Rossi, et al. (2016) could be attributed to the fact that a special school site (Site 1) was included in the NT data, where teachers identified that most of their work is health-related. Whilst the inclusion of Site 1 data may have increased the average time teachers spent engaged in health-related work, Site 2's average was still quite high in comparison to the other school settings outlined by Rossi, et al. (2016).

Of interest to the research is further exploration of the types of interventions, which constitute the health work classifications used in this study. Particularly the types of interventions related to pastoral care, which was high on the list of teachers' health work.

Conclusion

This research revealed that NTG teachers at these school sites, do spend a large amount of time engaged in health work. It also revealed that teachers perceived that the domain of practice (teaching health as part of the curriculum, leading physical activity as part of the school curriculum and pastoral care) were of most importance to the health of students. The domain of environment (extra-curricular food and nutrition, school health policy compliance and extra-curricular physical activity or sport) was identified by teachers as being of least importance. What is of interest to the research is that teachers are engaging in health work from all three of the domains of the HPS framework.

The findings also revealed that teachers have generally low levels of expertise in all of the health work categories. Further data analysis into correlations between the number of years teaching experience, areas of study and perceived expertise in the health work categories would be valuable. What is evident, is that teachers are performing health work and they need to be able to access professional development in health work at university as part of their undergraduate degree and later during their teaching careers to increase their levels of expertise.

What was not evident in the data was correlation between teachers perceived importance of leading physical activity as part of the school curriculum and the amount of time teachers spend performing this work. An explanation for this may be that each of the schools do have full time physical education teachers and that this work is predominately within these roles.

Whilst the findings provide an overview of the amount of time NTG teachers spent conducting health work and teachers' level of expertise, satisfaction and confidence to perform this work, there is a need to view this data from another perspective. A perspective, which clearly articulates the contextual differences between respondents and their respective school settings.

Absent from literature is an exploration of the perspectives of professionals and school community members on the health work enacted in NTG school settings, with a specific recognition that each school context or community is very different to mainstream schooling. The work of McPhail-Bell, Fredericks and Brough (2013), highlighted that the original vision for health promotion was for all people and that non-Western voices, professional and school community perspectives of health work conducted in NTG schools are lacking in the research to date. This non-Western perspective is of importance to the research due to the high Indigenous student population in the NT. Whilst the Indigenous student population is large the number of Indigenous teachers in NTG schools is low. Further research into Indigenous perspectives of the health work performed in schools will need to be sourced from school staff and community.

Of interest to the research will be exploring the sociocultural forces which shape the health work conducted by teachers, professionals and community members within NTG schools. Providing understanding of the alignment or disjuncture, with Indigenous knowledge systems and practice in relation to Indigenous perspectives of health. Recognising and considering any contradictions will enable the researcher to reframe perceptions into possibly a new theoretical vision (Eisenhart, 1989).

The information gained from further research will provide a valuable contribution to our understandings, aspirations and endeavours to enhance health work in NTG schools and provide quality educational research with relevant data, which could improve education practice, environment and partnerships in health in the NT.

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Practical research in schools to measure the effectiveness of BUZ (Build Up Zone) social and emotional wellbeing programs

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Abstract

This study examined the effectiveness of a strength-based intervention called Build Up Zone (BUZ) Life Skills School Programs for Primary Aged Children, on the overall Social and Emotional Wellbeing (SEW) of the classroom and the whole school. A pre-post research design was used to survey 103 children ranging from Year 2 to Year 6 in one primary school in Western Australia. Pre-intervention, at end of Term 2, July 2015, the Australian Council for Educational Research SEW survey was administered to all children. Intervention comprised one-hour, weekly classroom sessions over 10 weeks in Term 3 conducted by two external, trained BUZ facilitators in all classes. The same survey was then re-administered after the intervention, at end of Term 4. Survey data included indicators for overall SEW, Social skills, Learning skills and Emotional skills. Year x Gender repeated ANOVA of SEW indicated that BUZ Life Skills Program resulted in significantly higher SEW overall in the school post-intervention, but that gender and year level moderated the changes in SEW. Also, the overall school SEW score exceeded the ACER national comparative measures. Therefore, BUZ Life Skills School Programs resulted in measurable improvement in social-emotional wellbeing in children after a one-term intervention.

Introduction

Build Up Zone (BUZ) is a classroom and strength-based, social-emotional wellbeing (SEW) life skills program. According to Durlak et al. (2011), BUZ would be an example of a universal Social and Emotional Learning (SEL) skills program implemented in schools to develop SEW in children. The following reports an initial evaluation of the effectiveness of the Build Up Zone (BUZ) Life Skills School Programs for improving SEW in primary-aged children.

The Melbourne Declaration on the Educational Goals for Young Australians (Commonwealth of Australia, MCEETYA, 2008) recognised the importance of SEW in childhood when it stated that children and young people should be successful learners, confident and creative individuals, and active and informed citizens. Further, the declaration identified that children's and young people's social, economic, ethnic or Indigenous backgrounds should not determine their future place in society. This declaration highlighted the importance of SEW of the 'whole' child and for education to ensure the development of individual capacities and social competencies (Australian Institute of Health and Welfare, AIHW, 2012).

In the Early Years Learning Framework (Commonwealth of Australia, 2014), the development of positive social and emotional skills is recognised as fundamental to supporting children's wellbeing and benefits all aspects of children's lifelong learning and development. Notably, social and emotional skills are known to be a protective factor for present and future mental health and wellbeing (KidsMatter, 2014).

Greenberg et al. (2003) found that children with developmentally appropriate social and emotional skills are more likely to have better social and educational outcomes than those whose skills were less developed or who did not

participate in SEW programs. Benefits of enhanced social skills include higher self-esteem and more positive relationships in later life outcomes, such as successful marriages and careers. Other studies have shown that children who can regulate their emotions are more empathic, relate to peers effectively, respect the rights of others, and perform better at school (Lockwood et al., 2014; Hoffman, 2008; Spinrad, et al., 2006).

Children who are less skilled in handling their emotions tend to have more negative experiences with peers and adults. According to Rubin, Coplan, and Bowker (2009), this can have lifelong impacts. Especially as some children may have limited social skills to join in group play which can lead to feelings of isolation or rejection and undermine self-confidence (Coleman & Hagel, 2015).

Literature Review

In a recent study, the World Health Organisation (WHO) indicated that mental health problems account for nearly half of disabilities among individuals aged 10 – 24 (Gore et al., 2011). It substantiates Benson's (2006) suggestion of the growing need for proactive, supportive educational communities to provide caring and encouraging learning environments for children to develop important social and emotional competencies. Further, studies by Klem and Connell (2004) suggest that less than half of students graduating from college have developed competence in important social and emotional competencies such as empathic responding, conflict resolution and problem solving skills. Such evidence supports a growing need for schools to be more responsive to students' mental health and SEW.

A strong and growing evidence-base supports improving the wellbeing of children through effective prevention and early intervention (Fox et al., 2015). True prevention is about pre-cause - it is about creating a healthy culture and building a positive environment, empowerment, and being proactive. Heron (2011) proposed that 'it makes more sense to build-up children rather than wait to fix up adults' (p. 17). Clearly, preventing a problem developing rather than curing it is an increasingly important focus. Therefore, it is important for schools to promote healthy self-esteem, social and emotional competence, and social inclusion as aspects that may prevent emotional, behavioural and mental disorders.

A strength-based approach to wellbeing enables schools to be proactive (McCashen 2005). Instead of focusing on what not to do, this approach focuses on enhancing personal and social capability (Australian, Curriculum, Reporting Authority, ACARA, 2013) to help children become optimistic, believe in their own abilities, increase their happiness and motivation, and tap into their unique intelligences (Tummers, 2013). Using a strength-based approach to explore in depth the qualities of wellbeing, is to build strengths by encouraging children to investigate their perception of the self and to create self-awareness to be able to tap into and use their own strengths.

Seligman (2012), a pioneer in the field of positive psychology, uses the term 'flourish' to indicate a state of positive mental and social wellbeing. Seligman's "wellbeing theory" (2006) addresses positive emotion, engagement, meaning, positive relationship and accomplishment. When children believe in their ability to make things happen and take action, they have a sense of self-efficacy, a belief in their strengths (Bandura, 1994).

Strength-based social-emotional learning (SEL) approaches foster in children the skills to build personal wellbeing and positive community. The use of SEL programs encompassing neuro-based positive psychology strategies have been proven to help students increase self-regulation, build engagement through strength, improve relationships, assign meaning, and scaffold accomplishment (Seligman, Ernst, Gillham, Reivich, & Linkins, 2009). Implementing

a strength-based approach to SEL designed, specifically to work well within a classroom by creating a warm and inclusive environment, helps to build a positive environment (i.e., a Build Up Zone) and improve overall SEW (Bucholz & Sheffler, 2009).

'Strength-Based Practice' is to focus on what children are good at (Seligman, 2006). SEL concentrates on the inherent strengths of the individual student deploying personal strengths to aid discovery and empowerment. All children and young people, and their communities, have particular strengths and resources that can be nurtured to improve their own and others' health and wellbeing (McCashen, 2005). In helping create a positive learning environment for all participants whatever their background or situation, all students, even those who have learning difficulties and extraordinary personal challenges, can do well when they are physically comfortable, mentally motivated and emotionally supported (Schaps, 2003).

SEL can assist to improve all children's skills in resolving disputes, managing conflict, and communicating in ways that promote strong relationships (Pulla, 2012). According to Batson and Powell (2003) children learn to respond constructively to conflict in the early stages and through restorative justice practices that foster pro-social behaviour. Research by Morrison, Blood, and Thorsborne (2005) places the emphasis on the processes for restorative justice and the importance of learning the social skills of active listening, negotiating, facilitating and the appreciating of diversity. This helps widen the children's circle of friendship and improve their relationship with their teachers as well as to help children address conflict. Such skills may allow better academic outcomes.

The Collaborative for Academic, Social and Emotional Learning (CASEL) recently defined evidence based SEL skills programs as those that were universal (comprehensive) and school-based; designed to foster the development of core personal and social competencies; taught students to understand and manage emotions; set and achieve goals; feel and show empathy; establish and maintain relationships; and make responsible decisions (CASEL 2014). According to Greenberg et al. (2003) these competencies provide a foundation for better adjustment and academic performance in students, which can result in more positive social behaviours, fewer conduct problems, and less emotional distress (Durlak et al., 2011).

Increased positive emotions helps increase children's awareness, attention and memory (Siegal, 2010). If a universal school-based SEL program is creative, colourful and fun, it is more likely to attract the children's interest, increase their engagement and make the experience of learning social skills more positive and enjoyable (Fredricks & McColskey, 2012). Gray and Schultz. (2013) wrote that because children learn well through play, if they say something is 'fun', like BUZ, it usually means that it is enjoyable and that they are engaged and learning valuable skills.

If SEL programs are to provide the scaffold for students' social and emotional development such that they can manage and regulate emotions, and have ability to cheer up or calm down others (Goleman, 2007), it is critical that schools implement integrated whole-school approaches through strength-based practice to improve overall SEW. At present, there is limited information on the effects of strength-based SEL programs on SEW at different year levels or in relation to gender. Therefore, it is essential that such SEL programs are evaluated. This study examined the effectiveness of one such program BUZ, on the SEW of students of different year levels in a single school. If such interventions are effective one would expect that SEW would improve following SEL program implementation.

Methods

Participants

A total of 153 students, ranging from Year 2 to Year 6, in one primary school, were given parental permission to be involved in the study. All students participated in the pre-intervention survey administered at end of Term 2, July 2015 as well as the intervention. The intervention consisted of one-hour weekly sessions, using BUZ programs in all classrooms, for a total of 10 weeks during Term 3 (August to October 2015). The same survey was then re-administered as the post-intervention survey at end of Term 4, November 2015. Full pre and post data were available for 103 students (59 males, 44 females). Nine further cases who joined the school during the intervention period were omitted because they did not have pre-intervention data (eight males, one female).

The Intervention

BUZ is founded on a 'strengths' rather than a 'deficits' approach. The focus is on looking for what is 'right' or positive and going well in a child or family's life, and building on those aspects. Intervention works on developing connectedness among students through cohesive, collective and collaborative activities. Programs introduce a common language to cement and build relationships between staff, students and the wider community. Programs are holistic, colourful and highly visual, user-friendly and aligned to the Australian Curriculum. Fully resourced and developed in Western Australia, BUZ is designed to cater for multiple learning styles through its classroom activities while working to improve student learning, wellbeing and behaviour, and 'the conditions that support these' (Australian Research Alliance for Children and Youth, ARACY, 2010).

The intervention was comprised of one-hour, weekly classroom sessions over 10 weeks, conducted by two external, trained BUZ facilitators in all classes. A prerequisite of the BUZ program intervention was the participation of classroom teachers, education assistants and all other adults in the room during implementation. The teacher/assistants therefore acted as a co-facilitator(s) in the learning, steering the discussions and activities to suit the needs of their students as necessary.

Measures

The primary school version of the ACER SEW survey (ACER, 2015), designed by Bernard (2007), was used for both pre and post-assessment of students' SEW (Bernard, Stephanou & Urbac, 2007). The survey provides data on the SEW of groups of students (e.g., at one or more grade level; whole school; female; male). For the primary student survey, students responded on a two-point Likert scale: 'agree'/'disagree' (ACER 2015) to 53 statements. The survey took approximately 30 minutes to administer. The school results were compared to those of a national benchmark population. An adult assisted the younger children (Year 2) by reading the survey statements and helping them to respond. A standardised dialogue was created prior to the survey to ensure the process was explained in the same way to all students and also to provide a list of definitions/explanations for difficult words. This was relevant to the younger students.

The raw survey data were independently analysed by ACER and a report of the students' SEW scores, along with comparative 'All Schools' data (ACER 2015) was generated. The 'All Schools' data is based on a non-randomly selected, Australia-wide, cross-sectional sample of more than 10,000 students from 81 schools as reported in Bernard et al. (2007). The ACER raw data report included the following summary variables for each participant - raw

item response; the scored item response; the overall raw score (0 to 53); overall Scale Score (49.6 to 154.8); and its level (1, lowest to 6, highest); and the level for each specific SEW area (Indicators, Learning Skills, Social Skills, Emotional Skills) (1, low to 3, high). Data were grouped on sex and year level.

The variable overall SEW Scale Score was used for pre-post statistical analysis. Bernard et al. (2007) defines Overall SEW of Young People as a combination of Positive Indicators (the presence of positive emotions/behaviours and the absence of negative emotions and behaviours) plus Personal Factors (character strengths and SEL competence). SEW was described in terms of varying levels (see Table 1) rather than considering wellbeing as a binary notion of have or not have.

Table 1. SEW level descriptors

LEVEL 6	Highest level of SEW
LEVEL 5	Very high level of SEW
LEVEL 4	High level of SEW
LEVEL 3	Low level of SEW
LEVEL 2	Very low level of SEW
LEVEL 1	Lowest level of SEW

Bernard et al. (2007) applied Rasch measurement analysis and multi-level modelling to validate the ACER SEW scale's use and levels in surveys by schools. The SEW scale is independent of any particular survey form (i.e., pre-primary, primary, secondary, teacher SEW surveys). The raw scores are transformed to a corresponding Scale Score value which can then be compared across age groups, time points and schools. The overall Scale Score represents the students' location on the SEW scale.

Statistical Analysis

A three factor General Linear Model Analysis of Variance with repeated measures was conducted on overall SEW Scale Score using SPSS Version 23 on $n = 103$. The fixed effects were Year level (five levels – Years 2, 3, 4, 5, 6) and Sex (two levels, M, F), and the repeated measure being pre and post-intervention. The significance level was set at $p < .05$ for the analysis.

Ethical Considerations

Permission to conduct this research was obtained from both the school sector and the principal. Written permission was provided by parents of all participants. All data were de-identified for reporting purposes.

Results

The descriptive statistics of mean SEW Scale Score for the Intervention School compared the national primary cohort (all schools) of 13,292 students (see Table 2). This descriptive analysis was based on all students who had completed either the pre or post-intervention survey. Note this number varied from the cohort on which the analyses were conducted. The results indicated at pre intervention the mean SEW Scale Scores were comparable, but it was slightly higher at post-intervention.

Table 2. Mean SEW Scale Score comparison between Intervention School and national 'All School' data

		N	Mean	Std. Dev.
Intervention School	Pre-intervention	111	118.5	9.8
	Post-intervention	115	120.3	11.3
All School		13,292	118.6	11.3

Table 3 shows the summary statistics for the repeated measures analysis ($n = 103$). The SEW Scale Score increased significantly from pre to post-intervention (118.6 compared to 120.3, $p = .018$, (see Table 4). A complex three-way interaction was revealed between occasion x sex x year level in the Scale Score changes ($p = .04$) whereas sex and year level failed to reach significance. Table 5 details the summary statistics.

Table 3. Repeated measures ANOVA on SEW Scale Score for intervention occasion x year level x sex

Measure	Scale Score	Type III Sum of Squares	df	Mean Square	F	p
Pre-post Scale Score	Linear	224.482	1	224.482	5.767	.018
Scale Score * Sex	Linear	131.666	1	131.666	3.383	.069
Scale Score * Year Level	Linear	197.593	4	49.398	1.269	.288
Occasion * Sex * Year Level	Linear	408.337	4	102.084	2.623	.040
Error (Scale Score)	Linear	3620.063	93	38.925		

Table 4. Pre-post changes in mean SEW Scale Score

Occasion	Mean	N	Std. Deviation	Std. Error Mean
Pre	118.617	103	9.9257	.9780
Post	120.335	103	11.0256	1.0864

Table 5. Summary Statistics for pre and post-intervention SEW Scale Scores across year level and sex ($n = 109$)

			Pre-Intervention SEW Scale Score		Post-Intervention SEW Scale Score	
Year Level	Sex	N	Mean	Standard Deviation	Mean	Standard Deviation
2	M	17	116.0	10.0	118.8	9.3
	F	9	120.3	5.5	116.9	9.9
3	M	14	116.7	6.6	115.8	8.4
	F	13	118.3	9.1	119.5	11.3
4	M	13	118.3	8.5	120.7	9.8
	F	6	115.4	13.0	121.7	15.9
5	M	8	112.8	11.3	110.8	9.7
	F	7	119.1	8.5	130.8	14.5
6	M	15	125.6	10.6	126.0	9.7
	F	10	119.8	12.1	123.6	9.1
Total	M	59	118.5	10.3	119.3	10.2
	F	44	118.8	9.6	121.7	12.0

Figure 1 below illustrates the complex interaction effect in SEW Scale Scores for Sex and Year levels, particularly from years 4 to 6. It is important to note that the Scale Score, being standardised, means that one would not expect it to increase with development across the year levels. The average of each year level should be approximately the same. If on the other hand, the students' SEW was less developed within a year level and the intervention truly strengthened this capability, then one would expect to see the Scale Score increase from pre- to post-intervention.

Figure 1. Mean SEW Scale Score changes for primary school boys (n = 59) and girls (n = 44) at year levels 2 through 6

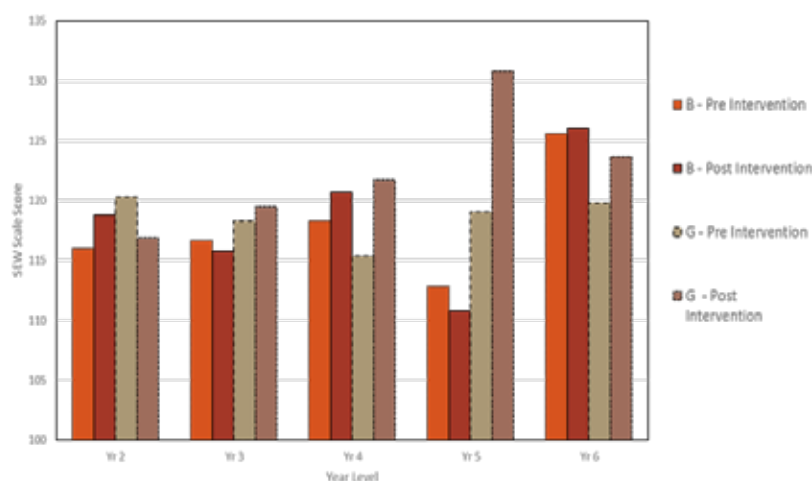
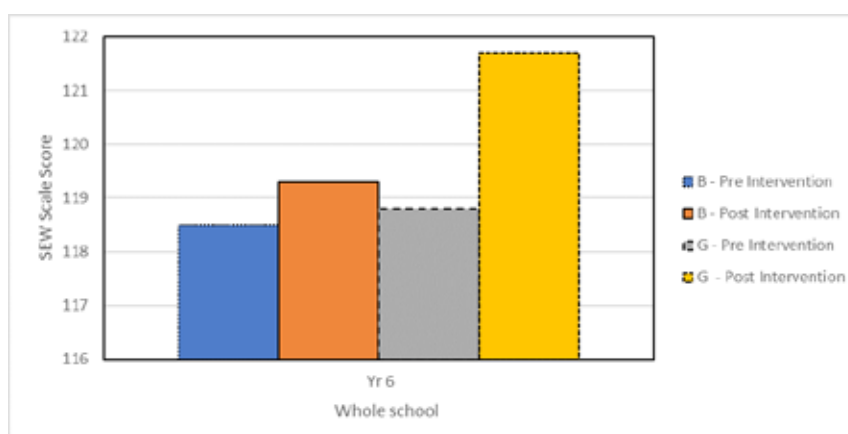


Figure 2 below illustrates the whole school Scale Score increase from pre to post-intervention.

Figure 2. Overall SEW Scale Score changes for the whole school boys (n = 59) and girls (n = 44)



In general, the change in the SEW Scale Score post-intervention depended on the Year level and was moderated by Sex. On average, boys' post-intervention scores did not change as much as did girls. From Years 2 to 3, a cross-over effect was found. Although girls initially had a higher SEW Scale Score than boys, post-intervention the girls' Scale Score decreased whereas the boys' score increased to exceed the girls' score.

The second pattern was at Year 4 to 5 with the Year 5 boys' SEW Scale Score appearing to be lower than their younger peers. On the other hand, Year 5 girls appeared to gain greater benefit from the intervention than at any other Year level. Within Year 5, the initial difference in Scale Score favouring girls was amplified post-intervention for them. Boys' Scale Score did not improve and was slightly reduced.

At Year 6, boys' SEW Scale Score pre-intervention exceeded the girls' score. However, at post-intervention only the girls' Scale Score increased whereas the boys' score remained unchanged. Although the boys still exceeded the girls' score overall.

Synthesis

Since 2001, anecdotal feedback has indicated that BUZ programs enhance student, teacher and parent wellbeing, and provide a more positive school culture when used to help teachers embed the teaching of SEL in their curriculum and teaching. This current study provides some empirical evidence to substantiate these qualitative reports and corroborates findings from two previous unpublished reports by Strikwerda-Brown (2007) and Heron (2005) on the effectiveness of BUZ in schools.

SEW is complex and difficult to define, particularly in a school setting (Dodge, Daly, Huyton, & Sanders, 2012). All states in Australia have a commitment towards whole school approaches to SEW which incorporate at least these five elements that affect wellbeing: safe environment; connectedness; learning engagement; social and emotional learning; and whole school approaches (Centre for Education Statistics and Evaluation, 2015). All states also make recommendations for the use of evidence-based programs for SEL.

Cole's (2008) review identified several reasons why schools are sometimes not continuing to use evidence-based programs – they are neither well-suited to meet the needs of targeted audiences, nor sustainable, nor cost effective, nor appropriate for their needs and their local community setting. The situation is especially common for programs that focus on 'changing negative behaviours', such as, bullying, rather than building skills that are proactive and prevent negative behaviour (Cooney, Huser, Small, & O'Connor, 2007). Hence, strength-based programs like the BUZ School Programs have great potential. If schools are to be more proactive and focus on strength-based approaches to health and wellbeing, system and school-level policy and implementation should reflect this.

These empirical findings indicate that BUZ programs may give schools a further option for implementing whole of school approaches to SEL. The findings are encouraging. However, more research is required to understand the most sustainable and effective way to implement the program for different ages, sexes and culturally diverse classrooms.

Summary, Implications and Conclusions

Summary

In summary, overall mean SEW Scale Score increased significantly from pre to post-intervention ($p \leq 0.018$) along with significant interaction between the factors year level and sex in the scales or changes ($p \leq 0.04$). No significant effect of year level alone ($p > 0.05$) nor sex alone ($p > 0.07$) resulted in overall significant improvement of Scale Score regardless of year level. When comparing the national SEW data, it suggests the BUZ program resulted in a slightly higher SEW Scale Score overall at post-intervention.

Implications

These results suggest that given the improvement from pre to post-intervention, BUZ has made a significant difference to overall SEW of this school's student population. However, the complex interactions between gender and year level indicates that further investigation is needed to understand how SEW is influenced by development among girls and boys. Only longitudinal research designs can clarify the implications of the interactions between year level and sex.

Another implication is the limitation that the study was restricted to a single school. Broader evidence about the influence of BUZ programs from a wider spectrum of children, teachers and schools would be important. Are there implications of different social and/or cultural factors? Follow up research could include an analysis of the percentage of students classified at low, medium and high levels of SEW and how a program changes the distribution of children within these groupings. It is planned that the intervention school will continue implementation of BUZ and re-administer the survey in 2017. Key factors related to sustainability should be investigated, such as cost and ease of delivery when an external facilitator is employed, or whether special training of the classroom teacher(s) would be more sustainable.

Conclusion

The study confirmed that overall BUZ had a measurable, positive impact on students' SEW, albeit with some differences in the relative change among boys and girls in particular grades. It is a first step in providing empirical evidence to validate BUZ as being effective SEL programs, at least when implemented across a 10-week period with a trained facilitator. It is crucial that in addressing SEW and building the personal and social capabilities in students, schools adopt SEL programs for which there is an evidence-base. At this stage, BUZ appears to be such a program.

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Creating an understanding of the UV Index amongst pre-service teachers

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Abstract

In Australia, the Ultra Violet (UV) Index is used as a measure of solar ultra violet intensity and is advertised locally, through various media outlets to promote sun safe behaviour. Despite this availability, skin cancer remains the most common cancer in Australia and the most significant cancer for the age range of 15-24 years. Research indicates that the UV Index is not well understood, especially that it is unrelated to temperature. In conjunction with the Cancer Council of Western Australia (WA), this study critically examined the UV knowledge and sun safe behaviours of pre-service teachers of health education (HE) preparing for employment in WA secondary schools. It utilised pre and post-intervention data to measure any change in the pre-service teachers' understandings of UV knowledge and willingness to adopt sun safe behaviours. Additionally, this study examined three HE lesson plans prepared by the pre-service teachers to account for their ability to utilise the UV concept in the development of lessons. Insights from this study identified particular sun-safe concepts and behaviours needed to improve pre-service teachers' understandings of the UV Index and teaching and learning of sun safety in secondary schools.

Introduction

Despite a recent downturn in melanoma rates amongst young Australians, the incidence of skin cancer in Australia remains very high (Australian Institute of Health and Welfare, 2016). In terms of direct human misery, well over 2,100 lives are lost to skin cancer each year and over 1 million skin cancers are treated per annum (Australian Bureau of Statistics, 2015). These are significant statistics for a population of only 24 million and partly explain why the direct cost to the Australian health care system is estimated to be \$650 million per year (Australian Institute of Health and Welfare, 2011, 2016; Fransen et al., 2012). Paradoxically, skin cancer is regarded as the easiest cancer to prevent as it is mainly caused by overexposure to Ultra Violet (UV) radiation; with our lifetime risk to skin cancer dramatically reduced by simply covering up during periods of strong UV. UV radiation is measured using the World Health Organization's UV Index (UVI), which qualifies UV strength and the risk to harmful sun exposure (SunSmart, 2016). Current guidelines from the World Health Organization advise that sun protection should be used when UVI is three or higher (Fig. 1).

Figure 1. The UV Index



Source: World Health Organization, 2002

After more than three decades of promoting the sun safety message in Australia, research indicates that a one size fits all approach to intervention does not work across the community, with tailored approaches found to work best (Williams, Jones, Caputi, & Iverson, 2012). Research has also shown that the UVI is not well understood in WA despite the high rate of skin cancer and public broadcasting of the UVI (Blunden, Lower, & Slevin, 2004; Carter & Donovan, 2007). Notably, the groups that are the most difficult to influence are teenagers and high school teachers and each for different reasons. Teens, who are finding their independence, are often resistant to many health messages and do not respond well to overt direction. As noted by Dobbins et al. (2009), indirect approaches such as the provision of shade and sun protective school uniforms work best with teens. High school teachers on the other hand, deal with many serious and challenging issues each day, often relegating those issues, which do not have immediate consequences, to the background and sun protection and skin cancer is a case in point. Accordingly, if the teacher does not understand the nature of UV radiation and the risk it poses, and the students are not motivated to cover up, then there are grounds for significant long term damage to occur within and pertaining to educational settings.

This paper presents part of the findings from a study that critically examined the UV knowledge and sun safe behaviours of pre-service teachers of health education (HE) preparing for employment in Western Australian (WA) secondary schools. It presents questionnaire data, before and after an intervention by the Cancer Council of WA, to discuss changes in the pre-service teachers' understanding of the UVI and willingness to adopt sun safe behaviours. This paper also reports on progress toward understandings of the pre-service teachers' ability to transfer knowledge into practice by analysing their lesson planning to identify the ways in which their pedagogical choices support and strengthen health-enhancing dispositions.

The Study

In 2016, the Cancer Council of WA and Edith Cowan University (ECU) embarked on a joint, dual-strand approach to deal with these issues (Fig. 2). The approach centered on two initiatives: the insertion of a sun protection component into a unit of study for the Post-Graduate Diploma of Secondary Education course at ECU's Joondalup campus and the positioning of a UV meter on ECU's, Mount Lawley campus.

Figure 2. The Cancer Council WA and ECU UVI Initiative Approach



As part of the unit, the Cancer Council SunSmart staff provided the pre-service teachers with a comprehensive lecture in understandings pertaining to UV radiation, along with practical approaches to sun protection use in schools. This initial inoculation aimed to up skill the pre-service teachers in matters concerning UV radiation and sun protection, which would then be embedded into their lesson planning to address the unit's assessment. More particularly, the pre-service teachers were required to write a series of three consecutive lessons that focused on pre-selected educational outcomes related to UV radiation and sun protection; identified in the WA P-10 Syllabus

for Health and Physical Education (School Standards and Assessment Authority 2015). These outcomes were aimed at year 7 students to remind them about the dangers of the sun.

This pre-service teacher study was carried out in parallel to one researching the impact of the UV meter installation. Preliminary results from the UV meter study had showed that on-campus students' knowledge of the UVI was low prior to installation of the meter. The UV meter is a large format sign that senses the local UV radiation and displays a value according to the global standard UVI. The impact of the meter is currently being investigated. This paper reports on the UVI initiative with the pre-service teachers at ECU's Joondalup campus and addresses the following three research questions:

1. Are pre-service teacher students on ECU campus aware of the UVI?
2. Is there a change in understanding of the UVI by pre-service teacher students following preparation of lesson plans utilising the UVI?
3. Is there a willingness to change sun protection behaviour as a consequence of acquiring knowledge about the UVI?

Methodology

Two methods were used to investigate the understandings of 48 pre-service teachers enrolled in a Health and Physical Education unit in 2016 (Creswell, 2014). An online questionnaire was used to measure student attitudes before and after an intervention to provide information about the UVI. Student lesson plans were analysed at the end of semester.

The Pre and Post-Intervention Questionnaires

The pre and post-intervention questionnaires were identical to measure any change following the intervention. The questionnaire questions were developed in consultation from the Cancer Council of WA and ECU's School of Education and School of Arts and Humanities staff. It included questions designed to elicit knowledge about the UVI adapted from Blunden et al. (2004) and Carter (2007). These items were used in both the pre-service teacher study and the on-campus UV meter study. Questions covering sun safe behaviours were adapted from the Cancer Council WA's annual SunSmart campaign evaluation survey. The questionnaire was piloted with a group of ECU staff before release, and opened to the pre-service teachers in August 2016 and closed in October 2016.

The final sample comprised two sets of 30 pre-service teachers who completed the online questionnaire. As the questionnaire was completely anonymous, different sets of pre-service teachers may have completed it at the two time periods. Analysis of the pre and post-intervention results was performed using SPSS 23, and descriptive statistics calculated. Central tendency and variations of scores were summarised using means and standard deviation.

The Intervention

Two Cancer Council staff from the SunSmart program visited two classes on Joondalup campus to present a three-hour lecture and workshop on UV radiation, the UVI and sun safety. Staff delivered a PowerPoint presentation and conducted a series of activities with the pre-service teachers, including a SunSmart puzzle. The pre-service teachers were provided with the PowerPoint presentation and printed resources to assist their lesson plan preparation.

The Three Consecutive Lesson Plans

The pre-service teachers enrolled in the unit were required to demonstrate their understandings of the UVI and sun safe protection within three consecutive lesson plans. A marking key that evaluated the extent to which the lesson plans could deliver teaching and learning and scaffold the educational outcomes was developed with consultation from 14 educational and health-related professionals. The marking key focused specifically on the appropriateness of the lesson's UV understandings for students within year 7 schooling in WA, pedagogical understandings related to the teaching and learning of HE, choice of teaching strategies and the sequencing and/or scaffold of teaching and learning. The lesson plans were assessed by three independent markers.

Analysis of the lessons plans included a numeric score for criteria which measured the pre-service teachers' ability to transfer pedagogical knowledge into practice and a qualitative assessment to determine whether pre-service teachers understood concepts surrounding the UVI.

Results and Discussion

The average age of the pre-service teachers was 29y (SD 8y) and did not differ significantly between the two sample periods. The gender was 37% male and 63% female at the pre-sample and 31% male and 69% female at the post-sample.

Following age and gender questions, the pre-service teachers were asked a series of questions designed to measure their current attitude toward sun safe behaviour (Table 1).

Table 1. Percentage response of pre-service teachers (n=30) before a Cancer Council Intervention to the question: Thinking about sunny days in summer, when you are in the sun for an hour or more between 10am and 3pm

	Never	Rarely	Sometimes	Usually	Always	Total
How often would you wear a hat?	10	20	30	33.3	6.7	100
How often would you wear clothes covering most of your body including arms and legs?	3.3	40	40	13.3	3.3	100
How often would you stay mainly in the shade?	0	16.7	33.3	46.7	3.3	100
How often would you spend most of the time inside?	0	23.3	46.7	27.7	3.3	100
How often would you deliberately wear less or briefer clothing so as to get some sun on your skin?	10	33.3	26.7	23.3	6.7	100
How often would you wear a sunscreen with a sun protection factor of 30 or higher?	6.7	0	20	53.3	20	100
How often would you wear sunglasses?	0	3.3	20	13.3	63.3	100

This set of items was asked again at the post-test. As the questions refer to past actions and the study period did not include summer, the expectation was that the answers would not change. Median values (having assigned numeric values 1 for never to 5 for always) were consistent except for Item 2: How often would you wear clothes covering most of your body including arms and legs? This decreased from 3 to 2.5 indicating a shift from "sometimes" toward "rarely" between the pre and post sample points.

Pre-service teachers were asked separately about the likelihood of their using sun protection during winter (Table 2), showing only a small change in planned behaviour.

Table 2. Percentage response of pre-service teachers (n=30) before and after a Cancer Council Intervention to the question: How likely are you to use sun protection in the winter?

Sun Protection Use	Time of response	
	Pre-intervention (%)	Post-intervention (%)
Likely	10	17
Maybe	27	33
Unlikely	63	50
	100	100

When asked in the pre-intervention questionnaire if they had heard of the UVI, only three pre-service teachers said no, whilst all 30 pre-service teachers had heard of it following the intervention. When asked where they had learned about the UVI, most pre-service teachers cited: “school” as the source. As expected, by the time of the post-intervention questionnaire, most pre-service teachers cited: “the Cancer Council” as the source of their knowledge. The Cancer Council WA intervention improved the pre-service teacher’s confidence in their own understanding of the UVI, with all indicating some understanding by the time of the post-intervention questionnaire (Table 3).

Table 3. Percentage response of pre-service teachers (n=30) before and after a Cancer Council Intervention to the question: Would you say you understand the UV Index or don’t really understand it?

UVI understandings	Time of response	
	Pre-intervention (%)	Post-intervention (%)
Understand it	23	87
Sort of understand it	63	13
Don’t understand it	13	0
	99	100

However, when asked to explain what the UV index was, there was considerable variability in the open-ended responses. At the time of the pre-intervention questionnaire, most pre-service teachers understood the UVI in terms of sunburn risk or cancer risk, but there were also general answers such as, “exposure to sunlight.” At the time of the post-intervention questionnaire more pre-service teachers understood the UVI as a measurement, with one pre-service teacher responding: “It is a scale measuring the intensity of UV light.” At that time, pre-service teachers were also more likely to agree that the UVI was useful (Table 4).

Table 4. Percentage response of pre-service teachers (n=30) before and after a Cancer Council Intervention to the question: Overall, would you say the UV Index is useful or not particularly useful?

	Time of response	
	Pre-intervention (%)	Post-intervention (%)
Very useful	54	77
Somewhat useful	40	20
Not useful	3	3
	100	100

When asked about where they would obtain information about the UVI, at the pre-intervention questionnaire pre-service teachers cited general sources such as “the internet” or “the weather” but by the post-intervention questionnaire they were more likely to mention the Cancer Council, the website myuv.com or SunSmart.

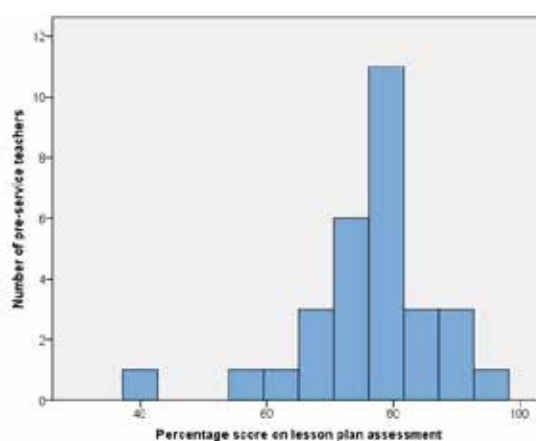
A series of questions were intended to test the pre-service teachers’ ability to understand and work with the UVI. The first question asked: “From what UV value upwards is it possible to get sunburnt?” The correct answer is three. At the pre-intervention questionnaire, the pre-service teachers cited values from one to 20 with a mean value of five (SD 4), indicating some confusion about sunburn risk. By the post-intervention questionnaire, the range was much smaller (2-4) with a mean of three (SD 0.2), indicating good understanding.

When originally asked the question: “If the forecast said the UV Index was going to be 6 today, does that mean it would be 6 at 9AM?” Only 19 pre-service teachers (63%) gave the correct answer of ‘no’. At the post-intervention questionnaire, all pre-service teachers gave the correct answer. Similarly, when asked to apply ‘true’ or ‘false’ as a response to the statement: “The UV index is generally highest at the hottest part of the day?”, only 18 pre-service teachers (60%) correctly answered, ‘false’. While the number of correct answers had increased to 23 pre-service teachers (77%) by the post-intervention questionnaire, there were still some pre-service teachers who had not mastered this concept.

For the final concept knowledge question: “At what hour of day is the UV Index usually highest?”, a very wide variety of answers were given in the non-numeric field provided in the questionnaire. Some answers were completely incorrect, even at the post test such as “3pm.” At both questionnaire points, a majority of the pre-service teachers gave a range rather than the requested hour and only those who gave a single hour like “12” or “1pm”, or a text answer to represent the hour such as “midday” and “noon”, were scored as correct. Ten pre-service teachers (33%) gave a correct answer at the pre-intervention questionnaire and this had only increased to 14 pre-service teachers (47%) by the post test. The most correct answer, “solar noon”, was given by a single pre-service teacher at the post test. Interestingly, preliminary qualitative analysis of pre-service teachers’ lesson plans showed that only 27% included explicit teaching on the time of day at which the UVI is hazardous.

Pre-service teachers’ successful ability to transfer pedagogical knowledge was demonstrated by a generally high standard of achievement (Fig. 3). All but one student passed the lesson planning assessment task and the average score was 76% (SD 10%). However, qualitative analysis of the content of the lesson plan is ongoing with an intention to identify whether the breadth of information required to understand the relationship of the UVI to sun safety is being provided.

Figure 3. Pre-service teachers’ lesson plan assessment results



Conclusion

The results showed that pre-service teachers' understandings of the UVI were poor (RQ1) but could be improved by an intervention involving direct instruction and preparation of lesson plans (RQ2). More specifically, the pre-service teachers were more likely to be confident of their understanding following the intervention and to consider the UVI as useful and more likely to know where to source information about it.

Following the intervention, pre-service teachers' working knowledge of the UVI remained imperfect, without a clear understanding of when the UVI is most hazardous. While this understanding is important, the pre-service teachers' improvement in general understanding that UV three is the point at which sun protection is required is promising. However, to ensure the pre-service teachers undertake sun safe behaviours themselves or with their pupils it is important that the Cancer Council identify explicit content for teachers that educational outcomes need address. This is necessary if school curricula in Australia is to contribute to decreasing hazardous sun exposure and the incidence of skin cancer. Further analysis of pre-service teachers' lesson planning will uncover their ability to transfer knowledge into practice and will identify the ways in which their pedagogical choices support and strengthen health-enhancing dispositions. It is hoped that this knowledge will contribute to the Cancer Council specifically identifying pedagogical content to be included in future pre-service teacher interventions.

Due to the short time period of this study, a change in sun safe behaviour was hard to ascertain (RQ3). However, the improvement in pre-service teacher's rating of the UVI as useful and their confidence in sourcing new information are promising indicators for future behaviour change. As mentioned in the introduction to this paper, a teacher's improved understanding of the UVI is necessary to support both their motivations to engage in sun safe behaviour and that of their students.

For the Cancer Council, access to educational outcomes and quality teaching and learning regarding the UVI represents a potentially excellent but indirect way to remind teens at school that UV radiation is always present and that they may need to cover up. In particular, the combination of better teacher education and the distribution of high quality lessons linked to the relevant syllabus has the potential to contribute to the downward trend in Australian skin cancer. For teachers and their students, the personal reduction in their own lifetime risk of skin cancer is surely worth having.

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Teens stuck to screens: A strengths-based approach to excessive use of digital media in young people

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Abstract

The overuse of digital media in youth is an emerging international public health concern. There is significant controversy in the literature as to what problematic use is and whether or not it constitutes a bone fide clinical disorder. This article reports on the findings of an exploratory action-research project which aimed to connect with excessive users and their families, to explore the relationship between overuse of digital media and wellbeing. The pilot project was undertaken by personnel at EACH, a national health and social services organisation in the Melbourne region. Cost free community seminars and a counselling service were offered to members of the community concerned by problematic use of the internet. This study gathered data to evaluate the project outcomes. The data was collected from an *Internet Gaming Disorder* diagnostic tool, a validated client satisfaction survey, de-identified client case notes and a transcript of interview with the project worker. The key learning from this small scale project was that problematic use at its most extreme would not appear to be a disorder per se, but rather a symptom of low life satisfaction. Pending more research, this project recommends a strengths-based approach to working with young people who are isolating themselves socially through immersive use of technology. It would seem that enquiring with authentic interest engages the young person and builds rapport. A dismissive or restrictive approach may only serve to reinforce a maladaptive cycle of poor relationships, complex life issues and continued problematic use.

Introduction

Technology has brought about a multitude of documented positive public health outcomes, facilitating pro-social behaviour and education (World Health Organization, 2015), and in turn enhancing psychosocial wellbeing (Yau, Potenza, & White, 2013). Despite this, the increasing popularity of the internet has also triggered media concern and academic focus on the negative health outcomes related to excessive use (World Health Organization, 2015). This paper reports on the findings of an exploratory pilot project undertaken by personnel at a national health and social services organisation called EACH. Therapeutic workers at EACH identified an increasing frequency of clients concerned about problematic online behaviour. A project was set up to understand more about the relationship between problematic internet use and reduced wellbeing, in order to inform the development of an effective intervention framework. Cost free counselling and community seminars were offered to community members affected by immersive use of the internet. A single project worker was employed for a period of 12 months and this role was developed and supported throughout by a steering committee. This article will focus on the counselling stream only as its direct contact with young people seems to be where the key findings came from.

The research questions were: *What are the risk factors behind problematic use of the internet? Can motivation for use inform harm minimisation?*

This was a rare opportunity in the field of problematic technology use because interventions in the field of internet addiction are rarely offered in primary health care settings (World Health Organization, 2015). All over the world governments are seeking prevention policies and response strategies aimed at effectively reducing the negative impacts of virtual environments on wellbeing (World Health Organization, 2015).

Literature Review

The literature review assisted the key project worker to build expertise on the nexus between use of digital media and reduced wellbeing. The initial finding from the review was the lack of clarity on where the boundary between healthy and unhealthy use lies (World Health Organization, 2015). To date the definition of problematic use is not clear or universally agreed upon. Additionally the literature is divided between excessive use as a clinical disorder in its own right, and excessive use as a symptom of an underlying disorder or issue (World Health Organization, 2015).

In 2013 the American Psychiatric Association (APA) proposed a diagnosis for *Internet Gaming Disorder* (IGD), adding it to the appendix of the Fifth Edition of the Diagnostic and Statistical Manual (DSM-5) as a way of stimulating research in the area (Van Rooij et al., 2014). Many studies in the literature apply this diagnostic nosology and look at excessive use as an addiction. They set out to measure behaviour and develop instruments to diagnose.

An alternative theory in the literature highlights that like many other maladaptive behaviours, problematic technology use is nothing more than a coping mechanism which serves to mask an underlying issue or stressful life event (Wang, Wang, Gaskin, & Wang, 2015; Yan, Li, & Sui, 2014).

The literature identified the relevance and prevalence of risk factors in moderating the relationship between problematic use and reduced wellbeing (Kuss, van Rooij, Shorter, Griffiths, & van de Mheen, 2013; Snodgrass, Dengah, & Lacy, 2014; Wang et al., 2015). Figure 1 lists the main themes that emerged from the review. An analysis of the risk factors in the literature revealed that stressful life situations result in a higher likelihood of using devices compulsively (Harwood, Dooley, Scott, & Joiner, 2014; Kuss et al., 2013; Wang et al., 2015).

The risk factors identified in the review appear to sit across three contexts. Firstly the user's *physical context or make up* (age, gender, personality). Secondly the user's *psycho-social context* (poor relationships or parenting, pre-existing mental health issues, low self-esteem) and finally *environmental context* (access, game design, socio-economic status). The literature reviewed suggests that poor mental health and poor relationships are two of the strongest predictive factors of excessive use.

Figure 1. Pre-service teachers' lesson plan assessment results

Risk Factors	
<ul style="list-style-type: none"> • Gender • Age • Genetic/Neurological Make Up • Personality Type/Introversion • Poor Relationships/Parenting • Allure of Online Relationships • Mental Health Issues 	<ul style="list-style-type: none"> • Low Self-Esteem • Social Isolation • Access • Game Design • Socio-Economic Status • Low Life Satisfaction

Several of the articles in the literature align their work with social compensatory hypothesis. In the context of excessive internet use, this theory looks at the reasons behind over engaging with technology (Wang et al., 2015), and suggests that motivation to use digital technology is compensatory and a manifestation of underlying low psycho-social wellbeing or risk factors (Haagsma, Pieterse, Peters, & King, 2013; Kirby, Jones, & Copello, 2014; Kross et al., 2013; Van Rooij et al., 2014; Wang et al., 2015; Weinstein et al., 2015).

Method

The *Counselling Stream* of the project involved working with adolescents and or their parents and carers to offer therapeutic support. Participants of the *Counselling Stream* of the project were adults (often with the young person present) who had heard about the service through the *Community Seminar Stream* of the project, or through a local school, school wellbeing officer or community worker who had attended a seminar from the *Community Seminar Stream*.

Data Collection Measures and Analysis

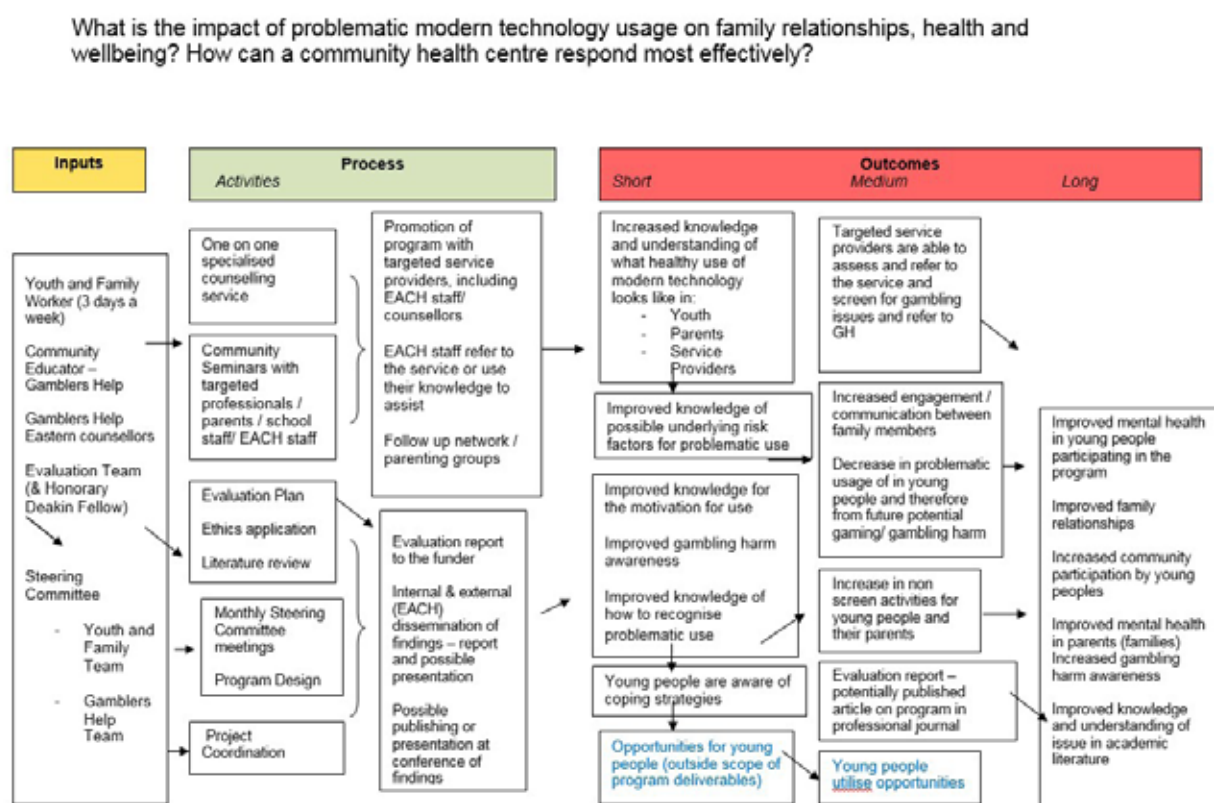
This was an exploratory project, therefore the research agenda and activities were shared by researchers and steering committee members (Lingard, Albert, & Levinson, 2008). The project used mix methods in order to capture multidimensional insights of the challenges as well as potential local solutions (Lingard et al., 2008). There were four methods of data collection for the *Counselling's Stream* of the project. Two quantitative methods in the form of surveys and two qualitative methods in the form of de-identified counselling case notes and a transcription of the interview with the project worker.

The first survey used was the DSM-5 proposed APA diagnostic tool for *Internet Gaming Disorder*. In order to test the feasibility of the tool clients were asked to complete the nine question survey pre counselling on intake and post counselling on being discharged.

The second survey used was the *Working Alliance Inventory*, a validated evaluation tool which measures three key aspects of therapeutic alliance. It measures the tasks of therapy, the agreement on the goals of therapy and the development of an affective bond (Munder, Wilmers, Leonhart, Linster, & Barth, 2010). Framework analysis was used to analyse the data as it moves from thematic analysis to associations between the concepts (McNiff & Whitehead, 2009), and is geared towards practise-orientated findings (Green & Thorogood, 2004).

Program Logic

The evaluation of the project was conducted by two staff members from the Health Promotion Team at EACH. Figure 2 is the program logic which was drawn up by the principal researcher during planning stage. It allowed the steering committee to build and articulate the logic of the project, which outcomes it expected to achieve, how it expected to achieve them, as well as how the outcomes would be measured.

Figure 2. Program logic for EACH, Young People: The Internet, Gaming and Social Media Project

Results and Discussion

Counselling Stream

This project invited young people into a conversation about the overuse of digital media. It was about comprehending a phenomenon, rather than measuring it (Green & Thorogood, 2014). As the project developed, it became apparent to the steering committee that the use itself was just the tip of the iceberg and that comprehending the life story and context behind the use was very important. The strongest findings in this project came from part of the project, which gave maximum voice to the young people. These findings came from the client case notes and the transcript of the interview with the project worker.

Reach and Demographics

Over the course of 12 months, the project worker offered counselling services to a total of 17 participants. The tables in Figure 3 summarise the demographics of clients.

Figure 3. Demographic of clients (parent and/or young person)

Participation type	
Parents/ carer (one or more attendance from adolescent)	94%
Parents / carer (no single attendance from adolescent)	6%

Demographic of parent or carer	
Mother	64%
Father	12%
Grandparents	12%
Foster Parents	12%
Gender of Adolescent with Immersive/Problematic Use	
Male	92%
Female	8%

Care episodes included outreach in 42% of cases. This was due to the young person not being able or not willing to travel to the service.

Of the 17 cases of young people, 15 were identified by the counsellor as presenting with problematic use, with some of these young people gaming for up to 16 hours a day. The counsellor made this identification using the DSM-5 *Internet Gaming Disorder* tool combined with his own professional judgement of the impact the use was having on the young person. These 15 adolescents were also assessed as being highly vulnerable young people presenting with a multi-factorial range of psycho-social issues.

In the remaining two cases, the young people had a negative diagnosis of *Internet Gaming Disorder* according to the DSM-5 tool. The project worker assessed their use, and found it to be 'normal'. The counselling sessions in these two cases centered on educating parents and carers about what healthy or balanced digital use looks like in modern day Australia. In these two cases, the key underlying issue was addressing cultural or generational disparity between the young person and their parents/carers.

Quantitative Data: Internet Gaming Disorder (IGD) Classification Tool - Diagnostic and Statistical Manual of Mental Disorders 5th Edition (DSM-5)

This project tested the feasibility of the DSM-5 tool for *Internet Gaming Disorder* (IGD) which collects categorical data to assess and diagnose behaviour. This tool is listed in the appendix of the DSM-5 as a condition warranting further study. The American Psychological Society have requested more research into the feasibility of the tool (World Health Organization, 2015). One of the aims of this study was to use the tool to test its feasibility, as well as to evaluate the influence of the counselling sessions. The tool was given out to be completed by client's pre and post care episode. As the project unfolded it became clear that there were two challenges with this process. Firstly, it was not always possible to know when a client's final session was, which made it difficult to request post care data. Secondly, the average number of sessions which clients attended was only small and ranged on average from two to three, making a change in behaviour unlikely. Moreover only four clients completed both the pre and post tool as well as their consent form for us to use the responses given for research purposes, making the results unlikely to be representative of the population. The DSM-5 tool collects categorical data to track behaviour change only. Working with a small sample, convenience sampling technique and minimal care sessions meant that this project was not able demonstrate improvement in online behaviour.

Qualitative Data (Case Notes)

The data provided by this community pilot project was inevitably small, however non-probability samples may use a small size more effectively, particularly if the aim of the research is the value of the information, not the quantity

(Hek & Moule, 2006). The strength of qualitative data is that it demonstrates the phenomenon of excessive use from the perspective of the individuals affected (Green & Thorogood, 2004). The qualitative data allowed for insight into the motivation for use.

Motivation for Use

When asked why they turned to immersion in digital media, young people's reasons included; to be entertained, to meet friends, to escape home life, to escape emotions, to distract from dynamics in the house, to escape feelings of neglect. The most common theme throughout was to regulate emotion and escape family tension. The project worker reported that early on in the role he loosened the emphasis on transforming the young person's use and looked towards establishing the motivation for use and examining underlying issues. This was the new starting point for therapeutic intervention.

Project Workers comments on working with a client – male – 20

"It is with this client that I worked out that the surface level manifestation is actually not the issue, it's the fracture underneath which requires therapeutic intervention. The young person was playing World of Warcraft and League of Legends for up to 16 hours a day. His sister was diagnosed with anorexia and he had the awareness of linking the gaming disorder to the anorexia and his sister having suicidal attempts. He said I do this because of that. He said he felt neglected. The parents have a dysfunctional relationship and the client said he was gaming to escape the emotional overload."

Identified Risk Factors

The risk factors identified in therapeutic work with young people and their affected other family members were complex, broad, co-occurring and relatively severe in nature. They ranged from family conflict or separation, chronic illness or death in the family, sexual, gender and cultural diversity, truancy, pre-existing mental health issues, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorder (ASD), social isolation, low self-esteem, drug and alcohol or mental health issues including torture and trauma. Death or illness of a parent or sibling appeared strongly as a co-occurring predictive risk factor.

"The death of a parent is high among my clients. A disproportionate number of my clients have experienced that. Often drug use and trauma too" – Project Worker

Relationship issues and low psycho-social wellbeing appeared to underpin most risk factors. Most cases had at least 3-4 complex and co-occurring risk factors. The project worker felt that the immersive use of technology was a coping mechanism. In the same vein several young people in the counselling sessions spoke about what for them, were the positives of gaming. They spoke of feeling a greater sense of self-esteem online, a connection with like-minded youth and a sense of protection from real life issues, which felt threatening. However, after working with young people experiencing problematic use the project worker commented that:

"The benefits of gaming are that it is task orientated and requires complex thinking. It's entertaining and social and becomes a support network for many, but it cannot replace the meaningful experience of face to face communication"

The project worker identified that the social haven of the internet and games was a risk factor of compulsive use. Several clients were using online communication or gaming to cope with social anxiety. One client described how gaming helps distract from anxiety and how he didn't have the motivation to do anything else. Several clients were immersed in playing Massive Multiplayer Online Role-Playing Games (MMORPGs) like *World Of Warcraft* a game which operates alongside other gamers twenty-four hours a day. Other clients played First Person Shooter Games (*Counterstrike & Halo*), which also involve huge time commitment if the player joins a clan.

Identified Impacts/Influence of Problematic Use

This small project does not make any claim to demonstrate cause and effect and simply notes the commonly perceived negative influences of problematic use, some of which may indeed be risk factors. There is no evidence-base to suggest direction of association between excessive technology use and reduced wellbeing (Kaess et al. 2014; World Health Organization 2015).

The public health issues linked to excessive use of technology fall into several domains of health (World Health Organization 2015), and will be examined separately below:

The physical impacts of excessive use of devices include a sedentary lifestyle, overweight and obesity issues, musculoskeletal issues like back pain, hearing and vision issues due to over use, and injuries and accidents due to using devices while doing other tasks (World Health Organization 2015). This project identified several negative biomedical issues co-occurring alongside excessive use and they include sleep deprivation and disturbances (gaming for up to 16 hours a day), poor diet (storing processed foods in the bedroom), sedentary lifestyle (barely leaving bedroom), poor hygiene (urinating in bottles in the bedroom), and self-harm (cutting, suicidal ideation and threats).

A common co-occurring impact of problematic use in the young gaming clients seen by the project worker was relationship harm, including aggression to family members, isolating from peers, refusing school and or work and lying about use. Eight of the 17 young people seen at the service were using First-Person Shooter Games, which include significant levels of violence. Additionally there were two clients who can experienced bullying both on and offline and two cases of young people having inappropriate relationships online.

The project worker saw many clients using digital media to regulate emotions. On analysing the project, case notes it would appear that 15 of the 17 cases were using technology to self-soothe. One client was quoted by the project worker as saying:

"I am addicted to gaming, I use it to escape my home life"

This is in line with the literature which found cognitive drivers behind overuse include using technology to regulate feelings of anger, anxiety, dependency, irritation, tension or depression (Haagsma et al. 2013; World Health Organization 2015, p. 13; Weinstein et al. 2015).

One of the aims of this project was to highlight to young people the infiltration of gambling industry into gaming. The convergence of social media, apps and online video games and simulated gambling is putting young people at long term risk of pathological gambling and is an emerging public health issue (King, Delfabbro, Kaptis, & Zwaans, 2014). The project worker did not come into contact with any young people with signs of pre-existing gambling harm or problematic spending per se, with the exception of two clients who had spent money on their parent's credit card

without consent on in-app purchases. Although there was no significant mention of exposure to gambling content by clients to the counsellor, it is likely that they were exposed to it online.

Overall, the project findings suggest that this kind of intervention may be able to achieve some improvements for families experiencing problematic use of digital media. A framework analysis of the case notes revealed repeated examples of improved insight and personal growth, greater understanding for the motivations behind the use in both clients and their parents and carers. Despite these improvements, the project was unable to meet the goals, which were mapped out during the plan phase of the project, which are depicted below in Figure 4:

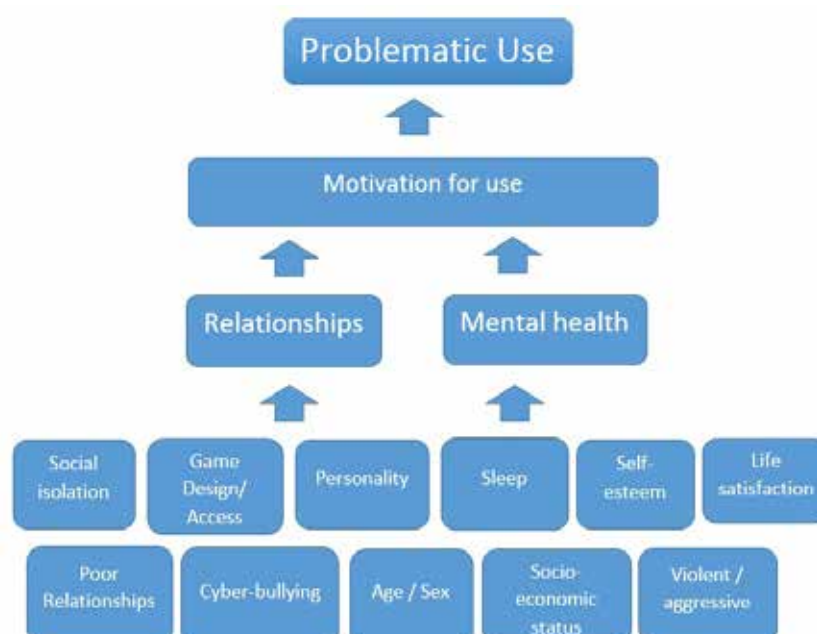
Figure 4. Goals of the counselling stream of the project



Failing to meet these outcome goals does not indicate that the counselling stream of the project was ineffective. The reason for not meeting the outcomes is likely to be a combination of the fact that the client portfolio was far more complex than the steering committee had envisaged, coupled with the fact that the outcome goals which were set were not realistic. A small 12-month project is unlikely to be able to demonstrate medium term cause and effect. The project goals should have been the short term outcomes, taken from the program logic. For example rather than aiming to see Reduced Technology Use, the project should have aimed to demonstrate *Improved Knowledge of the Motivation for Use*. This might have been a more realistic starting point towards behaviour change in the long term.

Conclusion

Figure 5. The project findings suggest motivation for use through positive relationship building is the starting point for prevention or harm minimisation work



This project set out to discover more about the relationship between problematic use of digital media and wellbeing. The aim of the research was to find out what the risk factors of problematic use are and whether or not the motivation for use can assist harm minimisation. The scope of this project was small and exploratory in nature therefore the conclusions and recommendations for practice, policy and further research are naturally limited.

In the absence of a definition or clinical classification for problematic use, this project would suggest that overuse is on a large spectrum, but that it might be considered problematic when it is deemed as such by either the user themselves and or their affected others.

The findings provide some anecdotal support for the idea of problematic use is a symptom of an underlying social or emotional fracture and unlikely to be a disorder in its own right. The use is merely a vector for a wide range of other psycho-social issues (World Health Organization, 2015).

Overall the project findings align with the social compensatory theory which is the idea that the use psychologically compensates for the social and emotional wellbeing a young person may feel eludes them in their offline life (Snodgrass et al., 2014, p. 481). This project found that if immersive use itself is not the issue and merely a coping mechanism, then an approach which is disciplinary and dismissive of the young person's use may serve to reinforce a maladaptive cycle of relationship and life issues and problematic use.

In short, in a high-tech world the starting point for prevention and harm minimisation of problematic use would appear to be through focusing on the motivation for use. It would appear that in excessive use, behind the motivation lie several complex and co-occurring risk factors (Boniel-Nissim et al., 2015; Chang et al., 2015; Haagsma et al., 2013; Kuss et al., 2013; Van Rooij et al., 2014; Weinstein et al., 2015). Figure 5 depicts motivation for use as a starting point.

Pending more research this project recommends a strengths-based approach to problematic use. In the case of this study authentic positive enquiring into what a young person was doing online meant that the project worker was able to make clients feel valued and was respected. This strength-based approach appeared to improve the likelihood of a positive professional relationship which was strong enough to explore the motivations behind the use, and ultimately insight to the key driver of the problematic use.

Behavioural therapy for maladaptive use should view problematic use as an indication of an underlying life issue and or low psycho-social wellbeing and take a strengths-based approach. This project found that acknowledging that each young person has a unique set of personal and family strengths and challenges appears to engage the family as a partner, in developing and implementing more protective factors for the young person who is using technology in an immersive way.

Future projects should include funding for therapeutic sessions, some of which may need to be outreach. Therapeutic staff would benefit from training to work effectively with clients who are compulsively using their devices.

Future practitioners should be familiar with the DSM-5 diagnostic criteria for *Internet Gaming Disorder* for reference, but then look beyond classifying use according to a diagnostic criteria and towards investigating problematic use broadly and in context.

This project would seem to show that parents or carers should engage in digital entertainment time with the young person. It appears helpful to the relationship to be mentored by young people online and to take the time to understand the young person's online world. It may be helpful to be interested and curious about what the young

person is playing or doing as in turn it can open up honest and mutually respectful conversations about healthy use, including conversations about planning offline activities together.

Future research should be longitudinal and explore risk factors of immersive use and their interaction. This may lead to a demonstration of the direction of causation. Qualitative study methodology is recommended. Motivational interviewing could be used to map reasons behind behaviours and context behind individual and sometimes episodic behaviours. Given the significance of the online space in contemporary society, future study might also examine average use (Rasmussen et al., 2015; Smahel, Wright, & Cernikova, 2015), and its relationship with wellbeing.

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Australian football in the United States 1908-1913

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Abstract

In the early part of the twentieth century the popularity of American football was being tested by questions about the brutality of the game and thus its appropriateness, particularly as a game for youth. Against this backdrop, in California the game of Australian football gained a foothold as a preferred alternative. Using document analysis of newspaper reporting from the period the previously untold story as to how Australian football nearly became the game of choice in one part of the United States for a brief period from 1908-1913 is revealed. Despite gaining a following in the school sector, ultimately the game failed to gain a sustainable level of support as it could not displace Rugby in American colleges and universities before the advent of World War One gave rise to a nationalistic fervor and re-interpretation of the value of the combativeness American Football. The pull factors creating acceptance of the game were not accompanied by substantive push factors from the Australian National Coaching Council to create broader appreciation of the game for adult participation, particularly in the colleges where rugby was popular. Promotion of the nascent game of Australian football in American schools was eventually stopped by the outbreak of World War 1 in 1914.

Introduction

On the 22nd April 1908 The San Francisco Call recorded plans to bring a team of Australian youngsters to San Francisco for the purpose of introducing the game into the athletic curriculum of American Universities (San Francisco Call, 22 April, p. 8). While the plan received generous support from local groups, such as Columbia Park Boys Club, there is no evidence that the tour of America proceeded. There is however, evidence that in 1909 the West Australian Football League supported a proposed tour of Australia by boys from the Columbia Park Boys' Club. The Columbia Park boys had recently given up Rugby and made Australian football their game, a remarkable piece of timing given the Australasian Football Council had also approached President Roosevelt with the objective of establishing Australian football in America (The West Australian, 19 March 1909, p. 7). The brutality of American football was resulting in serious injury and death, causing community concerns as to the appropriateness of the game. In 1905 American President, Teddy Roosevelt called for reforms to the game to make it safer otherwise he would abolish the sport (Miller, n.d.; Smith, 1981), and many clubs abandoned the game in favour of other types of football.

Against this backdrop, the San Francisco Call April 4 1909 reported that 40 youngsters from the Columbia Park Boys' Club would be sailing to Australia to play games, including Victorian football. To prepare, the boys received training from an Australian ex-pat Charles Lynam and then a Pat O'Dea. Not much is known of Charles Lynam, but Pat O'Dea played Australian football for the Melbourne Football Club. However, Pat made his name as the 'kangaroo kicker' legend and star American footballer playing and as captain of the University of Wisconsin team from 1896-1899 (Nauright, 1999). The Columbia Park Boys' Club tour to Australia was led by philanthropist and founder of Columbia Park Boys' Club, Major Sidney Peixotto. Peixotto was *prominent in the playground movement*

[...] a commanding figure in amateur athletics on the coast and throughout the country at large, having been president of the Pacific Athletic Association and a member of the board of governors of the Amateur Athletic Union (S.J. Clarke Publishing, 1913). Peixotto believed the physicality of American football made it unsuitable for schoolboys (The Argus, 24 July, 1909). During the first decade of the 1900's American football was besieged with fatalities and serious injuries and there had been calls for the termination of the game in high schools (Jeffery, 2006). Some universities and colleges banished the game (Park, 1984).

Whilst in Australia, Peixotto suggested Australian football could make a fitting replacement for as a winter sport at the end of the baseball season for young men. Peixotto was quoted in an Australian paper, *the American game of football is not suitable for schoolboys [...] so that (their) weekends shall not be wasted an effort is to be made to introduce the Australian game into California* (The Argus, 24 July, 1909, p. 16). He made a commitment to Australian football officials that he would promote the game of Australian football upon his return to America.

On tour, the American boys took to Australian football. Reports of the games played included in July where the America boys bettered a Melbourne team picked from the State Schools north of the Yarra River; 4 goals 6 behinds to 9 behinds (The Advertiser, 29 July 1909, p. 10). The Columbia Park Boys also played in Sydney, on the Sydney Cricket Ground, losing this game; 2 goals 6 behinds to 11 goals 18 behinds (The Argus, 12 July 1909, p. 5). In August, while in Western Australia, the Columbia Park Boys beat a team of Fremantle boys 7 goals 9 behinds to 2 goals 2 behinds in front of a crowd of 10,000 people (The Advertiser, 23 August, 1909, p. 7). In total, the young men of Columbia Park Boys' Club won six of the ten Australian football games they played while on tour (San Francisco Call, 3 October, 1909). Announcing the return of the boys from their tour, the San Francisco Call, headed the sport section; *Australia's Victorian Football Game to Be Introduced on This Coast, and declared, New football may replace old game: Columbia Park boys master "Victorian style" during Australian visit* (San Francisco Call, 20 February 1910, p. 74).

Figure 1. The San Francisco Call announcing the success at Australian football of the Columbia Park Boys



Source: San Francisco Call, 3 October 1909, p. 38

Upon his return from Australia, Peixotto travelled the west coast of America lecturing upon the merits of a sport he described as having all the exciting points of American football, the open play of English rugby and the spectacular chances of baseball (Los Angeles Herald, 23 April 1910, p. 11). The push for Australian football received diplomatic support via the American Consul at Hobart, who was quoted in the Los Angeles Herald declaring the game of great athletic benefit, with a style of play is open and free from injuries to men (Los Angeles Herald, 20 March 1910, p. 6). This last point directly addressing the concerns held about American football at the time.

Figure 2. Columbia Park Boys football team on their Australian tour, 1909



Source: San Francisco Call, 24 September 1911, p. 38

With Peixotto's urging, for the 1910 football season some grammar schools took to Australian football in preference to Rugby, American football and Association football (San Francisco Call, 17 July 1910, p. 48). A young Australian, Eric Cullen Ward, returned with the Columbia Park Boys' Club to America on a travelling scholarship and assisted in coaching boys interested in Australian football. The prize won by Ward was granted by H. Munroe King of the New South Wales Football League to the Sydney public school boy who would give the most elaborate description of the Australian game (San Francisco Call, 20 February, 1910). Crockett Grammar, Pacific Heights Grammar and Hancock Grammar were three of the schools training regularly with Ward (San Francisco Call, 9 August 1910, p. 13; San Francisco Call, 21 August 1910, p. 46). The Columbia Park Boys Club played exhibition matches to garner interest in Australian football, including one on September 9 against a team selected from local resident Australians at the stadium in Golden Gate Park (San Francisco Call, 9 September, 1910).

Figure 3. Headline in the San Francisco Call suggesting Australian football might replace American football, accompanying an article describing the game of Australian football

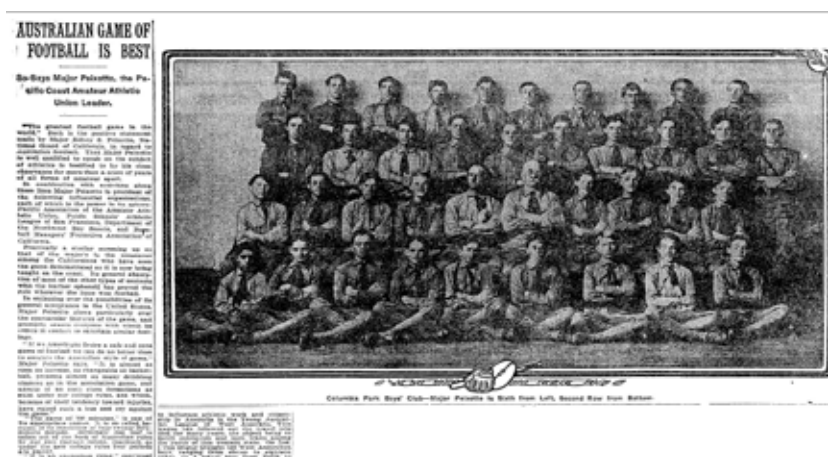


Source: San Francisco Call, 20 February, 1910, p. 74

Figure 4. Newspaper report on Eric Cullen Ward's scholarship visit to America

Source: San Francisco Call, 29 May 1910, p. 3

Back in Australia, James Lafferty returning after eight years residence in California, reported to the Australasian Football Council that there were 10 schools playing regular competitions in addition to a number of others receiving coaching by Eric Ward and an Adelaide boy, Cecil Martin, with support from the Columbia Park Boys Club. Lafferty predicted ambitiously that, in a few years we are going to have international senior matches America v. Australia (The West Australian, 3 December, 1910, p. 13). Meanwhile, Peixotto continued to promote Australian football, with the Columbia Park Boys playing several exhibition matches in Chicago. The result of this endeavour was that E. B. Groot, the Head of Chicago playgrounds commission, and C. H. Mills, another leader in the playground movement, organised a council of prominent Chicago men to interest Chicago schools to adopt Australian football the next football season (San Francisco Call, 7 April 1911, p. 12).

Figure 5. Major Peixotto promoting Australian football. *“The greatest game in the world [...] It is almost as open as lacrosse, as changeable as basketball, presents almost as many dribbling chances as the association game”*

Source: New York Times, 23 October, 1910

By April 1911 the San Francisco Call was reporting that the Australian “field ball game” *has been played in most of the local, grammar schools for some time past* (San Francisco Call, 25 April, 1911, p. 12). The interest in Australian football in grammar schools, now being called “Fieldball”, was such that young Ward needed to appoint Emil Hastings, James Caveney, Robert Hayes, Frank Danis and Edward Burke from the Columbia Park Boys Club as assistant coaches (San Francisco Call, 24 August, 1911, p. 13). In September 1911 a Boys Scout group from

Western Australia toured the West Coast of America and was entertained by the Columbia Park Boys Club while in California. A series of Australian football games were planned (San Francisco Call, 9 August, 1911). The third match between the Columbia Park Boys and the Australian team on September 24 received significant pre-match publicity in the San Francisco Call. Ed Burke captained the locals, and it was umpired by Frank Wildy, described as *a former big league umpire in Australia [...] He is a former star player having been a member of the champion West Perth team a few years ago* (San Francisco Call, 24 September 1911, p. 38). The captain of the Australian team, J. Williams was described as *the greatest exponent of the center position in the state of Western Australia, and is among the three best men playing the position in the whole of Australia* (San Francisco Call, 24 September, 1911, p. 38). To have this calibre of player touring the west coast of America must seemed to have assisted Peixotto's promotion of Australian football in local papers.

The Australian team won this game 95 points to 44 points, however, the Columbia Park Boys team were described as showing some good attacking qualities in the defeat. The Australian team's captain, Williams, was the star of the game, described as a "revelation" to the fans. Retalick, Franklin, and "diminutive" twelve year old fullback for the Australians, Kimber, were also mentioned for their play. For the locals, Waymire was the best of the Columbia Park Boys Club, kicking three goals. Caveney, Burke, Wing, Wihr and Ryan completed the list of best players for the locals (San Francisco Call, 25 September 1911, p. 9).

Figure 6. Teams for the Australia vs. Columbia Park Boys Fieldball exhibition match, September 24, 1911

The teams will line up as follows: -		
Australia	Position	Columbia
F. Allen	Center fullback	G. Wihr
T. Morrell	Right fullback	Trashler
L. Martin	Left fullback	Fraser
W. Scott	Left halfback	L. Wing
R. Lawrence	Center halfback	Locke
F. Curran	Right halfback	Nagel
P. Styles	Right wing center	Rosenthal
J. Williams (capt.)	Center	E. Burke (capt.)
R. Cleary	Left wing center	Costello
L. Renfroy	Right half forward	Glaser
P. Retalick	Center half forward	Peterson
R. Kimber	Left half forward	Behre
D. Tobin	Left full forward	Danis
J. Clark	Right full forward	Hayes
R. Franklin	Center full forward	Hastings
A. Coyne	Follower	Waymire
B. Jones	Follower	Ryan
H. Randall	Rover	Caveney

Source: San Francisco Call, 24 September 1911, p. 38

The picture from the match (Figure 7) indicates some compromises had to be made to accommodate the game of Australian football on American playing fields. For example, it appears that a round ball was used in this particular match, and the line markings give the impression that the game is played on a rectangular field. The jumper used by the Australians clearly identified the players as being from Western Australia by the black swan in the middle of the map of Australia.

Figure 7. Australian boys playing Columbia Park Boys, 1911



Source: San Francisco Call, 25 September 1911, p. 9

In 1913 the Columbia Park Boys Club returned to Australia with an itinerary of 30 Australian football games proposed. The game scheduled for October 4 in Melbourne was billed as *being for the school championship of the world under Australian rules*, as prior to the game the two leading Australian school teams will have played off for the right to confront the Columbia Park Boys (San Francisco Call, 23 March 1913, p. 46). Among the games before this championship of the world encounter, the Columbia Park Boys Club recorded a narrow loss against the midland junction schools in Western Australia, and played a game on Fremantle Oval against local schoolboys (Western Mail, 25 July 1913, p19).

The 1913 Californian Field Ball season saw the significant competition development of the introduction of a Public Schools Championships under the direction of the Public Schools Athletic League (San Francisco Call, 12 August 1913, p. 6). The opening game was played at Jackson Park playgrounds, located between James Lick and Bay View schools (San Francisco Call, 28 October 1913, p. 9). Although Field ball was developing a degree of popularity in the High School sports program, it was not supported in the Colleges where Rugby Union support was strong (Figure 8). Rugby engaged in the serious promotion of the game by sending a leading provincial team to tour America, in contrast, the Australian football team that visited the California in 1911 contained one or two prominent footballers, but the team was mainly young boys. Illustrating this contrast, in 1912 the New South Wales (NSW) state team, the NSW Waratahs, toured California (San Francisco Call, 13 August 1912; San Francisco Call, 31 December 1912). The return of “famous” Australian referee W. W. Hill, who toured with the NSW team in 1912, to officiate “the big intercollegiate football game” between the University of California and the Stanford University was front page news (San Francisco Call, 30 October, 1913, p. 1). An All-American college team had toured Australia in 1910 (Los Angeles Herald, 10 August, 1910). The comparison in standard of teams touring each country is stark - while state and national Rugby teams were touring the west coast of America, Australian football was being represented by schoolboys.

Figure 8. The Australian Champion Rugby team, The Waratahs, arrive in California, 1912

Source: San Francisco Call, 4 October 1912, p. 10

During this period where Australian football was gaining a presence, American football had also attempted to address concerns about the injury risks associated with the game through a series of rule changes to make the game more appealing to the public. However, possibly the more substantial blunting of the uptake of Australian football was not the competition with Rugby or American football but the advent of World War 1 in 1914. Australia's early entry into this conflict meant that the West Australian Football Associations support of the game of Australian football in America would have been put on hold. Further, the illustration central to Figure 9 also suggests that brutality of American football became to be perceived as advantageous to the American war effort and the development of a certain type of "man".

Figure 9. Football and American patriotism

Source: The Evening World, October 20, 1917

Conclusion

In the end, the push of Australian football by Columbia Park Boys and Major Peixotto appears to have petered out. The combination of a lack of a serious push factor to promote the game by the National Football Council in Australia at the time and promotion of Rugby Union, which had been well established in American Colleges for decades, did not support the pull factor emerging in the Californian schools. The advent of World War 1 effectively ended the promotion of the game of Australian football in the United States until the 1960's when the Australian National Football Council, through the Victorian Football League, re-enter America to promote Australian football. Perhaps historically appropriate given what has been described in this paper, the re-entry of Australian football in the United States in the 1960's began with an exhibition match between the Geelong and Melbourne football clubs in San Francisco, California.

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Health: Building an awareness of sleep disorders and problems impacting learning, behaviour and wellbeing

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Abstract

The Board of Studies, Teaching and Educational Standards NSW (BOSTES) is responsible for school curriculum, assessment, and teaching and regulatory standards in NSW schools. Recently BOSTES has stated: “The mandatory PDHPE K–6 and Year 7–10 syllabus acknowledges the link between a balanced lifestyle and good health. Students develop skills to manage stress, prioritise sleep and make positive health choices” (2016, p. 1). However, sleep is an elusive and complicated human activity occupying one third of our day; it is a phenomenon that can impact cognition and behavior of school-aged children and youth in ways educators may be unaware of.

Herein we consider the extent to which children and youth experience some form of sleep complication; which are often transient periods of sleep deprivation with no long lasting effect, nonetheless in a number of cases sleep problems can significantly influence cognitive functioning and wellbeing. Sleep disorders in children and youth can be categorised as dysomnias and parasomnias. Dysomnia includes those disorders that result in either difficulty initiating or maintaining sleep and involves excessive sleepiness. Parasomnias involve a disruption in sleep after it has been initiated, such as sleepwalking, talking or night terrors. Sleep problems outside the realm of disorders are noted herein, yet whether the phenomenon of sleep is overlooked as a contributing factor of academic underachievement and maladaptive behavior is addressed as an element of health that needs attention in education.

Introduction

Sleep is an involved process that typically occupies one third of our day and many children and youth experience some form of sleep complication (Driver et al., 2012). Sleep problems can significantly influence cognitive functioning, wellbeing, and are categorised into two groups: dysomnias and parasomnias (Kent, 2016). Dysomnia includes those disorders that result in either difficulty initiating or maintaining sleep and involves excessive sleepiness. Parasomnias involve a disruption in sleep after it has been initiated, as in sleepwalking / talking or in night terrors. Sleep problems outside the realm of disorders are considered alongside our investigation into whether the phenomenon of sleep is overlooked as a contributing factor of academic underachievement and behavioural concerns in schools.

“I like to get seven hours of sleep a night because that’s what I need to stay sharp, creative and upbeat”

– Bill Gates

Difficulties with sleep among children and adolescents are fairly common (Driver et al., 2012) and can include: trouble falling asleep, trouble maintaining sleep, restless sleep or sleeping too much. Many researchers agree that we sleep typically 33% of our lives and it is this duration and type of sleep that can either aid or impede anyone in their healthy development and wellbeing (Chiang, Arendt, Zheng, & Hanisch, 2014).

The purpose of this review is to develop an understanding of sleep problems in children and youth and to further ascertain whether sleep conditions are under-recognised in education and family systems by looking into current research. Educators, parents and medical communities have long believed that children and youth have not functioned well in school following a late night and medical practitioners have “...*long had a strong sense that irregular sleep schedules and inadequate sleep may lead to poor school performance*” (Wolfson & Carskadon, 2003, p. 492).

Background

Research has identified that sleep plays a key role in the ability to control one's emotions and without sufficient sleep, performance, mood, and ability to focus begins to deteriorate (Sheedy-Kurcinka, 2007). The average amount of sleep required for a school-age child is 10 hours and an adolescent, nine hours (National Sleep Foundation, 2016). Ninety-two percent of adolescents and 62% of school-age children do not get enough sleep (Sheedy-Kurcinka, 2007). Twenty percent of children are misdiagnosed with Attention Deficit Hyperactivity Disorder (ADHD), when in fact they have a sleep disorder and it is these errors that can change lives (Lee et al., 2014).

How then can a sleep-deprived learner appear? Some argue that the sleep-deprived student can exhibit feelings of being overwhelmed or easily irritated or anxious (Chiang et al., 2014; Stein, Mendelsohn, Obermeyer, Amromin & Benca, 2001). Sleepy students struggle to focus and/or they constantly need attention, become forgetful and perform poorly while talking excessively or have difficulty making decisions (Chiang et al., 2014; Ivarsson & Skarphedinsson, 2015). Sleep-deprived students are also more prone to illness (Stein et al., 2001), sometimes craving sugar due to sluggish feelings (Sheedy-Kurcinka, 2007). Socially, they may argue more readily and become demanding and difficult while dealing with others (Chiang et al., 2014).

Sleep varies across the sleep cycle, as a person should awake feeling refreshed and able to function optimally. There is a cyclical alteration between rapid eye movement sleep (REM) and non-rapid eye movement sleep (NREM). The normal physiology of sleep really is about the time of reduced awareness of the five senses as an opportunity to refresh but is influenced by duration of sleep and sleep quality (Maas et al., 2009). While asleep, the brain regulates hormones and endocrine functioning and acts to replenish the brain's neurotransmitters to organize new ideas and information (Maas et al., 2009).

Adequate and appropriate sleep is known to play a key role in the health and wellbeing of learners. The prevalence of sleep disorders in children and youth varies; one study indicates that as many as 17% of adolescents have sleep disorders (Goll & Shapiro, 2006); another study reports that “...*up to 45% of the world's population have sleep problems*” (National Sleep Foundation, 2015). With regards to school-age children, estimates up to 40% of the children have sleep problems (Blunden et al., 2004; Cooper, Kohler, & Blunden, 2012). Very few studies exist at the moment to further affirm how often primary care providers diagnose children and youth with sleep disorders (Ivarsson & Skarphedinsson, 2015). However, Blunden et al. (2004) suggest, “sleep disorders are often not recognised by general practitioners” (p. 708) which is problematic since sleep disorders are considered treatable conditions when recognised; this lends itself to a significant need for increased awareness for not only primary care providers but also educators and families (Cooper et al., 2012).

Each educator needs to be aware of the range of sleep disorders such as insomnia (psycho-physiological insomnia) which can be understood as challenges in failing or maintaining sleep, and/or waking up during the night which

can be described as insomnia. “Along with difficulty sleeping, some people don’t feel refreshed on waking and feel that their sleep was not restorative” (Driver et al., 2012). There are consequences to insomnia as noted by Driver et al. (2012) for instance: “...*emotional distress, impaired mental ability, poor concentration and memory, and emotionality*” (p. 5). In psycho-physiological insomnia there can be a hyper-vigilant, Type A personality, who cannot sleep due to excessive worrying. In addition, there are other contributing factors or triggers for insomnia in children, such as performance anxiety, emotional distress, general anxiety and depression (Driver et al., 2012).

Another sleep disorder is *Non-Restorative Sleep*: This is the sense that one’s sleep did not enhance one’s feelings of being refreshed following sleep. According to Driver et al., (2012) sleep serves a recuperative purpose; the Restorative Theory of Sleep includes evidence that certain types of memory require deep sleep, that sleep loss leads to deprived performance levels, that increased deep sleep protects against feeling pain and that adolescents get taller during the sleeping period (Driver et al., 2012).

Often there are *Circadian Rhythm Disorders* that can lead to irregular sleep patterns; in adolescence in particular, it is common to see hormonal changes that effect sleep as a youth’s melatonin secretion tends to cycle later in the day. This will delay their sleep phase by a few hours, which is why they become ‘late night owls’, and may appear fatigued in the classroom. Important to note, people with circadian rhythm disorders are unable to wake up in time for school.

In addition to sleep disorders, educators may see sleep problems as simple as not sleeping enough (*Sleeplessness*) which is the inability to sleep or the idea of remaining very active and thereby unable to sleep. Conceivably, *sleeping too much (Hypersomnia)* is linked to excessive daytime sleepiness. Finally, *Episodic Disturbances of Behaviour Related to Sleep*: These disturbances are classified as parasomnias, such as in night terrors, sleepwalking or sleep talking and nocturnal enuresis. In order to know what is a problem or disorder it is necessary to understand the phases of sleep as, *N1*: This is the first stage of light sleep and occurs in the first seven minutes. *N2*: This is the second stage of sleep and occurs in the next 10 to 20 minutes with jerky muscle spasms sometimes present. *N3*: This is where deep sleep occurs. It is commonly the time when children will have difficulty with night terrors (Shapiro, 2014). Often *N3* is referred to as deep sleep as it can be difficult to arouse someone in *N3*.

Also there is REM: Rapid Eye Movement (REM) which is ‘active’ sleep. During REM sleep, brains are active and dreaming ensues. Our bodies become motionless, breathing and heart rates become irregular (National Sleep Foundation, 2014). *Non-REM (NREM)*: typically involves REM and the NREM sleep cycle (children have more non-REM sleep for growing). During the deep states of non-REM sleep, blood supply to the muscles is enhanced, energy is reconditioned, tissue growth and repair occur, and hormones are then circulated for growth and development. Overall it is *sleep hygiene* which is a goal wherein certain activities and environmental routines promote an improved quality of sleep.

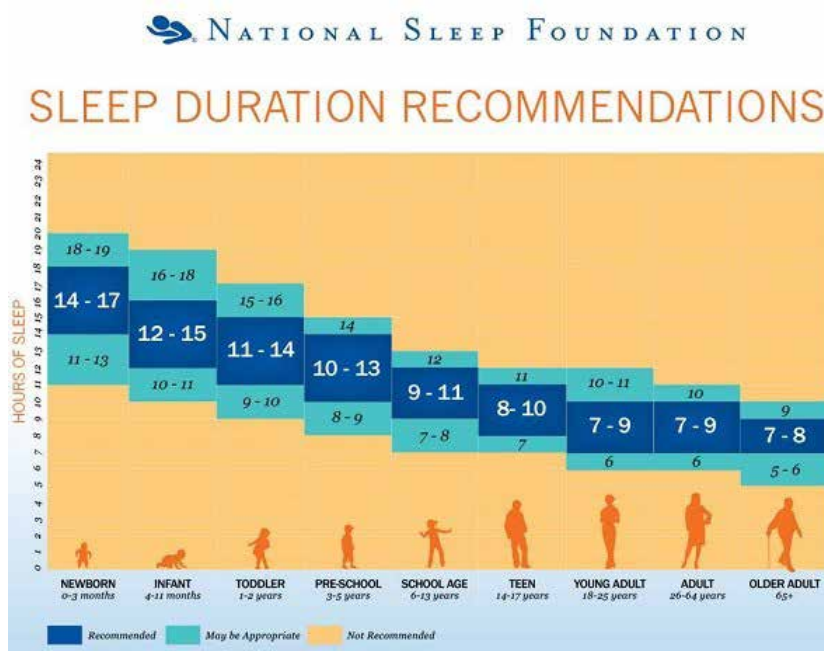
Rationale

Globally, mental health in children is a serious concern and approximately one in five children and youth across Ontario (Canada) are facing a mental health challenge today, implying that educators are also witnessing a rise in their students requiring different levels of support to manage their lives and approximately 70% of adult mental health diagnoses have their onset in childhood or adolescence (Government of Canada, 2006). By focusing on factors that affect a child/youth’s wellbeing we can better lead them to improved lives (Kent, 2016). A few of

the more common mental health diagnosis among children and youth include: anxiety, ADHD, depression, mood disorders, eating disorders and schizophrenia which are quite serious if providers (caregivers, physicians and educators) are not careful in identifying the risks (Chung, Kan, & Yeung, 2014).

Approximately 25% to 40% of children have inconsistent sleep throughout the world's population (Kent 2016) and this can bring about more serious mental health issues. To address this means going back to the beginning, asking questions about sleep routines and habits that can elicit important information. Sleep problems are highly treatable and may be less costly than medication and/or behavior therapies for other diagnoses. Research suggests sleep can affect more than just the student's brain (Walker & Stickgold, 2005), in fact, studies are now demonstrating that inadequate sleep can result in metabolic shifts that can contribute to the rise in obesity, diabetes and cardiovascular disease (Walker & Stickgold, 2005) yet for each additional hour of sleep the risk of a child becoming overweight lowered by nine percent (Walker & Stickgold, 2005).

Figure 1. Sleep Duration Recommendations



Source: National Sleep Foundation, 2015

Studies will persuasively reveal that healthy lifestyle choices enable a student's cognitive, social and physical development (National Sleep Foundation, 2015). Furthermore, when children and youth are cognitively, socially and physically healthy it leads to greater impact on the health care system, influence in the classroom and there will be less strain in the overburdened mental health sector.

Method

This integrative review (Cooper, 2001) of literature involved a focused search via search engines and terms such as: sleep disorders, childhood sleep problems, normal sleep physiology, sleep and academic performance, sleep and behavior, sleep hygiene, sleep and misdiagnosis, prevalence of sleep problems in youth and adolescents, sleep and ADHD, sleep and autism and sleep deprivation as an under-recognised issue concerning students.

Selected data were from peer-reviewed studies, which validated sleep experiences of learners and what is known in their sleep experiences. The iterative process (Cooper, 1982; 1989) uses evaluative, impact factor and journal quality metrics (H-factors) resulting in 43 articles due to our belief that “*iteration is at the heart of visiting and revisiting the data and connecting them with emerging insights, progressively leading to refined focus and understandings*” (Srivastava & Hopwood, 2009, p. 77). A sample of this process is provided in Table 1.

Table 1. Literature selection: Truncated summary

Study	Research Mode	Study Design + Outcomes	Journal Info
Ahrberg, K., Dresler, M., Niedermaier, S., teiger, A., & Genzel, L. (2012). The interaction between sleep quality and academic performance. <i>Journal of Psychiatric Research</i> , 46, 1618-1622.	Quantitative – survey Perform worse on exams - suffer from poor sleep quality - may negatively impact test performance as well, creating a vicious circle.	Survey subjective sleep quality - relationship between sleep quality & academic performance.	<i>Journal of Psychiatric Research</i> - Peer-Reviewed High Impact/Rank H-104
Astill, R.G., Van der Heijden, K.B., Van Ijendoorn, M. H., & Van Someren, E.J.W. (2012). Sleep, cognition, and behavioural problems in school-age children: A century of research meta-analysed. <i>Psychological Bulletin</i> , 138(6), 1109-1138.	Meta-analysis - incorporates 86 studies on 35,936 children.	Insufficient sleep in children is associated with deficits in higher-order and complex cognitive functions and an increase in behavioral problems.	<i>American Psychological Association - Psychological Bulletin</i> - Peer-Reviewed High Impact/Rank H - 223
Carotenuto, M., & Esposito, M. (2014). Sleep and cognition in developmental age. <i>Journal of Intellectual Disabilities Research</i> , 58(5), 421-9.	Mixed methods - overnight polysomnography (PSG) recording in the Sleep Laboratory	Eighteen (12 males) (age 10-12) & 24 female, typical developing children - importance of sleep for cognition processes borderline dysfunction	<i>Journal of Intellectual Disability Research</i> – Peer-reviewed High Impact/Rank H - 76
Cooper, P., Kohler, M., & Blunden, S. (2012). Sleep and academic performance in Indigenous Australian children from a remote community: An exploratory study. <i>Journal of Paediatrics & Child Health</i> , 48(2), 122-127.	Mixed Methods - Measurements of sleep were obtained using actigraphy	21 children - remote Australian indigenous community 6–13 years - reduced sleep quality in association with reduced academic and executive performance.	<i>Journal of Paediatrics and Child Health</i> - Peer-reviewed High Impact/Rank H - 59
Ivarsson, T., & Skarphedinsson, G. (2015). Sleep problems and cognitive-behavior therapy in pediatric obsessive-compulsive disorder have bidirectional effects. <i>Journal of Anxiety Disorders</i> , 30, 28-33. doi: 10.1016/j.janxdis.2014.12.009	Quantitative sleep problems – nightmares, too little sleep, trouble sleeping and parasomnias as well as being over-tired reduced during CBT treatment.	269 children & adolescents, 7-17 yrs.	<i>Journal of Anxiety Disorders</i> – Peer-reviewed High Impact/Rank H - 79
Kent, K. (2016). <i>Inconsistent sleep and the elementary level student: Development of a teacher and parent resource for school staff</i> .	Dissertation/Qualitative	Sleep is one area that can affect almost every part of a child's development and ability to learn.	Peer-reviewed - Creation of a handbook to assist parents and school staff in assisting students who are experiencing inconsistent sleep.
Trudeau-Potkin, K., & Bunney, W.E. (2012). Sleep improves memory: The effect of sleep on long term memory in early adolescence. <i>PLOS One</i> . 10, 1-6.	Quantitative – experimental design. Declarative memory is significantly improved by sleep in a sample of normal adolescents.	40 male & female normal, healthy adolescents, ages of 10-14 randomly assigned to sleep and no sleep conditions.	40 male & female normal, healthy adolescents, ages of 10-14 randomly assigned to sleep and no sleep conditions.

Note. The h-index is an author-level metric that involves both productivity and citation impact of publications. Based on the most cited papers and number of citations of other publications.

Perceived Consequences: Poor and Insufficient Sleep

Our iterative search of the literature led us to conclude that researchers studying the human brain acknowledge the brain is active during sleep (Kent, 2016) however, ‘what happens to a student’s ability to think and reason when they are tired in class?’ Both correlational and experimental studies reviewed by Willingham (2012) found poor sleepers demonstrated ‘slightly worse’ in regards to executive functioning (manipulate information in their mind) (p. 35). Willingham also discovered sleep-deprived students displayed more irritability, hyperactivity and inattentiveness (p. 35) and teachers added that sleep-deprived students “... *seem inattentive and have difficulty concentrating*” (p. 34). Other behaviours include: impulsivity and symptoms of ADHD (p. 35). Inadequate sleep can result in perceived negative impact on a student’s mood, cognition, and behavior and even “*restricted sleep is associated with lower grades in studies in the United States, a finding replicated in Norway and Korea*” (Willingham, 2012). Thus, inadequate sleep can have a cumulative effect on the child/youth (Trudeau-Potkin & Bunney, 2012).

Academic Performance: Sleep, Cognition, Memory

Sleep is undeniably essential to quality learning and effective cognition (Carotenuto & Esposito, 2014). All human growth involves “*cognitive development [which is] the construction of thought processes, including remembering, problem solving, and decision making, from childhood to adulthood*” (p. 29). Essentially this refers to how a learner thinks and expands understanding. Included in cognitive development are, “...*information processing, intelligence, reasoning, language development, and memory*” (Carotenuto & Esposito, 2014, p. 29). In otherwise healthy children who have sleep disrupted, it has been shown to “...*reduce neurocognitive performance (e.g., lower IQ, impair memory, reduced academic performance, reduced attentive ability)*” (p. 29).

Carotenuto and Esposito (2014), in their work, offer a review of studies that have taken place since 1980 as a framework to inform practices today. What they discovered was that since 1980, research has revealed that sleep is associated with IQ levels in children (p. 30). In fact, these studies suggest that there is a strong association between inadequate sleep and “*decreased cognitive capacity*” (p. 30). The equally important revelation is that with longer habitual sleep duration children will exhibit better performance and overall IQ (p. 30).

Carotenuto and Esposito (2014) found that adequate sleep plays a critical role in the development of memories. The reviewers refer to this as memory consolidation (p. 31). Therefore sleep can directly influence a students’ ability to remember previous learning. “*Additionally, sleep may help protect recently learned memories against retroactive interference due to the acquisition of a novel and related verbal material*” (p. 31). Studies dedicated to recording neurophysiological imaging, such as with a polysomnography machine, help to unravel the mechanisms involved in memory consolidation (Trudeau-Potkin & Bunney, 2012). An additional facet to the undertaking of Carotenuto and Esposito (2014) is the revelation in their extensive literature review that deprived sleep and decreased REM were reportedly distinctive of students who were diagnosed with developmental disabilities such as Down’s Syndrome, Autism, Angelman Syndrome, and ADHD (p. 32).

The process of sleep has many stages (N1, N2, N3, REM and NREM), and has a physiological and biological impact on the child/youth. In a study entitled: It’s Practice, with Sleep, that Makes Perfect: Implications of Sleep-Dependent Learning and Plasticity for Skill Performance (2005) Walker and Stickhold (2005) reason that the most efficient time for forming memory associations is not during sleep but rather while individuals are awake (p. 303). They regard this to be the first stage of memory acquisition as the authors believe that memory consolidation occurs

during the different stages of sleep when there is no competing factors or interference within the environment for the individual. Furthermore, *“...the development of efficient and improved memory representations does not occur in a single step, but instead progresses through a number of distinct stages...”* in the different brain states (p. 303). Studies demonstrate that sleep is necessary for memory consolidation as *“memory formation depends on a process termed brain plasticity, which is a lasting structural or functional change in the neural response to a stimulus”* (Walker & Stickgold, 2005).

There is growing evidence that motor learning continues to develop overnight as well (Walker & Stickgold, 2005) as researchers tested this theory in a study with two distinct groups of students. One group was able to have a midday nap of 60 to 90 minutes while the other subjects remained awake. What they encountered was that in the subjects who were able to nap an experience of a ‘significant learning enhancement’ resulted (p. 309). What this tells readers is that the sleeping brain has a role in improving memory and skill acquisition. This has significant implications in terms of academic performance. Wolfson and Carskadon (2003), found, *“...shortened self-reported total sleep time, erratic sleep/wake schedules, late bed and rise times, and poor sleep quality are negatively associated with academic performance”* (p. 491). Should competent skill learning be the goal, then educator, caregivers, and care providers need to realise that sleep ultimately leads to improvements in learning. In a study conducted by Public Health Ontario (2015) it was revealed that there is a strengthening body of evidence to suggest the significant relationship between sleep duration and cognitive performance for children and youth ages five to 17 (p. 2). Furthermore, their body of evidence also links sleep with a *“significant positive correlation with cognitive performance; specifically, on executive functioning, school performance, and multiple domain cognitive functioning”* (p. 2). Their findings were not conclusive in determining an association between sleep and intelligence (IQ) however.

Sleep and Behaviour

The impact of inadequate sleep on behavior has received less attention than the influence of sleep on cognition and memory (Trudeau-Potkin & Bunney, 2012). It has been established, however, that sleep disorders and sleep problems are not uncommon in childhood and adolescence (Driver et al., 2012). In fact, approximately one in five youth ages 12 to 19, report experiencing sleep difficulties on a regular basis (three or more times per week), (Driver et al., 2012). Behavioural consequences for deprived sleep can include: hyperactivity and attention deficits, aggression, irritability and potentially depression and anxiety (p. 18). Deprived sleep may also have a role in children who exhibit aggressive behavior such as bullying as they have been found to more likely have a sleep disorder (Driver et al., 2012).

Not only can poor sleep have a major influence on school performance and memory, but it can also promote poor behavior in the classroom or at home. Adolescence daytime sleepiness receives the most attention and theories abound as to why they are so sleepy in the morning. Nonetheless, daytime sleepiness is of concern. With regards to youth, in particular, educators see patterns of missing class or being late for class that can typically lead to lower grades (Goll & Shapiro, 2006). In sum, proper sleep assessments, including polysomnography, can address any association with sleep disorders and behavior.

Astill, Van der Heijden, Van Ijendoorn, and Van Someren (2012) believe sleep duration is associated with behavioural problems as behaviour impairments have been reported in children with sleep disorders (p. 1112) and

they established a positive relationship between sleep and cognition and a negative relationship between sleep and behavioural problems. Lengthier sleep meant better cognitive functioning and less sleep meant more behaviour challenges (p. 1116).

In the report, *Students Aren't Getting Enough Sleep – School Starts Too Early* (2014), the American Academy of Pediatrics conceded that, *“the empirical evidence [of] the negative repercussions of chronic sleep loss on health, safety, and performance in adolescents ...has been steadily mounting over the past decade”* (p. 2). And, according to the report, the National Sleep Foundation (2015) claimed chronic sleep deprivation contributes to higher rates of mental health illnesses, such as depression, elevated suicidal ideation and obesity (p. 2). Accordingly, the American Academy of Pediatrics has been advocating for later school start times in hopes of supporting learners who have difficulty waking in time for school. This is only one solution of many that have been proposed in my review of the existing literature.

Sleep and the Potential for Misdiagnosis

The distinction between symptoms of inadequate sleep or (un) diagnosed sleep disorders and a diagnosis such as ADHD or depression are not always that clear. Symptomology of ADHD or depression can certainly mimic those symptoms found in students with a sleep disorder or sleep problem. Of concern, however, is if left unaddressed, difficulties with sleep can lead to symptoms of anxiety and/or depression (Driver et al., 2012). This makes it even more critical to address sleep as a factor contributing to a student's wellbeing. It has been noted that, *“42% of youths with depression have insomnia symptoms compared to about 29% of healthy youths who have difficulty sleeping”*, which lends itself to important implications for educators and families (Driver et al., 2012, p. 19). Essentially, it is important to acknowledge if sleep disorders/problems are in fact mirroring a psychological disorder.

Attention Deficit Hyperactivity Disorder can be seen as a condition whereby a child/youth displays behaviours such as: inattentiveness, impulsivity and hyperactivity. It is estimated to effect between three percent to 7% of school-aged children (Wehmeier, Schacht, & Barkley, 2010). ADHD is known to affect the quality of life of an individual. Upon review of the numerous studies, it becomes apparent in addressing whether a student has a true diagnosis of ADHD by asking whether there is an underlying sleep problem or disorder. If symptomology is similar it would be important then to not make assumptions that a child has a diagnosis of ADHD and be treated for this rather than addressing the sleep condition through less intrusive treatment and perhaps less labeling.

Sleep as an Unidentified Issue

Some common causes of sleep deprivation can include, but are not limited to personal choice, habits (routines), illnesses, working hours for youth, medications (insomnia), environmental issues (excessive noise, heat, cold, family functioning, fears and stress), sleep hygiene (diet, smoking, tensions) (Kent, 2016, p. 12). In a study conducted by Stein et al. (2001), they supplied participants with a sleep and medical questionnaire alongside a Child Behaviour Checklist to survey the prevalence of sleep problems in school-aged children and to then examine these associations with reported problems. Their results verified that sleep problems were reported in 10.8% of the sample (consisting of n = 472 children ages four to twelve). Incidentally, *“less than half of the parents who recognised that their child had sleep problems actually reported this to their family physician”* (p. 60). The authors stressed that parental report of sleep problems need to be seen as a red flag for prevention of future health

and behavioural problems. They stress that sleep problems “...*should be queried about during pediatric visits for school-aged children*” (p. 61).

In an older national survey of 156 resident doctors, it was discovered that pediatricians receive a “*mean of 4.8 hours of instruction on sleep and sleep disorders*” (Mindell et al., 1994). This study was replicated in 2014 with results showing less than 10 hours of instruction on sleep was received overall by studying pediatricians. Pediatric residency programs completed the study’s surveys across 10 countries including Canada (Mindell et al., 2014). These survey outcomes indicate that there is still a great need to inform practitioners about the potential for sleep disorders or sleep problems in the children they see. Further education in sleep can inform practice whereby there is an increased awareness of the importance of sleep. Some studies indicate that if sleep problems continue to go unrecognised this will affect an individual’s quality of life long term since the more sleep deprived, attention span shortens and working memory declines (McCubbin, Peach, Moore, & Pilcher, 2012).

While some studies reveal that sleep disorders often remain undiagnosed by medical providers, there are very few studies that reveal whether educators are identifying/recording sleep as a factor in their student’s performance and behaviour. In a comprehensive study completed by Chervin and Associates (2001), they identified a number of children with sleep-related problems and reviewed their medical charts over the course of two years in order to determine how often sleep problems had been addressed in practice. What the researchers found, with a total of 830 questionnaires completed, “...*fewer than 15% of patients had current chart notes that mentioned any of the Pediatric Sleep Questionnaire (PSQ)-defined sleep problems*” (p. 1375). With such a substantial sample size, equally alarming is that, in this study, sleep disorder diagnosis were mentioned for only two out of 86 patients and no treatment was offered (p. 1375). What these studies suggest is the need for further education about sleep problems for the medical practitioner and the caregivers.

Sleep Hygiene and Evidence Based Tools

With respect to sleep hygiene, one problem created for adequate sleep is the chronic use of technology. Readers would be hard-pressed to find a local teenager who does not have a cell phone or laptop or iPad. Televisions, iPad’s, cell phones all emit a blue light that is known to impair melatonin production. Sleepers require melatonin secretion in order to feel sleepy. The blue light interferes with this process. What is actually occurring is that the blue light is confusing the sleeper by thinking it is still daylight so melatonin release is delayed (Mirghani, Mohammed, Almutadha, & Ahmed, 2015).

If sleep deprivation leads to increased irritability, decreased cognitive performance and reduced physical and mental health then one area caregivers can look towards is in the area of sleep hygiene in ensuring proper sleep routines are practiced. This is sometimes a daunting task but if the importance is stressed by educators, families and health care providers, then the message can be clearer and more pervasive. Sleep quality and duration checklists can provide identification of areas for concern in beginning the conversations about sleep hygiene (Mirghani et al., 2015).

Numerous studies have highlighted various techniques for sleep hygiene. Driver, et al. (2012) speak of using Cognitive Behaviour Therapy (CBT) for students who deal with insomnia. CBT is an evidence-based form of therapy that is a psychological approach known to be effective in working with conditions such as anxiety and depression and management of pain. “*Clinical studies have shown that 80% of people with chronic insomnia benefit from CBT*”

(p. 43). One important consideration is that the individual must be highly motivated to engage in CBT as it requires a great deal of work on the part of the participant.

There are some pharmaceutical treatments that work as sleep aids, such as melatonin (an over the counter supplement). With regards to sleep hygiene specifically, recommendations include: setting up an appropriate sleep schedule, restricting blue light emissions, not using the bedroom as an area for punishment, use of white noise or soft music, allowing time for unwinding, practicing relaxation techniques, avoiding stimulants such as caffeine and sugar, keeping the sleep environment dark and quiet and considering alternative therapies like yoga, aromatherapy and massage. Many of the studies reviewed for this report acknowledged these helpful techniques in helping with a tranquil decent into sleep.

Summary

Sleep is critical to wellbeing, academic performance and benefits mental health. Anxiety (sadness/suicide) in children and youth is growing at alarming rate leading to year-long wait lists for mental health services. Can children and youth really afford to wait that long for services and outside supports when their predicament is often about sleep? If even a portion of those on wait lists can be assisted by establishing better sleep or in receiving appropriate disordered sleep treatment, this could essentially lead to a reduction in wait lists and prevention of future problems.

Rarely is the student asked about their sleep habits and even more rarely, are they given intervention strategies to help them have a better night's rest. How much sleep individuals require will always be up for debate, but there is a physiological explanation as to how sleep deprivation impacts children and youth. The quality of sleep is a key feature. Students must balance school, a social life, family, and sometimes work commitments. For years, we have heard about the importance of eating healthy and there are marketing campaigns to support this, and students are instructed about healthy eating early on in their school careers. Research confirms a clear link between sleep and school performance and teachers may be unaware that a lack of sleep is the culprit in keeping many of their students from being able to concentrate at school and some may even jump to the conclusion that a child has a learning problem or ADHD. Professionals and families can easily overlook sleep deprivation.

Conclusion

This paper informs and connects readers to research that can help them to act when sensing sleep issues at school. Each educator has a level of health knowledge that is associated with each person's wellbeing and individual health behaviors; together these elements impact health outcomes, awareness and actions when teaching and living. In schools teachers help students "develop skills to manage stress, prioritise sleep and make positive health choices" (BOSTES, 2016, p. 1). However, sleep is a complicated human activity occupying one third of our day; it is a phenomenon that can impact cognition and behavior of school-aged children and youth. Recognition of the importance of sleep and health has caused educators globally to look deeper into this phase of living to increase the quality of life and daily performance.

Sleep is a growing field of concern and study, alongside a continuing need to inform educators, students and the wider community, sleep as a source of academic and behavioural problems needs to be considered regularly within education. Each person's ability to grasp, understand and take action is linked to their own personal understanding of health. The goal of this paper was to ascertain whether the phenomenon of sleep is overlooked as a contributing

factor of academic underachievement and behavioural concerns in schools. The findings in many studies noted leads to a position that sleep may be inadvertently ignored and misunderstood as a contributing factor in school academic and social functioning.

The identification of health related choices (positive health care behaviors) is informed by a person's level of health knowledge. Not knowing the implications of sleep problems and/or disorders can be linked to low health awareness. This low awareness can negatively affect health outcomes for all. Identification of sleep related behavior is a start (interventions) and the actions of educators to affect health can only help students do better in school. However, much more research needs to be done to investigate the prevalence and impact of sleep disorders and problems in our schools and community.

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AFL Game Sense 'grassroots' coach education

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Abstract

The Australian Football League (AFL), like most team sports in Australia, promotes game centred approaches in their coach education material, like Level 1 coaching manuals, as the preferred pedagogical approach to learning in their sport. Yet, clear challenges present educators looking to implement what is considered in the literature as methods alternative to traditional directive practice methods: alternatives like the Australian Game Sense approach developed by the Australian Sports Commission in the mid 1990's. There is a concern that 'grassroots' coaches lack the pedagogical skills to implement a game centred approach successfully, and also, that they face cultural ignorance amongst key stakeholders about a game centred approach's educational, psychological and social benefits within learning activities despite the international research collective on game centred approaches. This paper will present the key learnings from reflection on Author 1's experience in coach education delivered by AFL Queensland that had the stated purpose of educating participants on the Game Sense approach explained within the 2016 AFL coaching manual: and specifically, the stated aim "to use games as the focus of a training session" (p.24). This paper examines the use of Author 1's reflection on the Game Sense approach, whilst working with coaches in developing novice AFL players within AFL Queensland's largest region, Brisbane north. By discovering the experiences of Author 1 as coach educator supported by Author 2 in the role of consulting sport pedagogue, the paper considers the possibilities and trials faced in coach education and by coaches using a Game Sense approach, and suggests future directions toward community coach education.

Introduction

Since the mid-1990s, Australian coaches have been informed and encouraged by the Australian Sports Commission (ASC) (Australian Government, 2015a, 2015b; ASC, 1996; ASC, 1999, 2005) and academic research and scholarly literature (see for example, Breed & Spittle, 2011; Light, 2013; Pill, 2013) to use the Game Sense coaching approach (GSA). The GSA is a "games centred approach" developed as a counter to what has been described as "traditional" sport coaching, which has as its organisational centre drill practice and direct instruction styles of pedagogy (Light, 2013; Zuccolo, Spittle & Pill, 2014). Internationally, game centred approaches are promoted because of a perceived reliance by coaches on direct instruction of players in "drills" that do not connect perception-decision making to game-like action environments. Drills have been characterised as teaching players little about the complementarity of the tactical "thinking" component of performance and technical movement actions that are always coupled within the game (David, Button & Bennet, 2008; Den Duyn, 1997; Mitchell, Oslin & Griffin, 2013; Pill, 2014). Despite the inclusion of the GSA as the pedagogical foundation of Australian Sport initiatives such as the Playing for Life Philosophy (ASC, 2005; Australian Government, 2015a) and Sporting Schools (Australian Government, 2015b) the "traditional" linear and directive practice model still dominates as the essential learning environment (Pill, 2012a, 2014a; Pill and Younie, 2015; Zuccolo et al., 2014). This common or traditional model includes warm-up and cool down laps to start and finish training - often combined with static stretching, and then practice sessions

largely comprising repetitive “off-the-line” drills before some form of “match simulation” at the end of training.

The need for this study is provided by Harvey and Jarrett’s (2014) claim that further research was required on game centred approaches in community sports clubs and enrichment programs. This paper will use the experience of the first author with Australian football to discuss the dilemma that exists between the oratorical and documentation support for the GSA spanning 20 years since the GSA was introduced via the Australian Sports Commission’s Perceptions and Actions research report (1996), and accompanying nation-wide professional learning events conducted by the ASC to launch the GSA, and practitioner uptake. Despite the GSA being instructed and promoted at Australian Football League (AFL) Level One and Two coaching courses (AFL Queensland, 2016), featuring as keynote demonstrations at AFL National Conferences in 2015 (Etihad Stadium, Melbourne, January 30 - February 1) and 2016 (Patterson Stadium, Subiaco, February 5-7), and included in the Level One Coaching manuals (AFL, 2016), traditional, coach-centred directive style instruction of reproductive drill activities that focus on technical conformity of movement models still dominate Australian football community coaching (Pill, 2014b; Pill, 2016).

Author 1’s interest in the GSA within the sport of Australian Football stemmed from an invitation in January 2016 from AFL Queensland’s Brisbane North region to deliver a “games based learning” professional learning event for their casual and permanent staff of AFL Queensland. The initial conversation with Author 1 and AFL Queensland developed into an exchange of ideas in how to better reinforce the AFL’s directive toward the GSA in coaching manuals (AFL, 2016) with community level coaches. Author 2 became involved as a mentor to Author 1, taking the role of sport pedagogue. Evans and Light (2008) have explained that the role of the sport pedagogue in projects such as the one described in this paper is to assist pedagogical learning by making available research and discussion of the application of theory to practice.

This drive to better reinforce the AFL’s directive toward the GSA in coaching manuals in one jurisdiction has not been without its challenges. The purpose of this paper is to provide an auto-ethnographic vignette from Author 1 that describes these challenges and the steps taken to turn constraints and limitations into possibilities.

Pill (2014b) suggested that Australian football coaching has begun to shift away from the “traditional” dominance of directive and practice style coaching. The previously described interest in the GSA and Australian football coaching from the AFL evident in its professional learning events and coach education literature would seem to support this perspective. Despite this information, in general coaches seem to prefer the “comfort” of drills as practice tasks instead of designer games and deliberate play promoted by the games’ elite coaches (Pill & Younie, 2015). However, Author 1’s experiences of many Australian football coaches through professional learning activities undertaken with AFL Queensland suggests that there is a gap in practical, pedagogical knowledge of coaches which prevents a GSA being used as a favoured coaching method. Recent research by Pill (2016) charting an Australian football coaches journey to learn to coach using a GSA suggests Author 1’s experience is not a localised regional issue.

Method

Autoethnography

Autoethnography is a qualitative research method that analyses the foregrounding of authors’ personal narratives about cultural experiences (Sparkes 2000). The resultant text has the author as a main character in what at times can only be described as evocative and emotive stories about their authentic personal experience within culture (Smith, Sparkes & Caddick, 2014). Pill (2012b) promotes autoethnographic processes as a vehicle for authors to

extend their cognition of practice, which was the intent of Author 1 in this study positioned within “grassroots” AFL coaching and the Australian football coach education field. Autoethnography was used to inform more effective coach education using the reflective experience of Author 1 to highlight some of the personal and social complexities found by academics and scholars alike (Gearity, 2014).

Autoethnography has been promoted as a research method in sport coaching (Groom, Nelson, Potrac and Smith, 2014). For example, Jones (2009) suggests that it is a way for the author and reader to better understand the complex nature of coaching as a social construct. Author 1 used an autoethnographic approach by frequently journaling his reflective thoughts through involvement in personal coaching, the coach education process, observing other coaches, and harnessing the reflections of other coaches. With this process proving to be a strong descriptive recount of the push to implement GSA into the Brisbane north region, Author 1 was then able to analyse the critical complexities of educating within AFL through an alternative method compared to the dominant discourse of the traditional, coach-centred directive style instruction. Importantly, it was during this reflective, evaluative stage of the learning process (Peel, Cropley, Hanton & Fleming, 2013) that Author 2 as sport pedagogue, helped develop future direction within the wider promotion of GSA in Author 1's thinking.

Author 1 reflected on information obtained from his team session plans, personally devised GSA materials developed for coach education sessions, field notes when working with other coaches, and his collection of the thoughts from observations of mentored coaches' use of GSA that he worked with. This follows a similar format to the role of the coach in Pill (2016) and Evans and Light (2008) studies. By analysing this information regularly, Author 1 was able to synthesise the recurring themes. The role of Author 2 was to provide theoretical perspectives, challenge and debate of ideas, and review coding of Author 1, leading to a greater understanding of the themes.

There are however, limitations that need to be considered and that came to light through the reflexive process of autoethnography (Bessio and Butz, 2004). When Author 1 looked solely at his coaching of an under 11 girls' team he realised that his own experiences are far more appreciative of creative situations, where players can work in small groups, and that he “naturally” favoured athlete centred” cooperative learning” (Kidman et al., 2006), and empowerment activities where the players created their own games that matched strategies. That Author 1 coached an all-female team in what until recently might have been viewed as a traditional “man's sport” is also relevant. For example, would parents (particularly dads of boys) have reacted differently to his coaching of their sons? Highlighting this, Author 1 noted in his reflected writing that when a male masters' player watched his girls playing two games of Endball at training, with the ball being constrained to being kicked along the ground to encourage their “groundwork” ability to pick up the ball on the ground in small spaces, commented to the Junior Club President: “What are these girls playing - soccer?”

The next section of the paper deals with the themes that emerged from Author 1's autoethnographic reflection and theorising and the ideas that subsequently developed through a debate of ideas with Author 2.

Results and Discussion

It has been noted before that any game centred approach is hard to implement, even for experienced teachers (Lauder, 2001). After giving his first presentation to AFL Queensland's Brisbane north permanent and casual coaches, Author 1's review of lecture notes revealed that he was labouring hard on the point that AFL coaches had already written vast amounts of text on – the GSA. As such, it did not make sense that the organisation needed

help from him. However, the point made consistently in the literature that Australian football coaches' concentrated on technical skill drills was apparent from Author 1's interaction with coaches. Author 1 could see that this GSA was a challenge to the coaches thinking and suggested that, just as Pill (2014b) advised, AFL coaches are coaching players exactly how they were taught themselves: through traditional, coach centred, reproductive instruction, that is heavily technical, and, 'skill and drill' based. This observation together with the circumstance that Author 1 has daughters suddenly interested in playing Australian football prompted Author 1 to consider the juxtaposition between the promotion of good coaching through a GSA by the AFL coach education material (AFL, 2015) with what was actually happening in the field.

AFL Coaches' Pedagogical Issues

1. Session Planning – outlining clear learning objectives

Author 1 found on observation that the coaches had generic aims like "kicking" for planned activities, or no specific aims at all. As well, it was noted by Author 1 that questioning was not planned for or indeed indicated as going to be used as an instructional strategy, in the plans. Author 1 also noted the absence of recommendations of modifications for inclusion, challenge level, or skill progression. These observations are consistent with the findings in GSA research (Zuccolo et al., 2014).

Planning is the key feature of the AFL manual's 'Coaching' section description of the GSA (2016). Turner (2005) suggested that teaching through games takes considerable pedagogical skill. As such, with all nine coaches Author 1 worked with, planning activities for sessions was present - with diagrams, equipment organised and discussion of how it all worked occurring prior to the sessions with head coach and assistants. However, it was what did not feature within the outlines that was noticeable to Author 1 when reflecting on the assessment of coach planning documentation.

In his field diary, often discussions by Author 1 with a coach was initiated by the question, "What is your learning objective here?" and was usually responded with something like, "Handball" (Gunn, 2016). When probed further, the response was along the lines of "practising handball skills", which would lead to the question, "Which handball skills?" (Gunn, 2016), because tactically there is much to consider in establishing any learning environment so that is at least representative of the game (Pinder, Davids, Renshaw & Araujo, 2011). Additionally, the situated complexity of the problem confronted in the moment which leads the player to select the handball as the right technical action for the moment (Pill, 2014a) should be considered. It was clear that coaches Author 1 was engaging with had focussed on content perspectives but lacked teaching perspectives pertinent to the tactical perspectives of the game.

2. Observations and assessment of learning outcomes

One of the main themes presented within the GSA professional learning delivered by author 1 was that practice activities needed to be used as representative contexts; that is, game-like contexts, so that the players were developing perceptual, decision-making and technical skills together (Renshaw, Chow, Davids & Drummond, 2010). This is a distinctive feature of the "game sense equation" (Pill, 2012a). Yet, even after ongoing mentoring and emphasis by Author 1, he reflected that all but one of the coaches he worked with suggested that they were ever able to stop and observe what was going on in the players' learning. However, common throughout author 1's observed sessions and the mentored coaches' written and verbal reflections (Gunn, 2016) were comments

like, “Unfortunately I’ve noticed I haven’t done enough of standing back & observing,” or, “I’ve only really stood back and watched whilst Craig was running the kids through a game of kick tennis. To date I’ve been 100% involved in both training sessions and on-field on game days”. This points to clear pedagogical preference for highly task involved directive instruction by the coaches consistent with the findings in the literature previewed earlier in the paper.

Common also in Author 1’s guidance of the coaches (as in the session planning section above) was an interrogation of chosen learning outcomes. As such, Author 1 found the need to guide their planning thoughts a little. A typical conversation from the field journal (Gunn, 2016) along these lines features below. Interestingly to note here, the coach being guided was not “inexperienced” being in his fourth year of AFL junior coaching:

Four year coach: Craig, I am a coach who struggles to stand back and watch to observe and let them work it out through the game. Would you mind coming down to the U/10s and having a look and giving us some help?

Author 1: No worries but first I want you to decide what you guys want to show me so you know that you have some control over the feedback process. Do you know of a problem they want to fix? The next step is to ask yourself, ‘Why is this happening’?

Four year coach: (After a weekend of thought this was sent to Author 1 via email) First option/Best option – we want the boys to choose the best option, not necessarily the most dominant player to kick/handball to.

This exchange noted in Author 1’s reflective writing suggests that even with four years’ experience, this coach, like his more novice peers, forgets to delve deeper into the reflective process. This prompts further intervention from Author 1.

Author 1: Like I said earlier, you always need to ask yourselves why this behaviour is happening. I suspect that it is a mixture of ego from some boys and also not trusting certain others. Thus how I always handle these things is through specific small sided games that target what you want. Thus I will use your points here to demonstrate using two games only: “Keepings Off” and “Endball” with changes (constraints) that creates opportunity for movement solutions (Gunn, 2016).

Interestingly through interactions like this, Author 1 was able to see just how problematic a GSA is for volunteer coaches who received limited coach education and often lack mentoring by experienced coaches once they start coaching.

3. Management of session

Whilst the *AFL Junior Coaching Manual: for Coaches and Players Aged 5-12* (2016) suggests planning sessions that minimises waiting time for players, this skill is acknowledged by experienced PE teachers and academics worldwide as a hard process. Research suggests as little as 8.6% of PE class time is spent with children undertaking moderate to vigorous physical activity (Simons-Morton, Taylor, Snider & Huang, 1993). Indeed, Rink (1993) suggests that any teaching approach, requires the group practise of rules and routines, in regard to restarts, equipment management, and stopping for discussion. However, once again, it is a well-known precept that one of the hardest skills to hone for any beginning teacher is group management, in that it is only when the support of the group toward learning is achieved that the mutual education of all can begin (Rink, 1993).

Thus, Author 1 continually reflected on the facts that 'pre-service' PE teachers, let alone experienced teachers, who spend years at university and practicum environments, honing their questioning, observation, analysis and facilitation skills, struggle to implement an instructional method like GSA in class (SueSee and Edwards, 2009). Therefore, it makes sense that the junior coaches also struggle to build on their group management let alone capacity to coach using a Game Sense approach. Indeed, this is also one of the reasons for why author 1 first sought out Author 2 looking for advice on simplifying the GSA process for coaches. However, it appeared that educating coaches on the use of small-sided games resonated with the coaches (Pill, 2016). Written reflections like the one below were not uncommon from the newly trained coaches, as evidenced in the field journal:

First year coach: I must say Craig I have found your games centred coaching techniques a bit of a life saver, as the line-up kicking, handball back to the coach did not work for me. I have one or two handfals in my group and any lining up leads to 'niggling' and all sorts. I 'gotta' keep them moving to keep them motivated. Interestingly from a second year girls' coach: One challenge I do see with this (GSA) is that the girls can sometimes become distracted with the "fun" of it, especially if you have girls that lack focus to stay on task (Gunn, 2016).

Interestingly from a second year girls' coach: One challenge I do see with this (GSA) is that the girls can sometimes become distracted with the "fun" of it, especially if you have girls that lack focus to stay on task (Gunn, 2016).

4. Coach pedagogy summary

Indeed, academics like Rink (1993), would find that the fun, movement and motivation mentioned above are interdependent of each other in effective teaching. However, any first-time coaches, especially within the volunteer, junior and youth sectors should feel a little daunted by the experience. Amongst the many desires and expectations of stakeholders is the fact that people have paid money for their children to learn a sport. Yet, the challenge of implementing a games centred approach has also been common, in both PE (Butler, 1996; Harvey, Cushion and Massa-Gonzales, 2010; McNeill, Fry & Wright, 2004), and, representative level and senior sport (Cushion, 2013; Light, 2004; Roberts, 2011). Therefore, teaching skills like questioning and guided discovery processes have proved difficult for trained educators, and so expectations on volunteer coaches hoping to use a GSA need to be tempered (Pill, 2014a).

5. Sport coach as educator

Jones (2006) is strong in his drive toward the coach being 'reconceptualised' away from instructor or fitness director, toward the greater role of holistic educator. Indeed, he calls for more research to be done in the area of coach education by incorporating educational theory rather than just biomechanics or physiology frameworks (Jones, 2006), as coaching is closely intertwined with teaching. Perhaps indirectly supporting this, Brisbane North AFL enlisted Author 1 to challenge their coaches, in the region, assisting Pill's (2014b) suggestion that the AFL is undertaking a shift away from the technique driven coaching toward the use of games.

In proposing a way that sports coaches learn through educational practises, Author 1 generally leans on Rink (1993) for guidance. She has articulated four clear components of student learning that Author 1 always finds useful in teaching coaches in regard to focusing on the learning of their participants in games teaching pedagogy:

Stage One - Developing control of the object

Stage Two - Complex control and combination of skills

Stage Three - Beginning defensive and offensive strategies

Stage Four - Complex game play

Source: Rink, 1993, pp. 276-283

Further, Rink (1993) passes on more advice to educators that Author 1 uses in the education of skill acquisition, like:

1. It is impossible to 'master' stage one.
2. Minimal skill levels within the earlier stages need attainment before expertise in above stages.
3. Skills and strategies need to be taught simultaneously in the middle stages.
4. Educators need to observe and analyse game play and gradually increase complexity for ongoing student success.
5. Finally, when adding complexity in games, always: "Look at what a player does during the game – describe it and then order learning experiences that will develop these abilities." (p. 284)

Much of this advice by Rink will be utilised below when we consider the AFL Manual (2016). In any case, it is apparent that the AFL understand the complexities of this games pedagogy but are looking toward Jones's (2006) "coach as educator" philosophy for future direction. For example, leading coach, Alistair Clarkson, is found to be a strong advocate of game based coaching and playing games, as practiced at the 2015 AFL coaches' conference. However, in the reflections of Author 1 is that whilst the AFL's push for coaches learning teaching pedagogy is promoted in the Coaching Pathways section of the AFL website (2016), this is the suggestion for the "elite" coaches only. We would suggest that a "top down" education process needs to be reversed to improve AFL learning at community football for enhanced game development and participation outcomes.

6. Critical insights into the 'Level One AFL Manual'

In reality, the new Queensland AFL coaches are not helped by the at times confusing Level One, AFL manual (2016). This is because, although they are given a 45 minute practical learning session on the GSA, and coupled with the fact that they can access much game-centred information or small sided games (SSG) ideas on the AFL community coaching website, the manual mentions the GSA as a teaching method once only (2016). Additionally, a section on "game skills" features three brief paragraphs, where it alludes to modified games. This juxtaposes significantly with the enormous focus on "basic technical" skills" which feature heavily. Within the AFL coaching manual (2016) there is a focus on the "S.P.I.R" teaching method (show, practise, instruct and repeat) of skill acquisition, featured in an 18 page "skills" guide. This directive coaching framework has the coach: a) demonstrate the correct handball technique; b) ensure that the players get to practise this among each other; c) work around giving feedback; d) observe the power of repetition (Ericsson 1993) honing the players' technique well. The contradictory messages in the manual must be difficult for the novice coach to navigate. In contrast to the situation in Queensland, in South Australia coaches attending Level 1 courses are given an accompanying copy of a Game Sense coaching resource and workshopped into how to use the approach.

Conclusion

In order for coaches to stay correctly informed of a GSA, we suggest that coaches be given opportunities to further their education outside of workshop style, one day sessions, and perhaps develop communities of practice (Nash & English, 2014). Indeed, with today's technological advances, perhaps this can be done with the aid of online technology so that coaches can better explore ways that they can design training that is more representative (Renshaw, Chow, Davids & Hammond, 2010) of the 'real' game. The challenges in reforming coaching practice from the familiar and therefore comfortable base of one's prior experience of being coached was noted in reflection as the continuing trial of coach education. This challenge was discussed by Pill and Younie (2015) as reinvigorating coaches with the GSA approach, which Pill (2014) suggests can only be solved through well versed mentors/pedagogues (2014a) in the AFL community supporting coaches. The use of social media platforms like Facebook, Youtube, Instagram and others has the potential of having a significant positive impact, particularly in supporting coaching practice through a GSA. Indeed, Nash and McQuade (2014) muse that within the social media realm there are applications that provide untapped potential for organisations like the AFL.

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An application of non-linear learning in basketball: Game-Sense coaching

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Abstract

Information-processing understandings of skill learning have often been positioned as polar to non-linear learning perspectives in motor learning literature. Each has advocated for the role of different stimuli in influencing deliberate motor performance. Where information-processing theories have argued for the role of representative movement plans stored in the central nervous system, non-linear conceptualisations have focused on the importance of environmental feedback (i.e. constraints) in shaping movement performances. This paper contrasts the two perspectives, foregrounding a demonstrated application of non-linear learning in basketball.

Introduction: Traditional Understandings in Skill Learning

Skill learning (or acquisition) has been described as the relatively permanent changes in movement behaviour, which through practice and learning is made less vulnerable to factors that may disrupt motor coordination (Davids, Button & Bennett, 2008; Schmidt & Wrisberg, 2004). In this paper, we will refer to “traditional” approaches to skill learning. Multiple terms have been used to denote traditional approaches to skill learning, including method coaching (Abraham & Collins, 1998), leadership style (Kidman, 2010), coach-centred (Kidman, 2010), directive (Light, 2013), linear (Hopper, 2013) and technique centred (Kirk, 2010; Hewitt, 2015). These terms collectively reflect a behaviourist understanding of learning which dominated the 1980’s and 1990’s (Light, 2008, 2013). In sports coaching, behaviourism is exhibited by an almost exclusive focus on physical skill acquisition (Drewe, 2000), viewing the athlete body as a biological ‘machine’ that can be improved through training (Cassidy, Jones & Potrac, 2008). In this “traditional” view of skill learning, learning is conceived as a mechanical process to be broken down or compartmentalised into its simplest components to be learnt in isolation from each other and the complexities of the game. This is exhibited as an additive process whereby progressive part pedagogy is used in a complicated process that builds a prescribed movement model of a skill “bit by bit” (Light, 2008; Stolz & Pill, 2012).

Behaviourist understanding of skill learning directs practitioners to highly structured “training” sessions which are sequentially progress as segmented learning components in order to internalise objective knowledge - a prescribed movement model of a skill (Light, 2008). Sessions typically consist of a technical skill as technique related warm-up, followed by instructional demonstration and drills that isolate desired technical cues in closed and semi-closed practice environments. Closed skill practice is characterised by a focus on movement consistency, facilitated by the elimination of dynamic/unpredictable variables (Spittle, 2013) which may potentially disrupt skill acquisition. Typically, if skill competency is demonstrated via closed skill drills then applied gameplay may be used to conclude sessions (Stolz & Pill, 2012).

Resting on the behaviourist assumption that sport specific movement models called techniques (often referred to as skills) are fundamental for successful sporting participation (Stolz & Pill, 2012), using a traditional approach

teacher-directed instruction is used to demonstrate, correct, praise, verbalise feedback and question athletes on their technical performances (Claxton, 1988; Lacy & Darst, 1985; Rupert & Buschner, 1989; Smith, Zane, Smoll & Coppel, 1983; Williams & Hodges, 2005). An emphasis is therefore placed on coaches' specialist knowledge of sport related technique cues and the provision of sequenced "progressive-part" technical instruction to deliver the coach's knowledge to players. Light (2013) called this directive coaching. Demonstrations are a common pedagogical instrument synonymous with a focus on technique replication typical of a traditional approach. providing learners with a visual template or criterion model for the intended movement pattern. However, it has been suggested that this foregrounding of the demonstration in coaching pedagogy lacks empirical grounding (Williams & Hodges, 2005).

Collectively, these pedagogical features of demonstration, explanation and practice common to traditional sports coaching and teaching practices are synonymous with what is referred to as a linear approach to skill learning. Here, proportional changes between information input/movement responses, mono-stable movement outcomes, invariant movement patterns and internal rather external influences on learning are expected (Chow, Renshaw, Button, Davids & Keat, 2013). A traditional linear progressive part closed-to-open drill pedagogical approach has been criticised for focusing on "how" to execute a skill, omitting the "when, where and why" of its application (Light, Harvey & Mouchet, 2014; Wein, 2007). The argument being made that closed-skill drill and even many open drill practice conditions fail to provide the contextual environment representative of the game and the cognitive nature of the game (Pill, 2012; Wein, 2007). Therefore, players are not exposed to variables associated with executing skills under fluctuating constraints on performance. Non-linear pedagogical thinking, informed by dynamic systems theory emerging from ecological modelling, has emerged as an alternative framework for the understanding of game-based sport coaching accounting for the complexity associated with constructivist understandings of learning.

Non-Linear Learning Theory and Sport Coaching Pedagogy

Central to nonlinear pedagogy is the understanding of learners as complex neurobiological systems, comprising many individual components (e.g. muscles, joints, limb segments and bones), referred to in skill acquisition literature as degrees of freedom (Davids, Button & Bennett, 2008). Because of the sheer number of degrees of freedom involved in human movement and the endless possibilities for their interaction with one another, nonlinear pedagogy advocates suggest that learning cannot follow continuous linear and sequenced progressions of behaviour. Instead, as learners grapple with synergising various degrees of freedom for movement, skill learning reflects sudden discontinuous fluctuations (Kelso, 1997; Newell, Liu & Mayer-Kress, 200) characterised by abrupt shifts from one preferred movement state to another (Spittle, 2013).

Constraints

The implication of this understanding for physical education (PE) teachers and sport coaches is that the deliberate and purposeful manipulation of individual, task and environmental constraints exerts influence on learners degrees of freedom in order to bring about coordinated goal-directed movements (Chow et al., 2006). Constraints in this context are recognised as boundaries that shape learners' movement organisation, cognitions and decision-making processes (Passos, Araújo, Davids & Shuttleworth, 2008). Constraint modification in nonlinear pedagogy recognises four outcomes: 1. Non proportionality: a single constraint modification (e.g. instructions or equipment) may lead to non-proportionate changes in performance; 2. Multi-stability: a single constraint modification may potentially lead to

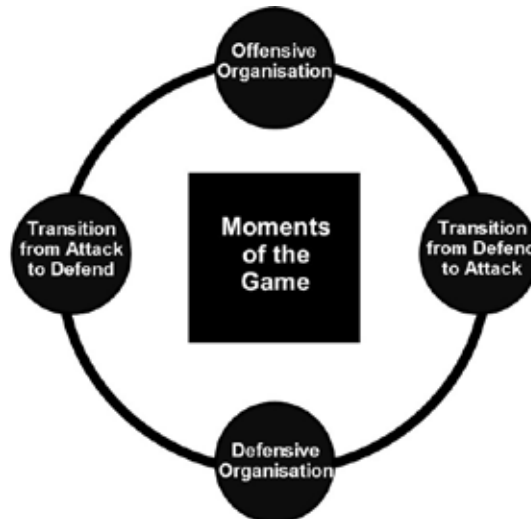
multiple effects on movement; 3. Parametric control: where linear systems involve a centralised control (e.g., top-down, prescriptive approach), nonlinear systems and movement generated within them are influenced at multiple entry-points; and 4. Variability: multiple movement solutions may emerge under the influence of individual, task and environmental constraints (Chow, Renshaw, Button, Davids & Keat, 2013; Lee, Chow, Komar, Tan & Button, 2014).

The Game Sense approach (Australian Sports Commission, 1996) has been described as a non-linear pedagogy (Breed & Spittle, 2011), where there is focus on movement outcomes leading to movement form, rather than the traditional focus on gaining replication of the demonstrated technique through ever more closer approximations of performance to the motor model demonstrated by the coach. The pedagogy through which this non-linear and this more flexible (Light, 2013) coaching is enacted are the principles of exaggeration, elimination and reduction of boundaries of behaviour (known as constraints) using the principles of representative task design for perception-action coupling. The nonlinear assumption posits early learning beginning with representative task design by simplification of constraints and the principles of exaggeration, elimination and reduction of boundaries of behaviour. Using tactical periodisation, game play can be progressively shaped and focused so that the complexity of play moves toward increasingly closer models of “full” game play.

Representative Task Design

Representative task design in skill learning research was originally raised as a concern for researchers in ensuring that the task constraints in a specific research context represented constraints outside the experiential setting and could therefore be generalised (Davids, Araújo, Button & Renshaw, 2007; Pinder, Davids, Renshaw & Araújo, 2011). For coaches, the experimental setting equates to practice environments and as such, practice conditions ought to be purposefully designed to reflect the performance conditions of the complete and final game context (Renshaw, Davids, Shuttleworth & Chow, 2009). This brief description on its own does not begin to identify the complexity or extrapolate various circumstances under which representative task design is employed for motor learning benefit. For example, applying this definition in its most literal sense may imply that novice children are engaged in a shooting activity using FIBA size 7 basketballs on a regular basketball ring. Immediately the issue of arm and leg strength to project the ball to the height of the ring becomes apparent. This is a cautionary example, one that highlights equipment scaling as a solution to developmental barriers in creating representative task design (Renshaw, Davids, Shuttleworth, & Chow, 2009).

A second key consideration of representative task design is ensuring that learning activities respect the internal logic of the game. For invasion/territory sports, internal logic is a product of the oppositional relationship created between players governed by game rules (Gréhaigne, Richard & Griffin, 2005). The internal logic of basketball revolves around four key moments of the game (see Figure 1) for which at least one should be reflected in any given learning activity (Delgado-Bordonau & Mendez-Villanueva, 2012).

Figure 1. Moments of the Game

Source: Delgado-Bordonau & Mendez-Villanueva, 2012

Perception-Action Coupling

Perception-action in sport is concerned with two key areas. Firstly, learners' detection of various environmental energy forms or properties and how these can be used to support goal directed behaviour (Fajen, Riley & Turvey, 2009; Hong & Bartlett, 2008). The ability to detect and ignore certain variables in the process of perceptual learning is referred to as the 'education of attention' (Gibson, 1966). This is process of differentiation whereby the learner attempts to identify a specifying variable they intend to perceive from a larger manifold of information (Gibson & Pick, 2000; Van der Kamp, Oudejans & Savelsbergh, 2003). This is a deliberate process as specifying variables may provide information on key environmental properties that can influence or regulate learners' actions (Hong & Bartlett, 2008). Once perceived, it is suggested that a subsequent process in perceptual learning is to maintain the relation between specifying variables and unfolding movement, referred to as calibration (Van der Kamp et al., 2003).

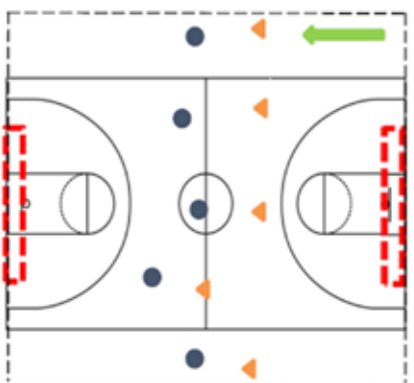
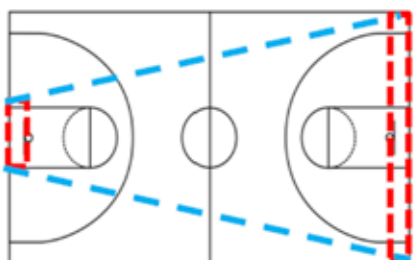
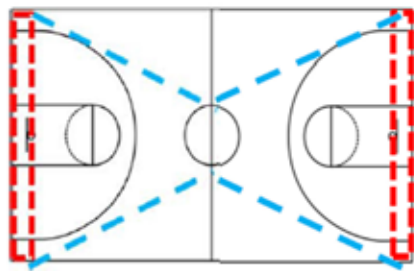
The interaction between "perceiving and acting is a circularly casual process involving (a) forces giving rise to flows/forms/times, and (b) flows/forms/times constraining or giving rise to forces" (Turvey & Carello, 1986, p. 134). The ability to continuously attune and calibrate movement to specifying information has been linked to sporting expertise (Van der Kamp, Renshaw, van der Kamp, & Renshaw, 2015). This has been demonstrated among pace cricket bowlers who have been shown to continuously adjust gait throughout their run-up (Renshaw & Davids, 2004, 2007) and bowlers who have shown kinematic differences facing ball feeding machines vs. bowlers (Pinder, Renshaw & Davids, 2009). Influences on movement in this context are referred to in the literature as affordances; that is, affordances for action (Hong & Bartlett, 2008). There is some evidence to suggest that implicit but not explicit learning is suited to evoking education of attention for different optic variables (Farrow & Abernethy, 2002).

Discussion

In this discussion we explain using basketball learning progressions that reflect the three key tenants of the Game Sense coaching approach as non-linear learning presented in this paper - representativeness, perception-action coupling and variability.

The first learning example (Figure 2) focuses on full-court transition immediately following a turn-over, rebound or reset of play. Court dimensions are modified to limit or increase task difficulty in transitioning the ball. The first progression increases court width, exaggerating time and space for transition opportunities via passing or dribbling. Scoring end zones (marked in red) as opposed to rings are used for the same purpose. Subsequent progressions reduce permitted playing to create choke points at mid and upper court, exaggerating transition difficulties encountered if players over-occupy or cramp 'dangerous' space. Should attackers over-occupy these choke points, questioning may be used to facilitate the importance of offensive lane spacing and off-the-ball movements to potentially drag defenders out of attacking space. A withstanding rule is enforced that no more than one defensive player may be present within the three-point arc or centre circle at any given moment. Given that 5v5 is maintained for game representation, this rule is necessary to prevent unneeded clustering of players in a confined playing space. Task-constraints may be added to tailor learning to address a variety of sub-objectives including breaking a defensive trap on the ball carrier and overcoming a full-court defensive press.

Figure 2. Basketball learning example 1

Game moment (internal logic): Transitioning across full-court / fast break Passing + dribbling	
Task constraints	Court structure
<ol style="list-style-type: none"> 5v5 Wide court Passing + dribbling Score via possession within red end zones. Possession changes and play resets immediately after scoring in the opposite direction. Depending on ability level, ball may be disposed by intercept only or stripped while dribbling. 	
<ol style="list-style-type: none"> Same as above with the additional that no more than a single defensive player may be present within the three-point arc. 	
	

Capturing the moment of offensive organisation, the primary learning objectives for the activity shown in Figure 3 are to maintain appropriate offensive lane positioning and ball movement in order to exploit space and score. A key rule is imposed on the offensive structure that no more than one attacking player may be stationary in a marked lane (unless providing a screen). Acknowledged as a task constraint, this rule serves as a specifying perception-action variable. That is, under the urgency of the imposed task rule, perception of the laneways is marked in order to act in spreading the floor. This may serve to discourage fixation on the ball with limited recognition of appropriate positioning within the broader offensive structure; an expected behaviour among novices.

Figure 3. Basketball learning example 2

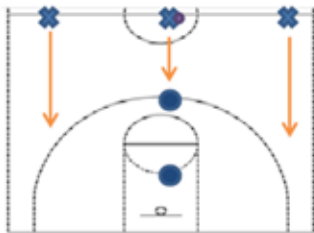

Game moment (internal logic): Offensive lane positioning + penetrating passing.	
<p>Steps</p> <ol style="list-style-type: none"> 1. Players set up with 5 players in offense and 5 players in defence. The court will be divided in marked 5 lanes. 2. The offensive team is not allowed to have more than one player can be stationary in a marked plane, unless providing a screen. 	<p>Court structure</p>
<ol style="list-style-type: none"> 3. Offensive players will pass to team mates. Each time a pass is completed, the passing player must then swap a lane with another team mate. For example, the offensive player in lane 1 may pass to the offensive player in lane 3, and then swap places with the offensive player in lane 2. <p>Defenders are aiming to deflect or intercept the ball.</p>	
<p>Progression:</p> <ul style="list-style-type: none"> • Enforce screens after every pass 	

Depending on the specifics of offensive organisation the coach may want to focus on (e.g. pick and roll screens, lay-up scoring, shot-selection) the activity may be progressed in a variety of different ways. A first progression may delimit learning to lane positioning with passing only with attackers being required to swap lanes with a teammate only after passing the ball. For example, attacker 1 may pass to attacker 3 and then swap places with attacker 2 (refer to Figure 2) with points being allocated for each successive pass. Defenders may only be permitted to intercept passes rather than strip the ball from possession to further ease complexity in early progressions.

So far, the imposed task constraints reflect an explicit pedagogical focus given their directive nature. From a non-linear perspective, as learning begins to stabilise and appears less challenged, we propose explicit task constraints should gradually be relaxed in favour of implicit modes. The purpose of which is to transition the learning activity closer to the more recognisable game form. Specifically, the aforementioned task constraints do not exist in the

accepted fully fledged game of basketball. However, we recognise their purpose in scaffolding and gradually transitioning learners from a simple iteration targeted game moment to the final form seen in the full game. As learning becomes increasingly implicit, questioning may be used as a substation for explicit task constraints to attackers on effective off-the-ball movements in order to free themselves to receive a pass (for example: when and in which direction should movement off-the-ball movement for the ball receipt occur?).

Figure 4. Basketball learning example 3

Game moment (internal logic): Offensive lane positioning + penetrating dribbling. Passing + dribbling + shooting	
Steps	Court structure
<p>1. Offensive player dribbles down from the half way line to the top of the 3-point line. Two wing players run from the half way line to the wings of the 3-point line. Two defensive players will start in the key.</p>	
<p>2. Lanes will be designated on the courts. Offensive players will dribble and pass the ball to one another. Points will be directed per shot:</p> <ul style="list-style-type: none"> • Long shot (0 points) • Forced shot (1 point) • Contested shot (2 points) • Cut to the basket for a shot within the key (3 points) • Layups dribbling through either lane 1 or 3 (4 points) <p>Defensive players cause a stop by deflecting the ball, intercepting or when the ball hits the ground unintentionally.</p>	
<p>Progression:</p> <ul style="list-style-type: none"> • Enforce screens on the ball so that the offensive players must use it to dribble • Add in another defender • Re-create using 5 v 5 • Add a shot clock 	

The activity shown in Figure 4 focuses on players' ability to make the best shot selection in order to score the most points. The activity draws attention to movement outcomes leading to movement form, rather than the focus on replication of a demonstrated technique from the coach. In this instance, the activity draws attention to the movement outcome of dribble penetration and/or a close shot to the basket, rather than focusing on repetitive shooting drills.

The activity offers players the ability to shoot the basketball in a variety of ways, with greater emphasis placed on the ideal areas for dribble penetration (i.e. from the wings of the court), and shot selection (i.e. close to the basket at a 45-degree angle using the back-board). The points attributed to each shot selection, create the imperative to get as close to the basket as possible before shooting the ball.

The emphasis on the ideal areas (e.g. using points for dribble penetration in lane 1 and 3) offer exaggerated desired behaviour by coaches and teachers. The game is representative of a basketball game, through the important

elements of competition, including defensive players, and providing a scenario that occurs within a game situation, often on a fast-break. Imposing the task rule, with the perception of laneways, acts as a guide to penetrate the basket through the wings of the 3-point line on the court. This may serve to encourage appropriate positioning for shooting, and to dribble to the basket in order to layup or draw in a defensive player. Furthermore, the teaching concepts that are evident within this activity relate to:

- Passing (efficient passing, quick passing, passing to an open player)
- Catch, turn and face people you pass to
- Moving off of the ball to receive a pass
- Moving out of the way of someone who is dribbling to the basket
- Reversing the ball from one side of the court to the other to make the defensive players move
- Communication
- Spatial awareness



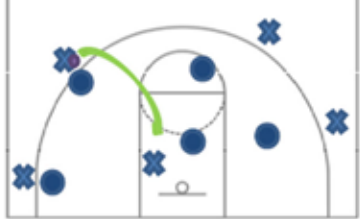

Supplementary progressions, explicitly the use of screening on the ball, aim to offer a constraint modification that may potentially lead to multiple effects on the movement, including increased dribble penetration to the basket. Following this, other progressions aim to create an activity further representative of the learning environment in order to provide opportunities to transition new understandings in to the game environment.

Technical focus: Dribbling + Passing + Shooting

Activity: War: 5v5

Aim: The aim is dependent on what you want to emphasize as a coach. For the example below, the primary aim is to get a full ball reversal. Players will score by getting the ball from one side of the court to the other.

Figure 5. Basketball learning example 4

Game moment (internal logic): Offensive set-up. Passing + dribbling + shooting	
Steps	Court structure
1. The game is started by setting up 5 players in offence, and 5 players in defence	
2. Players will pass (only) the ball around the 3-point line with the aim to get the ball from one side of the court to the other. If achieved, players will score 2 points for their team. Offensive players are allowed to screen off of the ball. There is no dribbling. Defence will be trying to get a steal, stop, deflection etc. If the ball hits the ground, or is stolen by defence, there is a turn over.	
3. Progression: If the ball can be passed in to a player who runs in to the key, then the team is awarded 1 point extra.	
4. Progression: Put in a permanent post player (watch the 3 second rule). No points awarded for passes to the post. Others can still cut in to the key to receive 1 point.	
5. Add in a 24 second shot clock. When the clock is down to 8, teams must score by cutting to the key, or on back cuts. A ball reversal will still count as 2 points. A catch in the key will still count as 1 point.	
Progressions: <ul style="list-style-type: none"> • Add the ability to dribble to the basket from lanes 1 and 3 (refer to figure 3) • Rules from Figure 2 can be imposed on the offensive structure so that no more than one attacking player may be stationary in a marked lane (unless providing a screen, or acting as a post) • If the focus is on scoring from a back cut, emphasise the number of points scored for back cuts • If the focus is on working with the post player, emphasise this action • Add screens 	

The activity shown Figure 5 captures all three elements of the triple threat: dribbling, passing, and shooting. The primary learning objectives for the activity above (refer to figure 5) are twofold:

1. Reverse the ball from one side of the court to the other whilst maintaining possession of the ball
2. Effective offensive positioning and ball movement in order to exploit the key and score

This activity reinforces the idea of representation as the performer and environment are identical to a game of basketball. The constraint of no dribbling does not exist in the accepted fully fledged game of basketball, however, has the capacity to lead to multiple effects on movement. From this point, the activity can be progressed in a variety of different ways, depending on specific objectives of the coach, or player behaviours. The progressions offered in figure 5 allow the development of the principles of basketball in to a specific logic of play. The progression of the ability to penetrate the basket and the structure of player positioning focuses on movement form, and creating variability through multiple movement solutions. This reinforces the idea of setting a pedagogic environment that challenges players/athletes and creates direction in problem solving in order to achieve the ultimate goal of scoring in a game.

For example, the teaching concepts that are evident within this activity and the progressions relate to:

- Looking at the whole court to view all players
- Moving off the ball (e.g. cutting, leading)
- Reading the defence
- Sealing the defender to get a good offensive position (if working on post)
- Communication
- Effective shot selection
- Spatial awareness
- Pick and roll (if looking at screens)

Conclusion

This paper has demonstrated a practical application of non-linear learning in basketball with particular emphasis given to constraint modification, perception-action coupling and representative game design. Traditional perspectives on skill learning were contrasted with non-linear understandings as a foregrounding discussion. The purpose of which was to acknowledge the dominant background of traditional skill theory that practitioners may be working from, perhaps unknowingly. The ideas presented in this paper are not exhaustive and do not reflect non-linear/constraints-led pedagogy in its entirety but may serve as a useful reference points for practitioners with an introductory understanding of associated key ideas.

In order to develop the contrast of ideas between information-processing directions for pedagogy and non-linear ideas for pedagogy examples of basketball practice tasks have been illustrated. The language of 'learning example' was used to highlight the non-linear assertion of player (or athlete) centred coaching achieved through representative task design that requires the player to think through game situations. These game situations are deliberate designed using task, environment and performer constraints to focus player development of perception-action coupling.

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Benefits of gymnastics participation for school age children – A literature review

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Abstract

Participation in gymnastics, along with swimming and athletics, forms an important part of a child's physical education. In the last two decades, little current information about the benefits of gymnastics has been reviewed. This paper seeks to update this topic.

Reported benefits from participation in recreational and competitive gymnastics are: enhanced motor coordination and the development of most of the fundamental motor patterns, enhanced flexibility, enhanced strength and postural control, enhanced balance, enhanced anaerobic endurance, unique long-term bone forming and strengthening advantages, potential for enhanced academic readiness and cognitive abilities, and enhanced task-mastery orientations.

Introduction

Children move to bring order to the multiplicity of stimuli that pervade their lives, to control their physiology and, by extension, their environment. A child's movement ability develops in a sequential manner moving from the very simple to complex movement patterns (Gallahue, 1993).

Fundamental movement skills do not simply evolve, but must be learned (Zaichkowsky, Zaichkowsky, & Martinek, 1980). These fundamental motor patterns of stability, locomotion and manipulation encompass running, jumping, landings, rolling, hopping, leaping, climbing, throwing, and kicking. The mature coordination and specialised skills of adulthood depend upon a planned acquisition of fundamental motor skills and associated fitness in childhood (Gallahue, 2010). A well-planned gymnastics experience at this time of the child's life may extend the performance of these vital movement patterns, enhance key motor fitness areas, and enhance later stages of motor development.

An earlier, much cited article on the benefits of gymnastics (Sands, 1999) organised the benefits and limitations of gymnastics into the categories of physical benefits, psycho-social benefits, and miscellaneous benefits. In the last decade, little current information about the benefits of gymnastics has been reviewed. This paper seeks to update the literature on this topic.

Method

To collate current information about the benefits of gymnastics participation in any context, peer-reviewed journal articles reported in English with a gymnastics subject were located via searches in ERIC, PubMed and Google Scholar. A variety of journal articles with research designs ranging from observation through to experimental design were considered. Studies have grouped under the three main headings of motor-skill benefits, motor-fitness benefits, and psychosocial benefits.

Results

Motor-Skill Benefits - Development of Fundamental Motor Skills, Postural Control and Motor Coordination

Historically, gymnastics has served an essential role in physical education and the development of physical fitness and can make significant future contributions to the goals of physical education (Coelho, 2010).

Gymnastics is an excellent vehicle for the teaching basic motor skills and promoting health-related fitness in children of all ages (Coelho, 2010; Donham-Foutch, 2007). The fundamental motor patterns that are best learned through a gymnastics education are: static shapes and static-dynamic balance, jumping and landing, rolling, turning and twisting, hopping, skipping and galloping, crawling and climbing, and stepping and leaping (Gilmore, 1990). The gymnastics learning environment (via varieties of “fields of play” and apparatus) is unique in human movement in that it demands complex gravity defying body movements that require specific joint actions to be carefully aligned with the gymnast’s space, direction, time and rhythm (Rickard, 1992).

Several recent studies (Benke, Damsgaard, Saekmose, Jorgensen & Klausen, 2002; Calavalle, Sisti, Rocchi, Panebianco, Del Sal & Stocchi, 2008; Danion, Boyadjian & Marin, 2000; Garcia, Barela, Viana, & Barela, 2011; Rudd, 2016; and Jaakkola, 2016) have investigated the influence of gymnastics training on motor coordination, postural control and proprioception.

The first study investigated the possible effect of specific sports training on motor coordination and anaerobic power in 184 children from different sports (swimming, tennis, team handball and gymnastics). While the differences between sports in Wingate performance disappeared when the data were normalised to body mass, the gymnasts were the best jumpers and were pre-eminent in the more complex motor coordination tasks such as the drop jump (Benke, Damsgaard, Saekmose, Jorgensen, & Klausen, 2002). The next study compared artistic and rhythmic gymnasts to other athletes in terms of their postural coordination. The most interesting finding in this study is that rhythmic gymnastics training seems to have a direct effect on the ability to maintain bipedal posture (Calavalle, Sisti, Rocchi, Panebianco, Del Sal & Stocchi, 2008). The findings of the third investigation showed that gymnasts’ proprioceptive system is more efficient than that of non-gymnasts, and that this may be the result of gymnastics training (Danion, F., Boyadjian, A. & Marin, L. 2000). The influence of gymnastics training on the postural control of children in age groups, aged 5-7 and 9-11 years old with and without the use of visual information was investigated (Garcia, Barela, Viana, & Barela, 2011). Younger gymnasts presented greater postural control with visual information compared to younger non-gymnasts. These results suggested that gymnastics training promotes improvements in postural control of younger children when visual information is available.

A recent study (Rudd, 2016) examined the effect of gymnastics participation on motor coordination. The aim of this investigation was to evaluate whether a gymnastics programme embedded within the Physical Education (PE) curriculum could develop children’s actual and perceived movement skill competence. The test battery used to assess movement competence comprised the Test of Gross Motor Development – 2 (TGMD-2) and the Körper-Koordinations test für Kinder (KTK). Children’s physical self-concept was assessed using the Physical Self-Description Questionnaire short form (PSDQ-s). The gymnastics-based PE curriculum was found to have a larger effect upon movement skill competence in comparison to a standard school PE curriculum. The pilot study also found that gymnastics enhanced physical self-concept in all year groups at a faster rate than the schools’ standard PE curriculum.

Motor-Fitness Benefits - Aerobic Endurance and Anaerobic Endurance

Gymnasts tend to have average levels of aerobic (with oxygen) endurance, and high to very high levels of anaerobic endurance (Jemni, Sands, Friemel, Stone, & Cooke, 2006; Lange, Halkin, & Bury, 2005; Monpetit, 1987). Gymnastics performances usually last under 120 seconds, but can be as long as six minutes. The level of intensity of gymnastics activities can be high and the duration too short for the development of high levels of aerobic endurance as observed in, for example, long-distance running sports. However, most sports are anaerobic in nature. Gymnastics requires, and therefore develops, high levels of anaerobic endurance. Maximal (anaerobic) power output has been measured by the Wingate test in competitive male gymnasts at between 11 and 14 W. Kg⁻¹ and in female gymnasts between 10 and 12 W. Kg⁻¹. (Jemni, Sands, Friemel, Stone, & Cooke, 2006; Lange, Halkin, & Bury, 2005). These levels are at and above the 95th percentile. Measurement of higher blood lactate values also confirms that gymnastics activity has resulted in an increased anaerobic capacity (Lange et al, 2005).

While the goals and characteristics of gymnastics training seemingly contrast with engagement in cardio-respiratory health-enhancing physical activity, improvements in Moderate to Vigorous Physical Activity (MVPA) can be realised in gymnastics. For example, Baldari & Guidetti (2001) examined the fitness level of a rhythmic gymnasts group and a young female classical dancers group. Although VO₂max was similar between gymnasts and dancers, VO₂ values of individual ventilatory (IVT) and anaerobic thresholds (IAT) were able to discriminate the higher level of fitness in gymnasts with respect to dancers. Overall, improvement in energy expenditure and developments of lean muscle mass can result when anaerobic activities of gymnastics are mixed with aerobic activities (Fairclough, & Stratton, 2006).

Motor-Fitness Benefits - Development of Relative Strength

Gymnasts are strong in what is termed “relative strength” (Sale & Norman, 1982). Gymnasts demonstrate their strength by being able to move their bodies against gravity through a myriad of demanding postures. Their strength is high when expressed relative to their body weight. One of the major determinants of absolute strength is physical size i.e. being large. Persons of a smaller size and stature can achieve high levels of relative strength. One of the pivotal demands in gymnastics is strength (Sale, 1976; Singh, Rana & Walia, 1987).

Not surprisingly, one of the major benefits, of children’s participation in gymnastics compared to that of untrained peers and participants in other sports is enhanced relative strength (Andersson, Sward, & Thorstensson, 1988; Bosco, 1973; Dotan, Mitchell, Cohen, Gabriel, Klentrou, & Falk, 2013; Halin, Germain, Buttelli, & Kapitaniak, 2002; Jemni, Sands, Friemel, Stone & Cooke, 2006; Maffulli, King, & Helms, 1994; Nelson, Johnson, & Smith, 1983).

Using a mixed longitudinal design, the development of flexibility and isometric strength of the upper and lower limbs was studied for two years in 453 young athletes (aged between 9 and 18 years) practicing football, gymnastics, swimming or tennis. Boys and girls in all sports were of similar strength up to around 11 years. Male gymnasts 12 years and older, who were still increasing their muscle strength up to 19 years, were significantly stronger than all other athletes (Maffulli, King & Helms, 1994).

Dotan and others (2012) compared strength and force kinetics of boy gymnasts to those of untrained boys and men in their investigation. Eight boy gymnasts, 20 untrained boys, and 20 men performed maximal, explosive, isometric elbow flexions and knee flexions. Peak torque, peak rate of torque development and other kinetics parameters were determined. The findings, of markedly elevated torque kinetics of young, pre-pubertal gymnasts to those of

untrained boys and adults, highlight the specificity of gymnastics training.

Maximal voluntary strength of the trunk muscles was measured in 57 male athletes (soccer players, wrestlers, tennis players, and gymnasts), 14 female gymnasts, and in a control group of 87 conscripts. Strength differences were present between the athletes and the controls, some of which appeared to be sport specific and related to long-term systematic training. Male gymnasts were significantly stronger in hip flexion than all others; gymnasts as a group were quickest in hip extension, and female gymnasts were found to be superior to untrained males in hip extension (Andersson, Sward & Thorstensson, 1988).

General strength results for children tend to plateau and in some cases (e.g. upper body strength in females) decline in late adolescence and adulthood (Hunsicker & Reiff, 1976). Children need on-going exercise to develop “relative strength” before age, gender and experience based changes become established. Gymnastics training provides an invaluable vehicle for this strength training in early childhood, late childhood and adolescence.

Motor-Fitness Benefits - Development of Balanced Posture and “Core” Muscular Strength

Participation in basic gymnastics skills requires that upper and lower limbs are alternating bases of support and locomotion. This occurs while the mid-body provides high levels of control and stability. Gymnastics-based performance actions require “core body” training which is unique to this type of activity. In investigations of the function of the rectus abdominus muscle according to gender and across sports, female gymnasts had higher flexion torque and higher neuromuscular efficiency values than female non-gymnasts (Pascal, Mora, & Pérot, 2008). Gymnastics training can provide a complete, balanced mid-body and “postural” muscle conditioning.

Motor-Fitness Benefits - Development of Flexibility

The skill related flexibility demands of gymnastics are among the more significant and unique aspects that serve to separate gymnastics from other sports (Bosco, 1973; Gannon & Bird, 1999; Sands, 1994). A high level of flexibility can be an effective aid to the reduction of injury, preventing persons from forcing a limb to an injurious range of motion (Knapik, Bauman, Jones, Harris & Vaughan, 1991; Knapik, Bauman, Jones, Harris, 1992). Gymnastics can provide this superior level of flexibility (Kirby, Simms, Symington, & Garner, 1981). But flexibility can also be overdone when a gymnast relies on an increased range of motion in inappropriate positions, particularly the lower spine and shoulder joints (Caine, Lindner, Mandelbaum, & Sands, 1996; Sands, Caine, Borms, 2005).

Motor-Fitness Benefits - Development of Static and Dynamic Balance

Gymnasts learn to effectively balance on their feet and their hands through the ubiquitous use of handstands and myriads of balance skills on all apparatus. A recent literature review (Hrysomallis, 2011) compared the balance ability of athletes from different sports to determine (among several factors) if there is a difference in balance ability of athletes in different sports. Based on the available data from cross-sectional studies, gymnasts tended to have the best balance ability, followed by soccer players, swimmers, active control subjects and then basketball players.

Interestingly, gymnasts tend to develop a higher tolerance for imbalance or disturbances to their everyday balance generally, more so than non-gymnasts and other athletes (Davlin, 2004; Debu & Woollacott, 1988; Kioumourtoglou, Derri, Mertzanidou, & Tzetzis, 1997; Vuillerme, Teasdale, & Nougier, 2001). Of importance to children’s developing coordination is that gymnasts, more so than non-gymnasts, have to use less attention in correcting postural sway in their everyday life (Gautier, Thouvarecq, Larue, 2008; Vuillerme & Nougier, 2004).

Motor-Fitness Benefits – Intervention Studies

Several “intervention” studies are available for examining the benefits of gymnastics participation (Sheerin, Williams, & Hume, 2012). Having age and activity based control groups, among other controls, is needed to ensure that observed changes are the result of the gymnastics intervention alone. The Sheerin et al study (2012) showed that nine weeks of gymnastics training had a beneficial effect on abdominal strength, flexibility, coordination and lower body strength in children aged 4-9 years, but this study lacked a control group.

A more recent study (Alpkaya, 2013) attempted to determine the influence of gymnastics training integrated with physical education courses on selected motor performance variables in seven-year-old girls. Students in the control group followed the physical education curriculum for 10 weeks. The students in the gymnastics group took gymnastics training for 10 weeks in addition to physical education curriculum, and this training was given for two days (one hour each) at the university gym. Analyses (t test) showed that basic gymnastics training improves selected motor tests like standing long jump, trunk lift, sit and reach, balance, run 20 m, chin-up, curl-up, pushup ($p < 0.05$). Nevertheless, physical education classes alone did not affect these motor performance variables ($p > 0.05$), which was not expected.

Other intervention studies (Babin, Katić, Ropac, & Bonacin, 2001; Čuljak, Ćavar, Crnjac, Marić, & Ćorluka, 2011; Hashemi, Dehghani, Saboonchi, Roozbahani, & Roonasi, 2012) showed similar significant improvement of all or some of the strength, dynamic and static muscular endurance, frequency of movement, balance and flexibility for the gymnastic training group.

Motor Fitness - Gymnastics Offers Important Bone Forming and Bone Strengthening Advantages

There is now considerable evidence that participating in gymnastics can have significant and long-term osteogenic (bone forming-strengthening) advantages for boys, girls and young women over their less active peers and athletes in most other activities or sports (Bass, Pearce, Bradney, Hendich, Delmas, Harding & Seeman, 1998; Bemben, Buchanan, Bemben & Knehans, 2004; Cassell, Benedict & Specker, 1996; Dowthwaite, Kanaley, Spadaro, Hickman & Scerpella, 2009; Kirchner, Lewis, & O'Connor, 1996; Laing, Wilson, Modlesky, O'Connor, Hall, & Lewis, 2005; Pikkarainen, Lehtonen-Veromaa, Kautliainen, Heinonen, Viikari & Mottonen, 2009; Robinson, Snow-Hareter, Taaffe, Gillis, Shaw, & Marcus, 1995; Taaffe, Snow-Harter, Connolly, Robinson, Brown, Marcus, 1995; Taaffe & Marcus, 2004; Uusi-Rasi, Sievanen, Heinonen, Vuori, 2006; Ward, Roberts, Adams & Mughal, 2005; Zanker, Osborne, Cooke, Oldroyd, & Truscott, 2004).

These significant long-term osteogenic benefits are due to the non-muscular loading through impact activities and the gymnastics specific muscular loading on skeletal tissue (Dowthwaite et al 2009).

While competitive gymnastics participation has been shown to be beneficial in bone forming and strengthening, recent investigations into non-competitive (recreational) gymnastics participation have produced similar findings that highlight the longevity of the benefits of gymnastics participation. Laing et al (2005) studied children's bone mineral accrual before and after recreational (non-competitive) gymnastics participation. Gymnasts' bone mineral characteristics are generally not known before starting their sport. Sixty-five prepubertal females who enrolled in beginning artistic gymnastics had lower bone mineral than controls ($n = 78$). However, after two years of recreational gymnastics participation the gymnasts experienced significantly greater accrual of forearm bone area and lumbar spine bone mineral density than the non-participating controls. It was concluded that females participating in

recreational gymnastics during childhood have enhanced bone mineral gains at the total body, lumbar spine, and forearm.

Uusi-Rasi et al (2006) examined the influence of long-term non-competitive gymnastics on the maintenance of bone rigidity and physical performance. One hundred and seven retired recreational gymnasts and 110 non-gymnast controls participated in this six year prospective study. During the six-year study both groups' agility and leg extensor power decreased by over 3% and 10%, respectively but the original between-group differences, favouring the gymnasts, persisted. Proximal femur bone mineral content (BMC) decreased approximately 0.5% per year in both groups, and femoral neck section modulus decreased. In spite of similar rates of decline in bone characteristics and physical performance, the non-competitive gymnasts' overall physical condition was comparable to the level that their less active referents had shown approximately five years earlier. Importantly, several studies have now suggested that in spite of a cessation of training for up to 14 years, retired female gymnasts retained an elevated bone mass into adulthood (Erlandson, Kontulainen, Chilibeck, Arnold, Faulkner, Baxter-Jones, 2011; Pikkarainen et al, 2009; Zanker et al, 2004).

Psycho-Social Benefits - Academic Performance

There is some evidence to suggest that school students who are physically active perform better academically (Sattelmair & Ratey, 2009). There is some persuasive evidence to suggest that physical activity can improve children's concentration and arousal, which might indirectly benefit academic performance (Bailey, Armour, Kirk, Jess, Pickup, Sandford, 2009).

It has been appreciated for some time that physical activity is connected to physiological aspects of cognitive functioning (Sallis, McKenzie, Kolody, Lewis, Marshall, & Rosengard, 1999; Shephard, 1997). Gymnastics participation, as well other active sport-dance activities, plays an important role here. Both human and animal studies suggest that learning complex movements stimulate the part of the brain used in problem solving and learning (Sallis et al 1999). Jensen (1998) suggested that physical exercise increase neural connections and cerebral blood flow. Podulka-Coe et al (2006) investigated the effect of overall physical activity on academic achievement. This link between activity and academic performance was most significant when kids met USA (2010) guidelines for vigorous activity of 20 minutes a day, at least three days a week. Interestingly, grades were not affected among children who were moderately active for 30 minutes at least five days a week.

While it may seem obvious that performing gymnastic skills uses cognitive abilities, specific relationships between participation in gymnastics and enhanced cognitive variables are only now being considered. Barret (2000) suggests a direct positive relationship between the type of motor learning experienced through gymnastics and the enhanced reading and numeracy skills of primary school children. He describes his applied research in Florida schools where children participated in gymnastic "motor-learning labs". The initial and follow-up research involved kindergarten and first grade classes that trained in the SMILE (Sensory Motor Intensive Learning Environment) Lab twice weekly for 12 weeks. In the two years, the SMILE Lab had been operating, numerous positive results showed a direct correlation between gymnastics related movement activities and enhanced reading scores.

A recent paper (López & Postigo, 2012) investigated the relationship between cognitive variables (spatial ability, reasoning, numerical ability, inductive reasoning, and reasoning and verbal comprehension) and physical prowess

in sport. Results showed elite gymnasts ($n = 40$) may present higher cognitive abilities (spatial reasoning) than other sportspeople ($n = 400$).

Psycho-Social Benefits - Gymnastics and Task Mastery Orientations

Decades of sports based research reviewed in Ntoumanis & Biddle (1999) have shown that skill mastery (task oriented) sport programs and “task-based” motivational climates are keys to high participation rates and long-term engagement in junior sport. When many other sport activities are innately competitive and ego-oriented (through a “win-lose” of a race or game) gymnastics can be more task-oriented based around the performance of skills. Children’s participation in gymnastics stresses task-mastery and can be a perfect medium for encouraging persistent motivated behaviours in physical education and sports.

Studies on interventions in sports motivational climate (Ntoumanis & Biddle, 1999) show that when task-mastery orientations rather than ego oriented structures are emphasised, athletes are more likely to use subjective criteria to judge their competence, to exert more effort, to persist longer, to attribute their performance to effort, and to be more intrinsically motivated. The investigations of Lattimore (2000) and Halliburton & Weiss (2002) with female gymnasts confirm the importance of the task mastery orientations in gymnastics especially with younger gymnasts.

Discussion

Overall, participation in gymnastics must be recommended as a positive foundational activity for school-aged children. Studied benefits from participation in gymnastics are: enhanced development of most of the fundamental motor patterns, enhanced flexibility, enhanced general strength and postural control, enhanced balance, enhanced anaerobic endurance, unique long-term bone forming and strengthening advantages, potential for enhanced cognitive benefits, enhanced Task Mastery orientations, potential for enhanced skill goal setting, and the ability to focus on a task to a high level. Even so, benefits of participation should be assessed alongside the inherent risks of participation.

Benefits and Risks

Gymnastics has been perceived as a more dangerous (or more injurious) activity than other popular sporting activity. This perception has been supported in the USA University and high school settings (Caine, et al 2003; Marshall, Covassin, Dick, Nassar & Agel, 2007; Sands, 2000) but is not the case in club-level gymnastics in Australia. In a recent review gymnastics was found to present lower hospital emergency department presentations and hospital admission injury numbers, injury rates, than those found in most other popular Australian youth sports (Dowdell, 2011; Kreisfeld, Harrison & Pointer, 2014). Moreover, in a review of injury rate literature the potential average range of injury rate (per 1,000 hours of participation) in club-level gymnastics was found to be 0.87 - 4.43, which is well below the injury rates for other popular Australian sports (Dowdell, 2011).

A further criticism of gymnastics participation has been that early (prepubertal) and intensive gymnastics training (18 hrs+ per week) may inhibit healthy growth (Theintz, Howald, Weiss & Sizonenko, 1993). However, in investigating whether gymnastics training does inhibit growth, literature reviews (Caine, Lewis, O’Conner, Howe, & Bass, 2001) found that heavily trained female gymnasts (20+ hours per week) may experience attenuated growth during their years of training followed by catch-up growth during the months following retirement. The other two reviews concluded that: adult height or near adult height of female and male artistic gymnasts is not compromised by

intensive gymnastics training; gymnastics training does not appear to attenuate growth of upper (sitting height) or lower (legs) body segment lengths; and gymnastics training does not appear to attenuate pubertal growth and maturation, neither rate of growth nor the timing and tempo of the growth spurt (Ferreira-Filho, Machado, Marques and Nunomura. 2016; Malina, Baxter-Jones, Armstrong, Beunen, Caine, Daly-Lewis, Rogal, & Russel, 2013).

It is suggested that a history of amenorrhoea (absence of menstrual periods) may compromise some of the skeletal benefits associated with high-impact gymnastics training. However, amenorrhoea caused no difference in bone health when compared to healthy controls (Ducher, Eser, Hill & Bass 2009). Moreover, peri pubertal artistic gymnasts display elevated bone mineral density at various bone sites despite delayed menarche and a high frequency of menstrual disorders (Maimoun, Coste, Mariano-Goulart, Galtier, Mura, Philibert, Briot, Paris & Sultan, 2011).

Conclusion

As in many things, it is the case of moderated gymnastic participation (under 18 hour's participation per week) where the higher level and greatest number of benefits for children are realised. In such contexts, it would appear that package of benefits offered by gymnastics participation may enrich and physically educate the lives of its participants in ways that are difficult to achieve through other activities and sports (Sands, Caine & Borms, 2005).

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Measuring sports class learning climates - The development of the sports class environment scale

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Abstract

The development and validation of a new, unique learning climate instrument - the Sports Class Environment Scale (SCES) was the focus of this study. This study began with a consolidation of the dimensions and items of the Perceived Motivational Climate in Sport Questionnaire-2 (Newton, Duda, & Yin, 2000) and the Classroom Environment Scale (Moos & Trickett, 1987). Field-testing of the SCES occurred with 204 competitive gymnasts from six metropolitan and four regional competitive gymnastics clubs in Queensland, Australia. Exploratory factor analysis provided a revised SCES with five subscales labelled Task Involvement and Improvement, Ego Involvement and Mistakes, Coach-Athlete Communication, Effort, Order and Organisation, and Affiliation. Using the revised SCES subscales as dependent variables, multivariate analyses of variance were conducted to compare club type, gender, and competitive level.

Effective measurement of sports class learning climates using the SCES may lead to a greater understanding of effective sports classes, and of coach and athlete behaviours in those classes, and provides a first step in monitoring sports class learning climates.

Introduction

Often a classroom or sports hall has a motivating atmosphere, one of energy and activity. This perceived “feel about the place” comes not only from persuasive functional and physical cues, but also from the behaviours of goal seeking persons in that environment (Moos, 2002). The first impression can be a lasting and valid assessment of a place or organisation. Terms such as “atmosphere”, “character”, “milieu”, or “the climate” are used to label what is perceived about any particular environment. Owens (1991) suggests that this perception about a place that is seemingly so palpable more than just describes the place: it is the place.

The coach-athlete relationship is one of the most important influences on the athlete’s motivation and performance (Mageau & Vallerand, 2003). One of the key leadership roles the coach plays in this relationship is the creation and maintenance of the sports class learning climate. Different sports class learning climates evoke different athlete perceptions about achievement, and subsequently can influence athletes’ learning (Ames, 1992). Investigation of the sports class learning climate may reveal much about these interactions that can influence the effectiveness of the sports class. All these interactions occur in a physical context or setting. Such physical settings and the attendant resources therein are secondary determinants of learning. This study adopts the perspective that teaching (in this study, coaching) is the key determinant in any learning. Measuring and understanding the sports class learning climate is important as it impels coaching behaviour and is, in turn, created by the coach’s behaviour (Fraser, 1994).

The learning climate of a sports class is the relatively constant quality of the training environment that student’s experience, and is based on the shared perception of student’s behaviour in that class setting. Motivational climate

is a part of the learning climate, and can be described as the student's shared perceptions of the classroom's achievement goal structure.

Three main bodies of information formed the basis for this study's literature review: the socio-ecological approach to environmental determinants of behaviour, the historical antecedents of needs-based behaviour and environmental press, and theoretical underpinnings to class learning climate and achievement motivation climate measurement.

Recent studies of motivational climate in sports have provided insight into coaching behaviour and its effect on sports class motivational climate (Ntoumanis & Biddle, 1999; Roberts, 2001). The joint influence of the environmental press (the sports class learning climate) and athletes' motivation can determine the cognitive, affective, and performance patterns regularly displayed by athletes (Ntoumanis & Biddle, 1999).

In spite of the potential value of class learning climate research to the field of sports class behavioural studies, no research has consolidated the fields of classroom learning climate research and sports class motivational climate studies. This study provides a first model for the investigation of sports class learning climates that involves a consolidation of the dimensions and items of the Perceived Motivational Climate in Sport Questionnaire-2 (Newton, Duda, & Yin, 2000) and the Classroom Environment Scale (Moos & Trickett, 1987). The result of this consolidation is a new and unique learning climate instrument - the Sports Class Environment Scale (SCES).

Method

The development of the SCES moved through three phases.

Phase one began with an adaptation of the CES (Moos & Trickett, 1987) to form the initial SCES. The CES (Moos & Trickett, 1974, 1987) evolved from a research program that measured perceptions of environments in many different class settings. Learning climate and motivational climate are terms that have rarely overlapped; however, a literature review (Ntoumanis & Biddle, 1999) of historically important motivational climate instruments, their development, validation, scoring and application in research prompted the use of motivational climate dimensions as potential subscales in the study of class learning climates. The initial SCES scale had become problematic, and was further developed with subscales and items drawn from the motivational climate instruments, the Perceived Motivational Climate in Sport Questionnaire PMCSQ-1 & 2 (Seifriz, Duda, & Chi, 1992; Newton & Duda, 1993). The process of developing this consolidated learning climate instrument began with the production of a draft scale of 39 items across eight sub-scales, and was followed by a review by a panel of experts in coaching and independent university researchers in sport and physical education. The 39 questions were listed randomly and without subscale labels. Each reviewer was initially asked to sort the questions into 6-8 groups and label the group or subscale item. This produced a first draft SCES consisting of 36 items under six sub-sales for pilot testing. The first draft of the SCES was then pilot tested with a small group ($n = 41$) of competitive gymnasts to prompt some changes to the scale.

In phase two revisions after pilot testing developed a second draft scale for initial testing. Initial field-testing of the second draft SCES occurred with 28 male and 180 female competitive gymnasts from 6 metropolitan and 4 regional gymnastics clubs in the state of Queensland, Australia. The returned surveys were coded for each participant, their gender, their gymnastic level, their club membership, and their club type. Participants' responses to each item were scored 1 ('Not at all like my class'), 2 ('Not much like my class'), 3 ('A bit like my class') or 4 ('Very much like my class') with 4 being the 'highest' score and 1 being "lowest". These scores for each participant's subscale totals

were computed to arrive at a final score with a range of six up to 24. Each participant's results were entered for each item under a subscale, and a total and average for the set of subscale items were computed. The generated scores for each subscale item were statistically described and presented in frequency tables. Any subscale item (question) that was highly skewed (dominated the total score for that subscale) was identified and removed.

In phase three, the remaining number of draft SCES subscale items ($n = 33$) was subjected to an exploratory factor analysis to provide a revised SCES. Using the revised SCES subscales as dependent variables, MANOVAs were conducted to compare club type, gender, and competitive level. Because of the unequal distribution of males among the cohort of clubs, two separate MANOVAs were conducted. To limit the effect of gender, the first MANOVA tests the effect of club type (low training hours clubs versus high training hours clubs) as measured by the SCES subscales. The second MANOVA tests the effect of gender and gymnastics level in the lower training hours clubs that include male and female gymnasts.

Results

During the development of the scale, a first draft SCES was sent to three objective University researchers and six expert gymnastics coaches for review. The gymnastics coaches were all highly experienced practitioners in competitive clubs in metropolitan and regional Queensland and five were tertiary educated in health sciences, human movements or education. The 39 questions, or scale items, were listed randomly and without subscale labels. Each reviewer was initially asked to sort the questions into 6-8 groups and label the group or subscale item. Questions thought to be irrelevant were to be identified and suggestions for other or additional questions were requested. Questions were retained if three or more reviewers grouped them under the same subscale heading. The results grouped 36 questions under eight subscales. The expert coach reviewers used analogous labels for the suggested scales. These labels were: effort, energy, intensity, work ethic; socialising or gymnast relationships; organisation, structure and class management; favoritism, fairness, respect or feeling valued; cooperation and teamwork; how competitive is the class; coach-gymnast communication; and positive OR negative coach/gymnast behaviours. The first draft of the SCES scale finally contained 36 revised questions under six subscale items. These subscales were Involvement and Effort, Affiliation, Coach Support, Task Orientation and improvement, Ego Orientation and Mistakes, Rule Clarity and Order and Organisation.

Field-testing of the second draft SCES was conducted in ten competitive gymnastics clubs that differed by gender and by the number of weekly training hours. At the time of this study, nine of the 10 clubs participating in this study ranked in the top 10 competitive clubs in the state. Gymnasts from clubs ranked in the top four in the state normally trained 14-22 hours weekly while gymnasts from clubs ranked lower than 4th in the state normally trained between 9-18 hours weekly. The clubs in the study cohort were grouped as either "high training hours" (14-22 hours weekly) or "low training hours" (9-18 hours weekly).

Field-testing of the second draft SCES generated scores for each of the scale's five subscales. Of the 36 items in the second draft of the SCES, three were excluded from further analysis as they were highly skewed (skewness scores $> \pm 3.0$) and accounted for approximately 90% of the total score response of that subscale. The remaining number of draft SCES subscale items ($n = 33$) was subjected to an exploratory factor analysis using principal component extraction with Varimax rotation and Kaiser normalization to determine the interrelationships among different items. Factors with eigenvalues greater than one, coefficients at 0.4 or greater, and that explained 50% or more of the variance were considered. The appropriateness of the factor model was assessed by the Kaiser-Meyer-

Olkin measure of sampling adequacy, which was 0.81 and by Bartlett's test of sphericity with a significance level $p < .01$. Both these results indicated the suitability of scale data for factor analysis. A summary of these results in grouped components is shown in Table 1.

Table 1. Rotated component matrix arranged in component groups

Source Item	Component				
	Ego Involvement and Mistakes	Effort, Order Organisation	Task Involvement Improvement	Coach-athlete Communication	Affiliation
Ego Orientation Q17	-.729	-.163	-.029	-.005	-.093
Ego Orientation Q23	-.710	-.165	-.079	-.136	-.173
Ego Orientation Q5	-.608	.022	-.063	-.077	.156
Ego Orientation Q35	-.544	-.316	-.062	.111	-.105
Order-RuleClarity Q18	.474	.111	.062	.151	.348
Order-RuleClarity Q24	.173	.774	.231	.038	.119
Involvement Q7	.102	.690	.178	.104	.106
Involvement Q13	.360	.520	-.071	.050	.010
Order-RuleClarity Q6	..043	.422	-.016	-.094	.191
Involvement Q31	.001	.164	.759	.061	-.080
Involvement Q1	.071	.259	.657	.122	.093
Affiliation Q14	.312	.145	.507	-.112	.299
Task Mastery Q22	.204	-.096	.434	.025	.180
Order-RuleClarity Q30	.054	.110	.090	.783	-.076
Order-RuleClarity Q36	.048	-.003	.129	.774	.063
Coach Support Q33	.032	.066	-.095	.477	.231
Affiliation Q8	.021	.095	.020	.124	.766
Affiliation Q20	.210	.210	.093	-.115	.648
Affiliation Q26	-.002	.108	.365	.145	.422

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

The majority of scale items ($n = 19$) loaded on five main factors with two items each in factors 6, 7, 8 and 9, and one item in factor 10. Items loading in factors 6, 7, 8, 9 and 10 were too few to form a meaningful or usable subscale and were eliminated. The remaining grouped items represented some of the proposed subscales in the SCES model. The loading of Ego Orientation items under the first component strengthens the case for this independent subscale. However, the proposed subscales of "Coach Support" and "Rule Clarity and Order & Organisation" did not form. Some of the items from these "departed" subscales loaded into a new subscale subsequently labelled "Coach-Athlete Communication". A new subscale of "Task Involvement and Improvement" was a mix of items from the initial subscales of Task Mastery, Involvement, and Rule Clarity, Order and Organization. A new subscale of "Effort, Order and Organisation" is made up of items from the second draft SCES subscales of Involvement and Task Mastery. The "Affiliation" subscale component presented with only three items, but was clearly forming as an independent subscale.

The revised second draft SCES was increased to 20 items across five subscales, titled Task Involvement and Improvement, Ego Involvement and Mistakes, Coach-Athlete Communication, Effort, Order and Organisation, and Affiliation. An explanation of the modified scale dimensions and item examples are shown in Table 2.

Table 2. The revised second draft SCES scale

Scale Dimension	Dimension Explanation	Example of a Dimension Item
Task Involvement & Improvement	The emphasis on planned class tasks where task mastery, task improvement while skill learning is paramount.	16. Doing your personal best performance is more important than winning.
Ego Involvement & Mistakes	The emphasis on athletes to display competence through out-performing others and to not appear incompetent (make mistakes) in skill learning.	17. The ONLY time athletes feel good about themselves is when they win competitions
Coach-Athlete Communication	The emphasis on clear and affirming communication with the athlete	18. The coach explains what the class rules are.
Effort, Order & Organisation	The emphasis on athletes following consistent rules, behaving in an orderly manner, and the overall organisation of the class.	19. This is an organised class
Affiliation	The emphasis the friendship athletes feel for each other, helping each other learn and enjoying working together.	20. In this class, athletes help each other to learn & to improve

The Cronbach's Alpha coefficients and the average inter-item correlation of the modified SCES subscales are shown in Table 3.

Table 3. Cronbach's Alphas and Inter-Item correlation means for modified SCES subscales

Climate Scales	Ego Involvement and Mistakes	Effort, Order and Organisation	Task Involvement and Improvement	Coach-Athlete Communication	Affiliation
Cronbach's Alpha	0.71	0.63	0.50	0.56	0.63
Inter-Item Correlations Means	0.38	0.29	0.20	0.24	0.29

Ideally, the Cronbach's Alpha coefficient for a scale (with more than 10 items) should be .7 or above, however for scales with less than 10 items, a coefficient greater than .5 can suffice (Pallant, 2004). Each of the new subscales has Cronbach's Alphas at or above .5. Considering that the revised subscales have four items each, the resultant coefficients are supportive of the revised SCES internal reliability. Inter-item correlation means were at 0.38 or below (range 0.2 - 0.38) and reflect that items for each subscale, while weakly related to the others, differentiate its climate dimension.

MANOVA was used to test the effect of club type (low training hours clubs versus high training hours clubs) and competitive level on climate as measured by the SCES and its subscales. The summary results (see Table 4) show only a significant main effect for club type ($p < .01$).

Table 4. Multivariate tests of club type and gymnastics level

Effect	Hypothesis df	Error df	F	p	Effect Size d
Club type (low training hours - high training hours)	5.000	200.00	6.617(a)	.00**	0.716
Competitive Level	5.000	200.00	1.817(a)	.11	0.058
Club type * Level	5.000	200.00	1.691(a)	.14	

Tests of between subject effects are summarised in Table 5 and indicate that there was significant difference between club types only on the climate subscale of Ego Involvement ($p < .01$).

Table 5. Tests of between-subjects effects club type and competitive level

Source	Dependent Variable Mean	df	Mean Square	F	p
Club type (Low training hours - high training hours)	Task Involvement	1	.007	.051	.82
	Ego Involvement	1	6.257	17.573	.00**
	Communication	1	.011	.031	.86
	Effort, Order & Org.	1	.088	.315	.56
	Affiliation	1	.332	1.972	.16
Competitive Level (Level 3-5 and Level 6-10)	Task Involvement	1	.134	.973	.33
	Ego Involvement	1	1.137	3.192	.08
	Communication	1	.513	1.465	.23
	Effort, Order & Org.	1	.001	.005	.94
	Affiliation	1	.058	.347	.56
Club type * Level	Task Involvement	1	.099	.715	.40
	Ego Involvement	1	.867	2.436	.12
	Communication	1	.323	.921	.34
	Effort, Order & Org.	1	.720	2.583	.11
	Affiliation	1	.007	.041	.84

* $p < .05$ ** $p < .01$

The subscale means for each club type and all clubs (shown in Table 6) indicate the direction of these effects. The SCES subscale climate dimension of Ego Involvement identified and separated competitive gymnastics club types. The clubs with high training hours had a higher overall mean Ego Involvement score than the low training hours clubs. Club 3, club 8, club 7, and club 2 had the highest Ego Involvement scores respectively.

Table 6. Ego and Task Involvement subscale mean scores for club types and all clubs

Club Type									
High Training Hours			Low Training Hours						
Ego Involvement - all clubs mean score = 2.21			Ego Involvement - all clubs mean score = 1.76						
Club 3	Club 8	Club 10	Club 1	Club 2	Club 4	Club 5	Club 6	Club 7	Club 9
2.76	2.13	1.76	1.44	1.80	1.65	1.44	1.73	1.81	1.89
Task Involvement - all clubs mean score = 3.61			Task Involvement – all clubs mean score = 3.60						
Club 3	Club 8	Club 10	Club 1	Club 2	Club 4	Club 5	Club 6	Club 7	Club 9
3.53	3.56	3.85	3.58	3.69	3.71	3.93	3.69	3.61	3.45

The second MANOVA tested the effect of gender and gymnastics levels in the low training hours clubs that include male and female gymnasts. The summarised results (Table 7) show significant main effects for club type ($p < .01$) and gender ($p < .01$).

Table 7. Multivariate tests of club type, gender and competitive level

Effect	Hypothesis df	Error df	F	p
Low Hours Clubs	5.000	198.000	6.621(a)	.00**
Gender	5.000	198.000	8.182(a)	.00**
Competitive Level	5.000	198.000	1.522(a)	.18
Low Hrs Clubs * Level	5.000	198.000	1.006(a)	.42
Gender * Level	5.000	198.000	2.123(a)	.06

* $p < .05$ ** $p < .01$

Tests of between subject effects are summarised in Table 8 and indicate that there was significant difference between club types on the climate subscale of Ego Involvement ($p < .01$). There are significant effects for gender on Task Involvement ($p = .00$), Ego Involvement ($p = .00$), Effort, Order and Organisation ($p = .00$), and Affiliation ($p = .00$).

Table 8. Tests of between-subjects effects of club type (low hours clubs) and gender

Source	Dependent Variable Means	df	Mean Square	F	p
Low Hrs Clubs	Task Involvement	1	.069	.531	.47
	Ego Involvement	1	8.863	26.288	.00**
	Communication	1	.044	.124	.72
	Effort, Order & Org.	1	.191	.780	.38
	Affiliation	1	.012	.078	.78
Gender	Task Involvement	1	1.821	14.051	.00**
	Ego Involvement	1	4.516	13.394	.00**
	Communication	1	.150	.426	.52
	Effort, Order & Org.	1	7.161	29.199	.00**
	Affiliation	1	2.942	18.989	.00**

* $p < .05$ ** $p < .01$

The SCES subscale means for each club type and by gender indicate the direction of these effects. The SCES subscale means scores for club type and gender in the low training hours cohort is displayed in Table 9. The means for males were lower than for females on Task Involvement, Effort, Order and Organisation, and Affiliation, but higher on Ego Involvement.

Table 9. SCES subscale means scores for club type (low hours clubs) and gender

Source	SCES subscale				
	Task Involvement	Ego Involvement	Coach-athlete communicate	Effort, Order Organisation	Affiliation
Male gymnasts	3.34	2.15	3.26	2.61	3.30
Female gymnasts	3.64	1.92	3.33	3.20	3.72
High hours clubs	3.61	2.21	3.31	3.16	3.73
Low hours clubs	3.60	1.76	3.30	3.11	3.63

In this study, the differences between SCES responses on the subscales of Ego Orientation were related to club type. The high training hours clubs had a combination of a high task involved climate score (mean = 3.61) and a moderate to high ego involved climate score (mean = 2.21) at the same time. Two of the clubs from the lower training hours group also demonstrated this characteristic. This may be due to the fact that these clubs, like the high training hours clubs, employ professional teachers and/or tertiary educated coach practitioners. Furthermore, the study indicated that the perceptions of the learning climate in gymnastics classes as measured by Task Mastery, Ego Orientation, Effort, Order and Organisation, and Affiliation were gender-related. The means for the male gymnasts were lower than for females on Task Involvement, Effort, Order and Organisation, and Affiliation, but higher on Ego Involvement.

The modified scale is shown in Table 10 with revised items listed under each subscale. The scale format is structured to limit the effects of survey administration errors, such as central tendency errors, the halo effect and proximity error. The subscale questions are scattered to every sixth place, have no numbering or labelling of subscales, and some questions are stated in the negative and thus rated in the reverse to other questions.

Table 10. The modified SCES scale

Dimension 1 Task Involvement & Improvement	Dimension 2 Ego Involvement & Mistakes	Dimension 3 Coach-Athlete Communication	Dimension 4 Effort, Order & Organisation	Dimension 5 Affiliation
1. Students in this class put a lot of energy into what they do here	2. In this class, students get picked on when they make a mistake	3. The coach explains what will happen if a gymnast breaks a rule	4. Students day-dream in this class	5. Students in this class are very interested in getting to know other
6. In this class we try to improve those things we don't do well	7. In this class, only the best students get noticed' by the coach	8. Rules in this class seem to change a lot.	9. Students often get bored and check how soon their class finishes	10. Students in this class are friendly towards each other
11. Students do a lot of work in this class	12. In this class, the coach favours some students more than others	13. Students who try hard get praised	14. Students "muck-around" a lot in this class	15. In this class students do not support each other
16. Doing your personal best performance is more important than winning.	17. The ONLY time students feel good about themselves is when they win competitions	18. The coach explains what the class rules are.	19. This is an organised class	20. In this class, students help each other to learn & to improve

Answer errors controlled by underlined questions in each scale stated in the negative and thus scored in the reverse to other questions.

Discussion

There is some evidence that higher level athletes seem to function better when a high task mastery orientation and/or a high ego goal orientation is tempered with a high task involved class climate (Pensgaard & Roberts, 2000). It may be that highly competent athletes with either a high task mastery orientation or a high ego goal orientation are motivated in any perceived class climate, but when in a situation that threatens their perceived competence, they do better in a task involved sports class climate (Duda, 2001). All things being equal, most researchers in physical education and sport suggest that when one is learning physical skills, being more task involved (as opposed to ego involved) is motivationally conducive to learning (Ommundsen, 2001; Roberts, 2001; Standage, Treasure, Hooper, & Kuczka, 2007; Xiang, Bruene, & McBride, 2004). This may result in greater intrinsic motivation for the athlete, discourage non-adaptive behaviours such as self-handicapping, and encourage adaptive behaviours, such as persistence in the face of difficulty, by the athlete while in their sports class.

It might be expected that all gymnasts, irrespective of gender, would perceive their training class climates as more task (skill) involved and less ego involved. In this study - this was not the case. The gender differences in task involvement and ego involvement found in these gymnastics classes may reflect a gender-biased view of effort and outcome. A gender biased result has been found in a study of the relationship of achievement motivation and anxiety in elite handball players (Abrahamsen, Roberts, Pensgaard, and Ronglan, 2008). These authors found a positive relationship between a perceived ego-oriented performance climate and anxiety, but only for females. The inverse relationship of task involved versus ego involved climate perception scores between the males and the females in these such sports classes tends to support the proposition that achievement goal dimensions are orthogonal

(Duda & Whitehead, 1998; Roberts, 1992). Of interest is the question about achievement goal dispositions of the male and female gymnasts that predispose them to a particular achievement goal perception and behaviour. Further tests of the SCES along with measures of personal goal dispositions, such as the Task and Ego Orientation in Sport Questionnaire (TEOSQ) (Duda, 1989), used on much larger numbers of male versus female gymnasts may shed light on gender differences in perceptions of sports class learning climate.

Conclusion

The use of the SCES allows sports class learning climates to be displayed graphically and can give the target class and their coach timely information about the learning climate of their class as perceived by participants in that class. Learning climate intervention study is a pragmatic use of a valid learning climate instrument and can provide coaching professionals with useful information for monitoring and structuring the best achievement environments for their setting. Sports class climate perceptions could be most useful in intervention studies when displayed graphically, and readily indicate learning class climate at pre-test and post test.

This study breaks new ground, and may lead to novel insights into sports class learning climates. Specifically, this study has demonstrated the ability to distinctly profile the climate of sports classes and, by extension, sports club learning climates. Moreover, if there is a relationship between sports class outcomes and the characteristics of the attendant class learning climate, a sports class climate scale may allow a coach to easily assess the learning climate of their class. If desired, the coach could change this learning climate to one more congruent with the desired class outcome. Because class learning climate is easier to manipulate than individual achievement goal dispositions (Whitehead, Andree, & Lee, 1997) and because perceptions of learning climate account for variance in learning outcomes beyond that attributable to student ability (Fraser, 1994, 1998b, 2002), class learning climate is an important variable that should be better understood, described, developed, and manipulated. Using the SCES to measure sports class learning climates may lead to a greater understanding of effective sports classes, and of coach and athlete behaviours in those classes, and provides a first step in monitoring sports class learning climates.

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The Game Sense approach as explicit teaching and deliberate practice

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Abstract

The Game Sense approach (Australian Sports Commission, 1996) was proposed in the mid-1990's as a game-based approach different to the dominant transmission pedagogy and practice style instruction. This ambitious approach to coaching/teaching sought to enhance sport participation and retention by aligning practice sessions/lessons with the reasons young people like sport and games – to be able to play. It now forms the pedagogical basis of the Australian Sports Commission Playing for Life Philosophy and programs like Sporting Schools (ASC, 2016). The player-centred narrative of the Game Sense approach has provided a serious challenge to the sport-as-sport techniques (Kirk, 2010) 'drill and test' mode of sport pedagogy. However, the Game Sense approach is sometimes perceived by teachers to imply a diminished role of the teacher/coach as facilitator. In this paper I propose an expanded explanation of the Game Sense approach equation based on the explanations of 'game intelligence' provided by den Duyn (1997), Maho (1974) and Hopper (2003). I argue that the game-centred/teacher-centred polarisation presented in scholarly work about game-based approaches like Game Sense can lead practitioners to a false premise of implicit teaching realised as "the game as teacher". In this conceptual paper, I present the case that the Game Sense approach is explicit and deliberate teaching in the form of guided participation. The act of teaching becomes the tasks of clearly articulating learning intentions and the associated forms of 'doing' that promote the learning of these intentions. This paper will use the concept of 'understanding by design' to inform the theory into practice demonstration of sport and games teaching as explicit, strongly guided and deliberate. In the context of game based pedagogies like the Game Sense approach this means intentional learning design creating play with purpose in a flexible and adaptive way to meet the learning needs of students and players.

Introduction

The Game Sense approach in Australian sports coaching literature in the mid-1990's was proposed as a pedagogical response to perceptions of over-emphasis on technique-based teaching that did not adequately prepare players for the dynamics of play (Australian Sports Commission (ASC), 1996). In technique-based teaching, unorthodoxies or deviations from a prescribed ideal (or optimum) movement model can be portrayed as "incorrect" and requiring coach intervention to "fix". An alternative framing to the coaching scenario is to frame the need to correct a players' movement model by first asking the question: "Will changing the movement model affect the end result?" (ASC, 1996; den Duyn, 1996). In the technical teaching scenario, the teaching emphasis is on reproduction developed through replication of the model by the player. The pedagogical emphasis tends to be on learning by drill and directive instruction. Typically, technical competency was viewed as necessary before game play (Light, 2013).

The Game Sense pedagogical concept is about using games to develop both tactical-strategic thinking as well as skill development as complimentary pairs (Smith, 2016). The "realistic context" of a game or a game-form "becomes the focus and starting point of practical sessions (Australian Sports Commission, 1996, p. 1). The Game Sense approach is therefore described as a "game-based" model (ASC, 1996; den Duyn, 1997a). A pedagogical model

is a functional representation of a specific arrangement of pedagogical actions that serves to guide pedagogical and content planning for sessions.

The Game Sense approach challenged pedagogical orthodoxy in sport teaching that favoured the teaching of skill as sports techniques observed as players developing skills as technical representations through repetitive practice. In the Game Sense concept, the skill equation was originally described as “technique + game context = Skill” (den Duyn, 1997b, p. 6). Pill (2013) advanced the equation by highlighting the role of perception-action coupling in player decision making and the emergence of skill as an appropriate movement response to the in the moment demands of play (Figure 1).

Figure 1. The Game Sense equation

$$\begin{array}{ccccc} \text{Decision Making} & + & \text{Movement Knowledge} & = & \text{Skill} \\ \text{[What to do]} & & \text{[How to do it]} & & \text{[Movement Capability]} \end{array}$$

Source: Pill, 2013, p. 7

Unlike other game-based teaching models, like the Tactical Games Model (Mitchell, Griffin & Oslin, 2006) and Teaching Games for Understanding (TGfU) (Bunker & Thorpe, 1982) the Game Sense approach was not accompanied by a model of skill acquisition to ground the pedagogical emphasis.

The pedagogical concept of the Game Sense approach is that both the motor action called technique and knowledge of how to enact that motor action in the moment of play to achieve a purposeful outcome are equally important and complimentary. This is also a long held position of motor learning literature (McMorris, 1998). The Game Sense approach does not represent a criticism of motor learning theory, rather addresses concerns of pedagogical practice and emphasis in the process of skill acquisition.

The game-based concept of the Game Sense approach is different to the dominant transmission pedagogy and practice style instruction historically common in sport teaching and coaching (Light, 2013). The game-based practice concept emphasises designer games and play practice tasks that provide players with the perception-decision making coupling through games retaining the patterns of play representative of the tactical organisation of actions in the game. This is a different central pedagogical strategy to the demonstrate-explain-practice strategy (Tinning, 2015) of the sport as techniques (Kirk, 2010) approach where directive pedagogy and a focus on movement reproduction is more obvious (Light, 2013, Metzler, 2011). In addition, this approach brings a more prominent focus on the role of games in teaching for skill learning through representative task design (Pinder, Davids, Renshaw & Araujo, 2011). Representative task design occurs through the use of pedagogical strategies like exaggeration, simplification, elimination or re-design of game constraints.

A key pedagogical strategy of the Game Sense approach is the use of questions to direct and instruct player engagement in preference to direction by “telling” (ASC, 1996; den Duyn, 1996; Light, 2013). This preferential emphasis on the pedagogical function of questioning to develop thinking players led some to the description of the role of the coach/teacher as facilitator (Light, 2013) and the pedagogical effect as guiding player discovery (Light, 2014; Pill, 2012). Harvey and Light (2015), Harvey, Cope and Jones (2016) and Pill (2016) have captured the pedagogy of questioning explained across the game-based coaching literature, including the Game Sense approach.

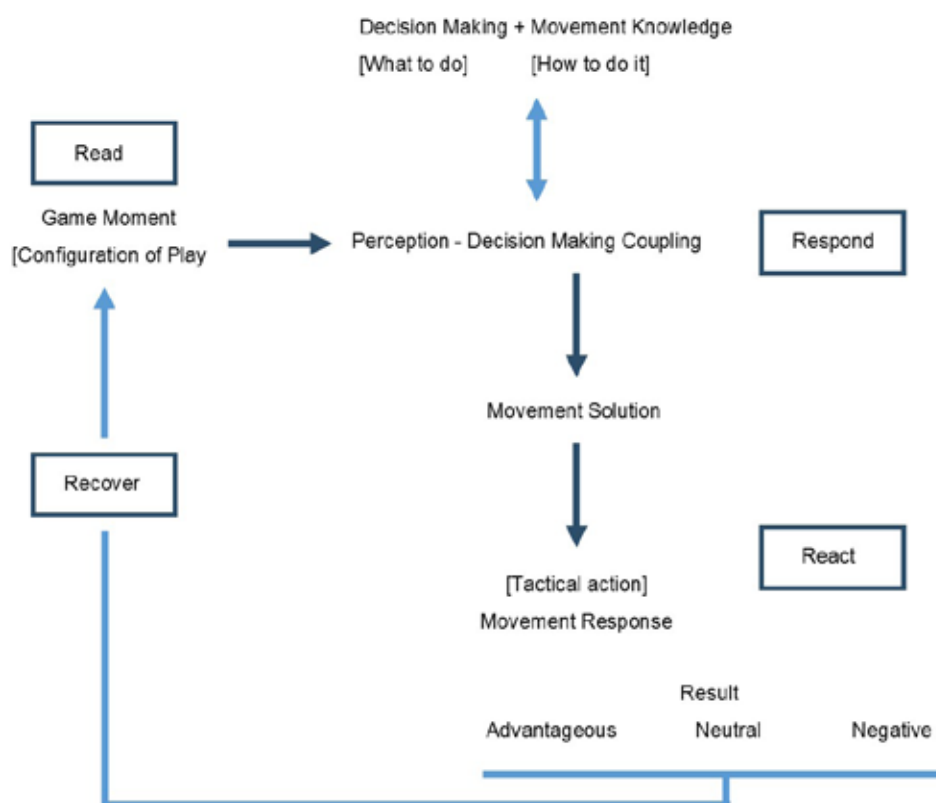
A recent comparative study by Praxedes, Moreno, Sevil, Garcia-Gonzalez and Del Villar (2016) investigating the effects of a teaching program for young footballers based on questioning found players in the experimental (questioning based) group demonstrated better decision making and skill execution compared to the control group. Another recent study, investigating the effectiveness of a training program with an emphasis on questioning and video feedback on performance in tennis by Garcia-Gonzalez, Moreno, Gil, Moreno & Del Villar (2014), also found the experimental group (tactical question and video feedback) improved and retained improvements in performance significantly more than the control group.

Results and Discussion

A Model of Skill Acquisition for the Game Sense Approach

The character of skilled performance in the moment of play is complex. What one observes as a movement response to the demands of the moment of play is in effect a tactical action (Mahlo, 1974 in Grehaigne, Richard & Griffin, 2005). Figure 2 illustrates a skill acquisition model for the Game Sense approach that begins to recognise the complementarity of cognition and action/tactical and technical game behaviour. It shows how Hopper's (2002) explanation of game behaviour sits in a modification of Mahlo's (1974) explanation of skilled behaviour. In this model, the skilled action of the player has occurred as the player has 1. Perceived and analysed the moment; 2. Resolved a mental solution to the problem of the moment; and 3. Produced a motor skill solution (Grehaigne et al., 2005).

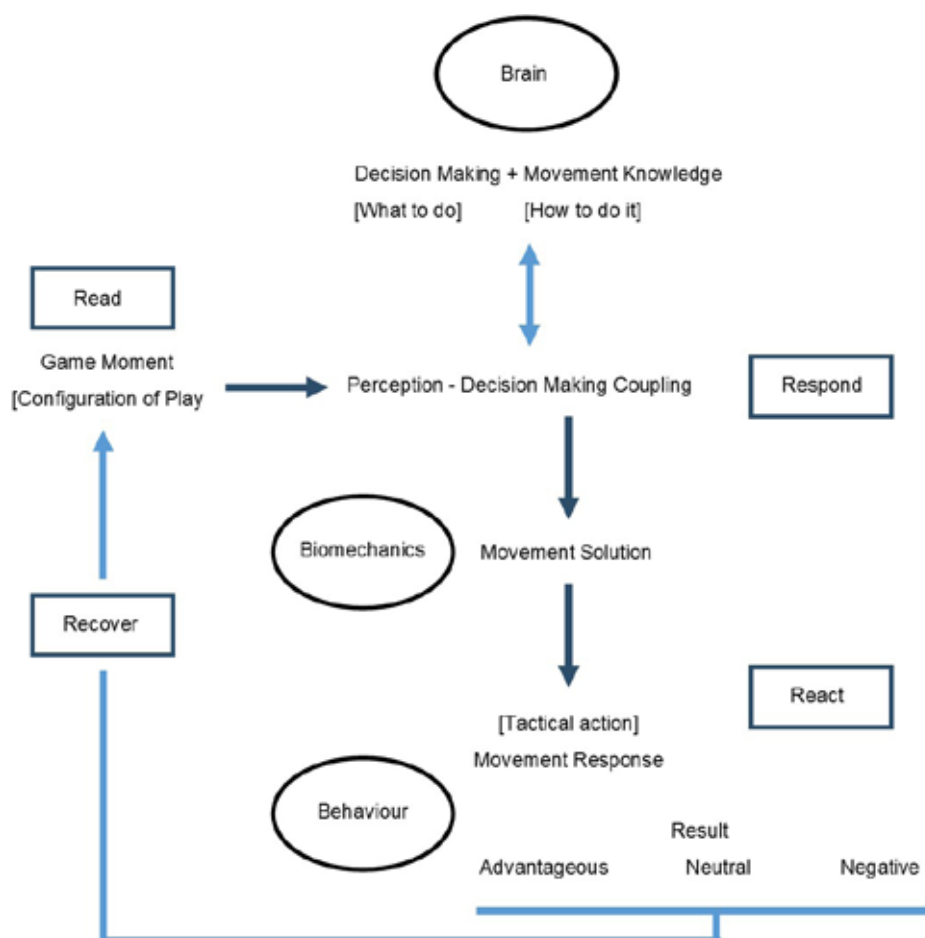
Figure 2. Expanded Game Sense modelling of skill performance in play adapted from Mahlo (1974) and Hopper (2002)



Although not new concepts, Scott (2004) provide a useful explanation of how movement skill consists of the interaction between three components – motor behaviour, movement mechanics and neural control. Patterson and Lee (2013) called this triage the 3Bs - brain, biomechanics and behaviour. Making this dynamic explicit in the model for skilled behavior in a Game Sense approach the overlaying of the 3Bs is shown in Figure 3. We see the process of movement skill commences with cognition of the moment, followed by the brain organising a movement plan for the body to achieve the goal decided as the outcome of the movement. How well the movement plan is executed, or what one might describe as the coordination and control evident in the execution of the movement plan, is a function of biomechanics. We observe this as the characteristics and “shape” of the body in motion as the movement plan is executed. Deliberate practice environments are organised to purposefully allow for constant repetition of the 3Bs (Patterson & Lee, 2013). In this model the important role of cognitive processes in skillful game behaviour is consistent with the Game Sense metaphor, “developing thinking players” (den Duyn, 1997b). This is unlike other explanations of skillful game behavior and the development of skill in the Game Sense approach and other game-based approaches which have been through the lens of ecological modelling (such as a constraints model) or social constructivism (Light, 2013).

Theoretical explanations of skill acquisition using ecological modelling of games as dynamic systems place emphasis on the role of perception of environmental, task and performer constraints in directing players action. Direct perception is often implied with the player mapping the dynamics of the moment as patterns of play. Functionally preferred movement models are constructed by the player to meet the in-the-moment dynamics of the play. The information processing model is another description of skill learning. Where the Dynamic Systems theory emphasises a direct relationship between what the game environment permits and the actions that are possible, the information processing model explains sport skill from a focus on memory – specifically, the storage and retrieval of information. Stage theory model, levels-of processing model and connectionist model are variations of explanations of the information processing model. The differences in explanations of the process have meant that dynamic systems and information processing have been presented as two distinct, and sometimes viewed as opposing, ideas on skill acquisition. This is because some skill acquisition accounts of the information processing model position motor actions as built from cognitive functions for attention, memory, decision making and pattern recognition. The role of perception here is to filter information for cognitive operations. Dynamic systems explanations stress cognition being built from action and perception which are strongly connected and not isolated ‘modules’ (Anson, Elliott & Davids, 2005; Witt, 2011; Witt & Riley, 2014). The model of skill performance presented Figure 3 reconciles the environmental and cognitive emphasis. It accounts for the possibility that a players’ action ability adapts perception in ways consistent with explanations provided by an ecological model which stipulate the environment in terms of the performers’ ability to act. However, players of differing ability perceive the same environment differently. The environment will provide a different perceptual experience. Therefore, players of different skill ability have different action potential (Witt & Riley, 2014).

Figure 3. Expanded Game Sense modelling of skill performance in play adapted from Mahlo (1974) and Hopper (2002) overlaid with the 3Bs



The model of skilled behavior presented in Figure 3 captures skill acquisition and the emergent behaviour of skill in games as a complex undertaking. My personal experience of many hours working with teachers and coaches, observations of practice while on teaching rounds, and as an active coach, is that the game-based pedagogical concept is frequently interpreted by practitioners as little more than the pedagogy of small-sided and modified games where players are often left to “figure it out” for themselves. The second part of the paper addresses this conceptual confusion.

There is a growing movement advocating for play/game-based approaches. Pedagogical approaches like the Game Sense approach are frequently presented as approaches where players learn through play (Kidman & Lombardo, 2010) with the “game as teacher” (Storey & Butler, 2010; Hopper & Sanford, 2010). However, the evidence for the presumptions of learning through play and self-discovery are not apparent (McNamara, Collins & Giblin, 2015). There is research to support the role of structured instruction in developing the movement learning and interaction between actual competence, feelings of competence that may predict engagement in physical activity (Barnett, Morgan, van Beurden & Beard, 2008; Barnett, Morgan, van Beurden & Lubans, 2010; Pesce et al., 2016; Stodden et al., 2008). I therefore argue that the pedagogical act of the Game Sense approach in physical education (PE) teaching and sport coaching is not distinguished by using the “game as teacher”.

Assumptions that skill learning will occur within the context of game play alone are unsubstantiated (Stolz & Pill, 2014). Game-based approaches in practice interpreted by teachers or coaches as “the game as teacher”, allowing participants to play with limited or no scaffolding of expectations of competency, both technical and tactical natured, and lacking the strongly guided instruction of well-considered deliberate questioning are unlikely to result in skill learning. For many, the confidence in one’s skills and feelings of competence self-efficacy required to ensure physical activity is encouraged beyond the PE/sport coaching setting may not occur.

An unguided or minimally guided “game as teacher” approach may be intuitively appealing for some PE teachers and coaches as an expression of game-based teaching but research suggests minimal guidance is likely to be ineffective and possibly negative when the objective is participant learning (Kirschner, Sweller & Clark, 2006; Mayer, 2004). The idea that a student will learn with greater understanding from personal discovery rather than thoughtful processing is not substantiated (Hattie & Yates, 2014). Kirschner et al. (2006) suggest the evidence is “overwhelming and unambiguous” that guidance “specifically designed to support the cognitive processing necessary for learning” (p. 76) is advantageous. The concept of “specifically designed” will be elaborated in the following discussion as explicit teaching and deliberate practice.

Understanding by Design – Explicit Teaching

Time alone spent in physical activity accumulation is not enough to promote learning – positive changes in movement skill competency (Fischer et al., 2005). Competence should not be confused with experience. Frequently, differentiation in movement skill competency occur because of the differences in experiences and not just volume of time accumulated in physical activity (MacNamara et al., 2015). Simply spending more time on an activity will not result in improvement. Deliberate effort must be made for improvement to occur, with the critical elements under control of the teacher in this deliberateness being planning, guidance, pedagogical choice, goal setting and feedback (Hattie & Yates, 2014). If accepted that unstructured or weakly structured, or what might also be called weakly guided, play or game-based approaches are unlikely to afford the development of competence and confidence (MacNamara et al., 2015), what is the pedagogical and curriculum response? The play with purpose concept proposes structured “explicit” teaching incorporating instruction and understanding by design (Wiggins & McTighe, 2005).

Whatever framework guides PE lesson and program planning, whether school-based such as the Australian Curriculum (ACARA, 2016) or a sport-based framework such as the Football Federation Australia (FFA) Curriculum, objectives for learning can always be organised into what the learner should understand (transferable concepts), know (factual information) and be able to do (skills and processes) (Wiggins & McTighe, 2011). While it may be relatively more straight forward in PE and sport settings to plan for teaching from the identification of technical movement cues as a form of factual knowledge, teaching similar to what Kirk (2010) describes as PE as sport techniques (Kirk, 2010), deliberately designing situated learning environments for the acquisition of movement skill and its continued development requires students to be immersed in the use of knowledge organisation, knowledge application, meaning making, and knowledge transfer (Erickson & Lanning, 2014). This implies a clear articulation by the teacher of learning outcomes and achievement standards to plan back from what is acceptable evidence of achievement and the experiences aligned to student learning that brings them to a demonstration of the evidence of their learning (Wiggins & McTighe, 2011).

Table 1. Defining learning objectives for soccer from which to “plan back” the lesson content

<p>SAMPLE ESSENTIAL QUESTIONS</p> <p>What principles of play make soccer an example of an invasion game?</p> <p>How do the tactical concepts and strategic thinking learnt in the hockey unit apply to learning and performing in soccer?</p>
<p>SAMPLE LEARNING OBJECTIVES</p> <p>As a result of engaging with this sequence of learning experiences, students will:</p> <ul style="list-style-type: none"> • Understand that movement concepts, principles, and strategies learned in one sport can be applied to learning and performance in similar sports • Know the mechanics and purpose of passing and receiving in a game of soccer • Be able to describe how the ball movement learnt in hockey can be transferred and used to help movement performance in soccer • Be able to use feedback to improve and refine the on the ball and off the ball movement concepts and abilities • Know specific offensive tactics (pressing space, passing lanes, motion offense) • Be able to apply specific offensive tactics effectively and appropriately in game play • Be able to evaluate, improve and refine the use of specific offensive tactics in the context of game play in response to feedback

Table 1 details an example of learning objectives for a unit of soccer in secondary school PE. The objectives are sufficiently specific and explicit for the planning of content and its educative experience to be detailed into a unit of work. The objectives therefore direct planning as understanding by design is a curriculum design approach based on the premise that learning happens within students through a process of meaning making. It is important for PE teachers to deliberately design curriculum through the lens of explicit teaching involving clarity of expectations for learning and clarity in task presentation as these two factors have been shown to have a relationship with skill learning (Rink, 2013). Hattie & Yates (2014) suggest teacher clarity as one of the most influential factors in student achievement, and Marzano (1998) earlier synthesis of the teaching research literature also includes clear and specific lesson goals as an important factor in student learning success. Hattie & Yates (2013) go further, suggesting that moving the planning of learning objectives from content expectations to success criteria of the type shown in Table 1 is one of the five big impact actions on planning for learning teachers can make.

Deliberate Practice

In educative settings generally, Hattie and Yates (2014) summarise the research evidence as pointing to deliberate practice as the “essential prerequisite for skill learning” (p. 96). Ericsson and Pool (2016) describe deliberate practice as a pattern of interaction purposefully directed to changing the neural circuitry that are involved in the quality of mental representations of performance. Through this type of practice, faster and more accurate performance decisions are developed over time. Ericsson and Pool (2016) suggest the representative task design typical of deliberate practice requires a teacher who can provide a learning environment designed for learning, not just doing. In other words, purposefully informed practice. Coyle’s (2009) earlier investigation of competence development also found that targeted practice designed by teachers or coaches to improve speed and flexibility of thinking through a focus on the development of flexible neural circuits for skilled performance was a consistent feature of what he described as talent hotspots. Deliberate practice is therefore systematic attention to competence success – in other words, learning. Participant performance is therefore data that assists the teacher or coach in

planning progressively structured challenges that aim for learning development (Lemov, Woolway & Yezzi, 2012). It is focused, self-evaluative practice that marks the learning environment and therefore PE teachers and coaches who are deliberate in their interventions and conscious of their pedagogical decisions are likely to have the biggest learning impact (Ericsson & Pool, 2016).

The structure of deliberate practice and “play” within this concept change both as a function of age, growth and development, and experience. Deliberate play activities that are regulated by constraints adapted from standard sport rules are important in early motor tactical and technical skill development (Cote, Baker & Abernathy, 2003). If one accepts that sport performance results from a complex interplay between cognitive knowledge and processing applied to the perception of a momentary situation in play with a players’ ability to be skillful in meeting the demands of the moment (Figure 2) then deliberate practice design for the intentional development of both the mind necessary for performance and the capacity for bodily response of the performer should result. However, historically in both PE and sport coaching the cognitive “tactical” attributes of skill are neglected (McPherson & Kernodle, 2003). For teachers and coaches it is therefore not so much a matter as to how much the player practices (although this is a factor in the development of competence) but more so how the player practices (Patterson & Lee, 2013).

Competence in complex tasks like game play and sports is intricate and takes time because competence is not ability in a single skill but a collection of skills (Ericsson & Pool, 2016; Kahneman, 2011). The acquisition and performance of sport skills requires extensive, regular and sustained “practice” (Cote, Murphy-Mills & Abernathy, 2012). There is, however, some definitional controversy about deliberate practice in the literature (Ericsson & Pool, 2016). This mostly concerns supposition of a “10,000” hour rule that proposes that the accumulation of approximately 10,000 hours of deliberate practice is required to reach expertise, popularised by Gladwell (2008). This depends of the neurological integrity of a person’s system. Some people master skills faster than others. Learning takes time, and the deliberate practice concept is that skill develops and improves due to prolonged effort while negotiating personal motivational factors, external constraints and enablers. The point for PE teacher and sport coach pedagogy is that practice and experience don’t inevitable lead to learning (Ericsson, Krampe & Tesch-Romer, 1993). Deliberate practice research highlights to the PE teacher and sport coach the importance of goal-directed skill learning in purposefully structured activity requiring effort and cognitive engagement in skill learning. Purposeful play that provides the sport-specific “representative” practice is essential to develop the perception-decision making coupling typical of skilled performers (Renshaw, 2010).

Conclusion

In this paper I have used theoretical ideas in skill learning from both teaching and motor skill literature to suggest that a practice schedule or PE class should be organised “with the brain in mind” to purposefully facilitate the cognitive processes of players that are required for skilled performance in the context of play. I have presented an extended “equation” to explain the Game Sense approach focus on developing “thinking players”.

Motor actions in the situated complexity of a moment in a game occur with a specific movement outcome desired by the player. The salient recommendation for teachers and coaches is that practice contexts should be organised to encourage players’ active engagement in the cognitive processes required for motor action planning as well as reflection and inquiry on error detection and correction. In the Game Sense approach this deliberate and explicit pedagogical intention is emphasised through well planned and considered coach/teacher questions and questioning processes (see Harvey & Light, 2015; Harvey et al., 2016; Light, 2013; Pill, 2016) in preference to being

highly directive and telling or commanding behaviour. I agree with Patterson and Lee (2013) that the mind-set of PE teachers and coaches concerning the pedagogical principle of “repetition” needs to evolve to an account of techniques as product of a scheme of events involving brain, biomechanics and behaviour.

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Young Muslim girls and their dispositions towards school based sports and physical education: Using Bourdieu to understand the rationale for their exclusion/inclusion

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Abstract

This paper analyses the dispositions of Muslim high school girls towards physical education (PE) and sports. Many studies of Muslim women's experiences in school sports and PE activities have recognised their significant dropout rate from PE and especially from sports. It is noted that female Muslim students experience some challenges, which include participation in physical activities during the fasting month of Ramadan, the absence of a gender segregated environment and sports dress codes – which their religion and culture consider should be modest. In addition, because of certain religious and cultural limitations, they could confront some restrictions in taking part in PE and other extracurricular activities. A phenomenological approach is adopted in order to seek a better understanding of Muslim girls' participation in school based sports and PE. The data is analysed using the Grounded Theory approach. The outcomes have been theorised with the use of the sociological ideas of Pierre Bourdieu to frame the analysis of the experiences of female Muslim students attending Islamic and non-Islamic (secondary) schools in Brisbane. By using two cases, this paper examines the ways in which PE and sports practices are enabling (or not) the activation of their sports and PE habitus. The paper highlights the ways in which the fields of PE and sports are accommodating (or not) the religious and cultural needs of pupils.

Introduction

This paper presents some of the findings of a doctoral study into the participation of Muslim girls in school based sports and physical education (PE) activities. The larger study is exploring the experiences of Muslim girls attending schools in Brisbane. The introduction, sets the background of the relationship between the participation of Muslim girls in sports and PE and their religion and culture.

A large number of studies have found that participation in school sporting events could have a positive impact on the lives of students (Blomfield & Barber, 2011; Brown, 1999; Brown & Evans, 2002; Feldman & Matjasko, 2005). Feldman and Matjasko (2005) noted the importance of school sporting activities, particularly for high school students, since a) it potentially could enable them to develop a positive attitude towards academic achievements; b) can develop a sense of belonging to the school and develop strong relationships with peers; and c) could significantly affect the dropout rate of students from the school. While research has proved that school based sports can highly influence adolescents to establish an identity which poises them for success, not only in the field of education but in life as a whole, it is also argued that school sports is highly gendered. Many studies have found that sports and PE in school is a gendered practice where there is a classification of male and female appropriate activities (McCallister, Blinde, & Phillips, 2003; Ruyters, 2012). Satina, Solmon, Cothran, Loftus and Stockin-Davidson (1998) argued that girls are aware of the fact that school sports are dominated by boys and that this is the reason why girls hesitate to participate in school based sports and PE.

However, as far as Muslim girls' participation in school based sports and education is concerned, it is noted that for Muslim girls there are many other factors that collectively become the reason for their dropping out. Dagkas, Benn, and Jawad (2011) noted that the religious and cultural requirements Muslim girls have is one of the major reasons that they face difficulty in partaking in sporting activities in Western schools. For many Muslims, their religious beliefs, as well as their values, are very important as these beliefs give great significance to the ways and the structure of their lives. They consider that Islamic teachings are an essential feature of their lives, as is their Muslim habitus, and thus their approach to sporting activities is often determined by religious, ethnic and cultural factors. In fact, following Islamic teaching, Muslims believe that running (exercising) or participating in physical activities is necessary in order to maintain good health. The Prophet Muhammad (Peace be upon Him) would often take part in certain exercises and used to walk at a fast pace.

Islam promotes fitness and good health and encourages believers to engage in sporting as well as physical activities in order to maintain a healthy lifestyle (Walseth & Fasting, 2003). However, some aspects of the religion affect the ways in which sport is practiced and how physical activities are participated in. For example, Islam does not allow mixed gender sporting activities as women are strictly prohibited from exposing their hair and uncovered limbs to an unrelated or marriageable male (someone who is mahram). Therefore, young women who follow Islamic teachings must consider the dress code and culture of their religion in order to participate in any sporting or other physical activity offered at school.

This paper applied the sociological ideas of French anthropologist and sociologist Pierre Bourdieu (1977, 1990) to theorise the ways in which Muslim girls experience school based sports and PE. Specifically, I use his notion of habitus and field. I also use the term hysteresis effect which he used to describe the mismatch between the habitus of individuals and the changing rules of the field.

Literature Review

Over the past decade, a number of studies have been conducted in America, Canada and Australia, which have explored the participation of Muslim youth in physical health and sports related activities, paying special attention to Muslim girls' engagement (Alamri, 2013; Bashir-Ali & Elnour, 2003; Benn, Dagkas, & Jawad, 2011; Dagkas & Benn, 2006; Dagkas et al., 2011; Hargreaves, 2010). It has been found that Muslims' participation in school based sports and PE related activities has dropped significantly (Benn, 1996; Benn et al., 2011).

A study conducted by Benn and Dagkas (2006) describes in detail the tensions between Islamic cultural practices and physical education. Some of the examples they gave included dress codes for women, mixed/single gender groupings, attitudes related to privacy and modesty, extra-curricular activities, fasting during Ramadan, swimming and dancing. They particularly remarked on the abovementioned Islamic requirements for modesty and privacy, which do not permit the wearing of short skirts or shorts for girls, or the use of public changing rooms with public showers. According to Islamic codes, Muslim pupils should be segregated; however, no consideration is given to this in many secondary schools. During the month of Ramadan Muslims are required to fast from sunrise to sunset, not only abstaining from food, but also from water or other liquids. As a result, students' lower levels of energy and dehydration can be risk factors in any situation, let alone during sporting and other physical activities (Dagkas & Benn, 2006). Bashir-Ali and Elnour's (2003) research found that in order to avoid any kind of direct contact with males, it is possible that Muslim girls will avoid all kinds of social events. They could even avoid any contact at all

with males in their school setting. As a result, it is possible that this attitude, cultural philosophies and customs about avoiding any direct eye contact, shaking hands or touching males and speaking loudly, is completely misunderstood by male teachers and also by non-Muslims in Western society. Bashir-Ali and Elnour explained that Muslim girls also do not feel comfortable in any kind of interaction with boys, even sitting with them in classroom settings. These cultural norms also transfer to many of the physical activities associated with sport and PE. Alamri (2013) noted that, due to cultural and religious requirements, female Muslim students may limit or even completely stop fully engaging in some school sporting activities. Kanwal and Jorgensen (2014) argued that young women attending non-Islamic schools often found it difficult to participate in sports related activities due to the lack of segregated classes in school, and also due to issues about what sporting attire would be considered practical whilst still being culturally sensitive.

Methodology

This study adopts a phenomenological approach in order to seek a better understanding of Muslim girls' participation in PE and school based sports. The data is analysed using the Grounded Theory approach (Glaser & Strauss, 1967). The outcomes have been theorised using the sociological ideas of Pierre Bourdieu (1977, 1990) to frame the analysis of the experiences of Muslim female students who are attending Islamic and non-Islamic secondary schools in Brisbane. The larger study has interviewed 14 Muslim girls attending non-Islamic schools and 10 Muslim girls attending Islamic schools. However, this paper focuses on two cases, one from each school system. A semi-structured format was used in the interviews, with open ended questions inclusive of observations to provide access to the experiences of these girls in the context of the research aims. In-depth interviews were conducted in order to gain a better understanding of their experiences. This paper discusses and analyses the responses of two Muslim girls - one attending an Islamic school and one attending a non-Islamic school.

Applying Bourdieu's Theory

To theorise the outcomes, this paper has used the work of French sociologist Pierre Bourdieu (1977, 1990) - his notions of *habitus*, *field*, and *hysteresis* help to theorise the ways in which school practices shape the sports and PE experiences of young Muslim girls. *Habitus* is the internalisation of cultures that provides people with a lens to see and interpret the world they live in. It is generated when people participate in individual and collective practices taking place in different social fields. Bourdieu says that 'it [habitus] is an acquired system of generative schemes objectively adjusted to the particular conditions in which it is constituted' (Bourdieu, 1977, p. 95). It is the field where the positions of individuals are located, providing various opportunities for shaping the habitus. Every field is a social system which functions with its own set of rules and reasoning. The field sets the rules and defines what is accepted and legitimate within its sphere. For the purposes of this paper, the field is school sports and PE. To achieve the successful involvement of Muslim students (or any other group of marginalised students) it is important that sports and PE become relevant to them. From a Bourdieuan perspective, the participation and success of students in sports and PE is less to do with the inborn abilities of students and more to do with the relationship between the habitus of the school and that of students. The positioning of an individual in the field depends on the correlation of the rules of that specific field, individuals' habitus and the capital that individual holds. Capital is the form of power that people hold in social fields. The aim of the struggle in the field is to maintain or increase individual or group capital and dominate the other participants. So, fields are also created out of the struggle between individuals and

groups over what amounts to meaningful 'capital' in the particular field, as well as who will have control over that capital and the power it affords. The distribution and accumulation of the different capitals within their specific fields have a strong influence on the social outcomes of the individuals who are involved in that field (Zevenbergen, 1995).

The termed *Muslim habitus* is used to describe the Muslim students' dispositions, which they have developed over a period of time. *Muslim habitus* suggest the dispositions of Muslims who are strongly embedded in the religion of Islam. The religion of Islam emphasises the total submission of Muslims to Allah and this submission should be achieved by practicing the Five Pillars of Islam, which are: 1) to believe that there is no God but Allah and the Prophet Mohamad (PBUH) is the last prophet of Allah; 2) to pray five prescribed prayers daily; 3) to fast during the month of Ramadan; 4) to give *Zakat* (alms) from your wealth to the needy and to the poor; and 5) to perform *Hajj* (pilgrimage) to the city of Makkah (Diab, 2009; Bates, 2002). In addition, there are rules and regulations about life that Muslims have learnt from the Quran and the Hadith. These rules and regulations cover all aspects of life, from very personal issues to business matters; for example, personal hygiene, sexual relations, food, clothing, inheritance and the Islamic way of banking, which should be interest free (Diab, 2009). The majority of Muslims learn all about these practices and rules at a very young age (which Bourdieu calls early socialisation) and hence these regulations shape the formation of their Muslim habitus.

The remainder of this paper presents two cases in order to demonstrate Bourdieu's concepts in theorising the ways Muslim girls are shaping (or not) their sports and PE habitus, and to understand the practices within the field of sports and PE that include or exclude Muslim girls.

Case One Sadi: Sadi is attending a non-Islamic school situated in a multicultural suburb. River State School (RSS) is a secondary school located in the metropolitan area of Brisbane city. Sadi is in Grade 9.

Case Two Erum: Erum is attending an Islamic school (Islamic School A - ISA). ISA is also situated in a multicultural area in the metropolitan area of Brisbane city. Erum is in Grade 12.

Both girls have identified themselves as being 'sporty girls'. However, they are not both actively participating in school based sports and other PE activities. The theoretical notions of Bourdieu help to understand the dispositions of these two pupils towards sports and PE and to recognise the ways in which these girls are positioned in the field of sports and PE in their respective schools. Bourdieu's concept of *hysteresis* helps to understand the mismatch between the habitus of the individual with the changing practices of the field, which in simple words could be symbolised as being like a 'fish out of water'. In these two cases, Sadi is under a 'hysteresis effect' whereas Erum is like a 'fish in water', because there is no clash between the habitus of Erum and the practices of the field.

Case 1: Sadi - Fish out of Water

Sadi is attending RSS and she is in Year 9. She has been attending RSS since she started her secondary schooling. She identified herself as a girl who loves to take part in school based sports and PE activities.

I love doing sports at school - I love to play basketball, volleyball.

The analysis of her interview suggests that she used to play a lot of sports when she was in primary school, however when she started secondary school, she began to refrain from a lot of sports and PE activities.

I used to play basketball and volleyball twice a week in school as a subject. I used to participate in a lot of sports when I was in primary school, I used to play netball there and stuff, but when I came to high school I feel kind of that I am older now...

Sadi was not a visible Muslim when she was in primary school, meaning that she was not wearing a *hijab* (headscarf) - she began wearing a *hijab* when she started secondary school. She said that all of a sudden she felt that she was a big girl and she found herself struggling with a lot of discomfort that she felt when she was attending sports or PE. Here Bourdieu's work helps to understand that individuals internalise a culture or a philosophy through which they interpret their world. Sadi started to feel that she was not comfortable playing sports and she felt that everyone was looking at her when she ran, and that others may think it is funny to see a girl running around wearing a hijab. It is evident from the quote below that the habitus of Sadi was not in alignment with the practices of the field.

It was my first day in school and with hijab as well, I thought that how I will play with hijab as it would be hot, and it will look awkward that I am running in long pants and with a headscarf while other girls are wearing shorts. I felt that as everyone finds it funny to see a hijabi [a girl who wears a hijab] running...I just started to lose my interest because I was not enjoying it anymore because I was not comfortable anymore...I was not wearing proper sports dress code...

Shaffe and Wittes (2006) found that when girls do not enjoy playing sports and other physical activities, it can negatively affect their self-esteem. For Bourdieu, Sadi's Muslim habitus was clashing with the practices of the field so she began to feel a hysteresis effect – feeling like a 'fish out of water'. There was a mismatch between Sadi's Muslim habitus and that of the practices on the sports field, because she thought that she was not equipped with a sports habitus which was acceptable within the field of sports. Consequently, she began to step back - because she was not comfortable with the acceptable practices of the field. She expressed her desire to see 'only girl' types of sports - she suggested that if the school would adopt the segregation of boys and girls when grouping them, then a number of Muslim girls would come forward and participate. She also revealed the same problem when it came to swimming:

I really wish to have only girls' groups. Like other schools, if our school started making two separate groups of sports, boys separate and girls separate, then I am sure many Muslim girls will come forward and will participate in sports. It is the same case with swimming; if we have separate pools with female coaches then we can participate more confidently. But still I am doing swimming by wearing my completely covered swimming suit.

It is argued that when individuals enter into any field (for this paper, it is the field of sports and PE), their home habitus needs to be reconstituted in order for them to be successful. It is speculated that it is more likely that Sadi and many students like her will keep dropping out of school based sports and PE activities if their home habitus does not transform/change according to the habitus that is accepted in the field. However, schools and teachers need to understand the gap between the habitus of the student (with cultural and religious needs) and that of the school, and they need to carefully build a bridge between the two habitus in order to include Sadi and many other Muslim girls within the field of sports and PE.

Case 2: Erum - Fish in water

Erum is attending Islamic School A (ISA) and she is in Year 12. She has been attending ISA all her life. Like Sadi, she also identified as a girl who loves playing sports and getting herself involved in other PE activities in and after school.

I play sports all the time; I grew up in a sporty environment, so I just play sports all the time.

Erum believes that playing sport gives a sense of belonging with the team one is playing for and it also teaches individuals about morals and unity.

To do sports is fun and if you are playing for a team it gives you a sense of belonging and also you learn a lot from sports. For example, I play basketball and I learn a lot from it, like just morals and stuff like that and it is good exercise.

Erum takes pride in telling that she is part of every type of sports that is being played at her school. She has a black belt in taekwondo and she has developed that interest from her father.

I'm actually part of every single sport there is – I did taekwondo for five years and I'm a black belt. Yeah and my dad started us from a young age. I am part of all sorts of sports being played at school.

The analysis of Erum's interview reveals that her family is also involved in sports and other PE activities, and she believes that growing up in an environment where sports hold great importance in life, one ought to develop an interest.

My dad lives for sports (laugh). My sister and brother also play sports, so me and my sister we play basketball and my brother plays soccer and yeah he is always taking us to training. My dad encourages us to do sports in our lives. He loves sports. Anything related to sports he will say yes to it.

Erum considers that sport and PE are an important part of her life. Taking a Bourdieuan perspective here, Erum has already developed a sports habitus from home and when she goes to school, she easily recognises the practices taking place in the school. In the field of school, Erum transfers the habitus she has developed at home by taking part in sports and other PE activities. She enters school with a feel for the game (Bourdieu, 1990, p. 9). And by having a 'feel for the game', Erum is able to understand the rules of the game; she knows how to anticipate and participate in the activities. It is Erum's parents who created opportunities for her to be able to understand the rules and practices of the field so that she can play sports when she is at school.

It is much more comfortable for Erum to actively participate in school based sports than it is for Sadi. Two factors have been identified; a) home habitus that recognises the structured practices of sports and PE at school; b) the alignment between the home habitus and the school habitus. Since Erum is attending an Islamic school, she does not have to face the challenges of a dress code, or an absence of the segregation of sexes. She said that when her team goes to play inter-school sports, they meet other school teams and all the other teams and their coaches were very friendly and curious to see them in a uniform that is not the normal one that non-Muslims wear when they play touch football. She said that her school has imported a uniform for them from Sweden, and that they play in great comfort.

We do all school touch football. It is a three day competition, and whenever we go for it and we feel that everyone is curious as we are the only Muslim school out of 200 schools you can say, and yes people do talk a lot with us and about us. We didn't really get bad comments, most of the coaches from other schools will approach us and say that they are so happy to see Muslim girls' teams coming to play, and I think it opens people's eyes. The uniform for touch football is shorts but we wear the uniform that our school has imported from Sweden, it is very comfortable and we play in our comfort zone, and yes our school is catering for sports a lot.

Erum's comfort zone is created by the fact that she is wearing a sports uniform which recognises her religious imperatives towards clothing. She is going to a school where she finds everything accords with her religious and cultural beliefs. She does not face the hysteresis effect as Sadi did, because there is an agreement between the habitus of Erum and the practices taking place in the field of sports. Unlike Sadi, Erum finds herself comfortable within the field of sports and PE in her school, just like being 'a fish in water'.

Discussion and Conclusion

This paper presents a brief description of one of the major themes of my doctoral study, i.e. "*participation of Muslim girls in school based school and in PE activities*". It is argued that when Muslim girls are comfortable playing sports and taking part in other PE activities at school, they tend to take part more in school based PE and sports. By discussing the cases of Sadi and Erum with the sociological ideas of Bourdieu, this paper suggests that when the habitus of individuals are in alignment with the structured practices of the field, then the chances of success are higher than expected. However, when there is a clash between the two - then the hysteresis effect will take place where individuals are more likely to struggle between the two habituses.

From analysis of the two cases, it is argued that Muslim girls are eager to take part in school based sports and PE activities. However, their active participation in the PE and sport is related to their experiences at their respective schools. The two cases discussed suggest that Muslim girls tend to restrict themselves from the participation in school based sports and PE at non-Islamic school because they struggle to manage their Muslim habitus in the school. An example of this is discussed in the case of Sadi. It is argued that Sadi stopped playing sports at school because of the limitations of the dress code around sports at her school and also the fact that it comprises mix groups. On the other hand, those Muslim girls who do not struggle to maintain their Muslim habitus while taking part in PE and sport tend to actively participate. Erum's case has elaborated this notion quite convincingly.

This paper concurs with previous studies (Alamri, 2013; Benn et al., 2011; Dagkas & Benn, 2006; Dagkas et al., 2011) that religious and cultural limitations tend to limit the participation of Muslim girls in school based sports and PE. However, this paper distinguished itself from the findings of the previous studies on the basis of its theoretical approach. A Bourdieuan theoretical framework enables this paper to theorise the outcomes and to better understand the rationale of Muslim girls' dropout from school based sports and PE activities, in particular, in non-Islamic schools.

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Chinese High School Students' Perception of Sport Education Model

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Chinese High School Students' Perception of Sport Education Model

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Introduction

Ministry of Education in 2012 developed the Education Blueprint for 2013-2025 to aspire Malaysian education system as a whole: access, quality, equity, unity, and efficiency (Malaysia, 2012). A quality physical education (PE) program provides students to achieve the five outcomes of blueprint. Many PE teachers have adopted traditional teaching as direct teaching in the context of PE. Physical education is organized in units that are often of short duration, sometimes lasting no longer than five to six lessons, so student experiences are incomplete. Sport Education Model (SEM) was developed by Siedentop in 1994. Sport education seeks to educate students to be players in the fullest sense and to help them develop as competent, literate, and enthusiastic sports people (Siedentop, 1994). Therefore, it is necessary to examine the perception of SEM on performance of high school students in physical education lesson.

Methodology

1. Participants

- There were 48 tenth grade students (28 males and 20 females, average age of 16) participated in this study.

2. Badminton lessons

- Twelve SEM badminton sessions with each session lasted for 40 minutes were conducted. The content of the first seven PE lessons consisted of warm up, skill practice and play practice; the eighth to twelfth PE lessons were made up of game play and tournaments where the students played different roles as captains, coaches, referees and others (as shown in Table 1).

3. Data Collection

- Students' learning sheets were collected twice for all students, a total of 98 copies were used for further analysis.

4. Data Analysis

- The data were analysed inductively using constant comparison method.
- Data coding as M22-1 where M = Male; 22 = student; 1 = First time learning sheet.

Table 1
The Badminton Season Plan

Session	Key Content	SEM Concept	Teacher's role	Students' roles
1	• Introduction and outline of the unit • Introduction of team roles and responsibility • Beginning short and long grip skills	• Concept of persisting teams, roles and competition format. • The competition shall be played in Knock-out stage. • Five groups were played to 7 points each. • Announcement of teams: development of team (name, slogan etc.)	• Class leader	• Participant • Role play
2	• Beginning forehand & backhand serving skills	• Whole class instruction and scrimmages • Free play	• Class leader	• Participant • Role play
3	• Beginning net shot skills Forehand & backhand	• Whole class instruction and scrimmages • Free play	• Class leader	• Participant • Role play
4	• Beginning forehand & backhand drive skills	• Whole class instruction and scrimmages • Free play	• Class leader	• Participant • Role play
5	• Beginning forehand & backhand clear skills, which can be attacking, defending or neutral (rally building)	• Whole class instruction and scrimmages • Free play	• Class leader	• Participant • Role play
6	• Beginning forehand drop shots skills, which can be attacking, defending or neutral (rally building)	• Whole class instruction and scrimmages • Free play	• Class leader	• Participant • Role play
7	• Beginning forehand smashes skills, which attacking	• Whole class instruction and scrimmages • Free play	• Class leader	• Participant • Role play
8	• Beginning offensive and defense I • Single & double • Modify games - Three on two games	• Pre-season scrimmages • Players learned and practiced duty roles as coach and referee	• Program director	• Captain, coaches, players • Learn duty role
9	• Beginning offensive and defense II • Single and double • Modify games - Four on two games	• Team practice □ Men / Women's singles □ Men / Women's doubles □ Mixed doubles	• Program director	• Captain, coaches, players • Duty team roles
10	• Games I □ Men / Women's singles □ Men / Women's doubles □ Mixed doubles	• Team problem-solving tasks • Duty team responsibilities	• Program director	• Captain, coaches, players • Duty team roles
11	• Games II □ Men / Women's singles □ Men / Women's doubles □ Mixed doubles	• Team problem-solving tasks • Duty team responsibilities	• Program director	• Captain, coaches, players • Duty team roles
12	• Final game competition • Awards ceremony	• Culminating event • Duty team responsibilities	• Program director • Master of ceremonies	• Captain, coaches, players • Duty team roles

Purpose of the study

To examine Malaysia Chinese high school students' perception on performance during 12 SEM sessions through practical participation.

Research Question

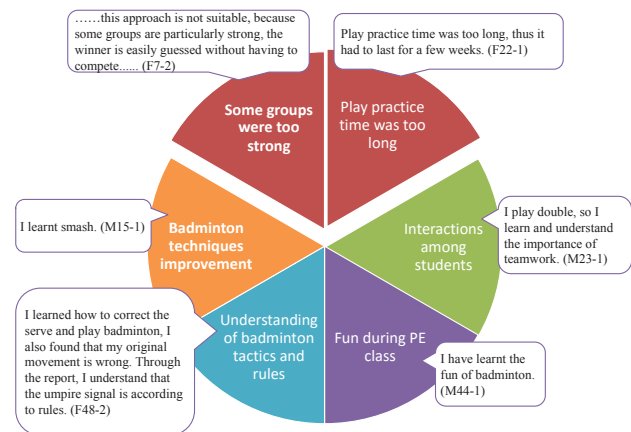
In order to describe tenth grade student's perception of SEM regarding learning in badminton, the following research questions guided the study:

- What did they learn about badminton in PE class?
- How did they evaluate their performance?
- What were their favorite units?
- What were their thoughts about 12 SEM sessions?

Results and Discussion

Results

- The students mentioned about the increase in the interactions among students, fun during PE class, the understanding of badminton tactics and rules, and badminton techniques improvement.
- They also revealed some negative perception on SEM, such as the play practice time was too long and some groups were too strong to have fair play.



Discussion

- The students thought team cooperation and group competition were fun. They gained understanding of badminton tactics and rules, and badminton techniques improvement (Huang, Pan, & Hu, 2011; Lin, 2009; Hastie, 1998).
- They also mentioned that play practice time was too long and some groups were too strong to have fair play (Huang, Pan, & Hu, 2011).

Conclusion

Students' perceptions of SEM were mostly positive, especially in student interaction and game tactics learning. The findings of this study have implications for promoting SEM for teacher education institutions and other related units. It is suggested that further study should consider examining other different sport games.

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Creating inclusive environments in sport, education and community settings: An auto ethnographic vignette

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Creating inclusive environments in sport, education and community settings: An auto ethnographic vignette

Stephanie Greenland ¹

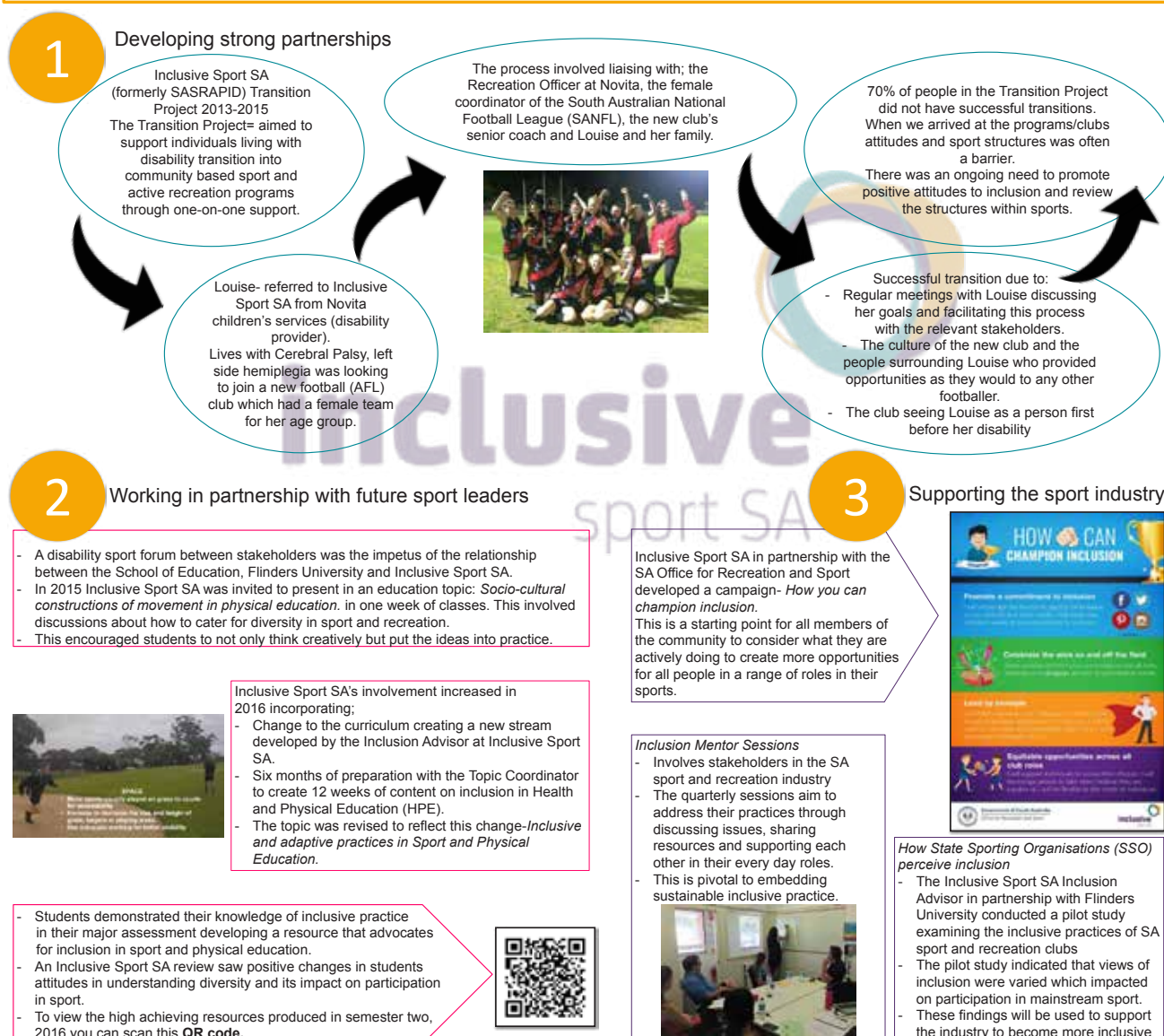
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Abstract

Background: Inclusion is at the forefront of education and is high on the agenda for sport and recreation stakeholders. Creating more inclusive environments through education and community connectedness is vital to ensure sustainable pathways for individuals to participate in sport, recreation and Physical Education (PE). **Method:** An auto ethnographic vignette captures the contribution of the non-for-profit organisation Inclusive Sport SA and their impact on people with disabilities partaking in sport, recreation and physical education. The impact on the sport and recreation industry, educators and the community in supporting participants from diverse backgrounds will also be shared. **Findings:** Inclusive Sport SA works to promote awareness and advocate for inclusion in sport and recreation by: (1) Developing strong partnerships with community based sport and recreation groups to strengthen their approaches to building an inclusive culture. (2) Working in partnership with the future sport leaders in South Australia (SA) at Flinders University and (3) Supporting the sport industry through mentoring sessions, facilitated and partnered events, and providing resources on how to practice inclusion across all roles. **Conclusions:** The work Inclusive Sport SA delivers is a positive step within the inclusive movement. The importance of creating links and working alongside those who share the same agenda will encourage sustainable practice and therefore cater for those who need supportive environments to have valued participation in sport, recreation and physical education. There is scope for the influential programs Inclusive Sport SA currently delivers to be reflected in other settings and tailored to other audiences. This will require validation of the current programs which is another positive step towards building inclusive cultures in sport and recreation.



Outcomes

- Inclusive Sport SA strives to work alongside stakeholders to develop relationships and encourage sustainable practice for inclusion in sport, recreation and education.
- The Flinders University partnership educates approximately 150 first year students on inclusive practices. This topic can empower the next generation of HPE teachers and has potential to educate other audiences to provide meaningful opportunities in sport and recreation.
- The Inclusive Sport SA Inclusion Advisor is working with The SA Office for Recreation and Sport, SSO, educators and researchers to develop partnerships, support and advocate for inclusion. Inclusive Sport SA disseminates proactive resources to support the sport industry in building a culture of inclusion.

Creating possibilities: The Lunchtime Enjoyment Activity and Play (LEAP) intervention

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Creative possibilities:

The Lunchtime Enjoyment Activity and Play (LEAP) intervention

Dr Brendon Hyndman, Southern Cross University



Background and Aims

- Creativity is described as "the process by which ideas are generated, developed and transformed into value."¹
- When children solve fundamental movement tasks in different ways, they not only generate ideas, but act on those ideas via 'creative flexibility.'²
- The aim of this study was to gain insight into the creative physical activities developed after the Lunchtime Enjoyment Activity and Play (LEAP) intervention was introduced (123 children; response rate: 90%; mean age: 7.0 years) in comparison to a matched control primary school (152 children; response rate: 86%; mean age: 8.2 years).*

The LEAP Intervention

- Movable/recycled materials with no fixed purpose were introduced to a grass field in a brand new primary school over a 13 week period that included milk crates, buckets, cardboard boxes, rubber tubes, pipes, tractor/motorcycle & bicycle tyres, swimming boards, exercise mats & hay bales.

Methods

Part A

- The System of Observing Play and Leisure Activities in Youth (SOPLAY) instrument³ was used to measure the predominant physical activity types across targeted school ground areas (Intervention school= 5 areas; Control school= 6 areas).
- Observation scans were undertaken at 5 minute intervals across 5 consecutive lunch break periods at baseline (0 weeks), post-test (7-weeks) and follow-up (8-months) phases.

Part B

- Descriptive field note observations of the physical activities developed within both school grounds were documented by experienced school teachers & researchers.
- Analysis of field notes were based upon **criteria for 'creativity'** including: **1- modification of movements & alternate methods of movement execution; 2- physical activities encouraging curiosity & taking initiative; & 3- interacting & communicating with others to find answers & propose ideas.**³



Results

Part A: After the LEAP intervention was introduced, use of the movable/recycled materials was the predominant activity type across 66% of observation scans at post-test (53% imaginative play with the materials & 13% building/construction) and during 50% of scans at follow-up (26% building/construction & 24% imaginative play with the materials). At the control school, 24-29% of scans across the data phases revealed that imaginative play with fixed equipment was most predominant.

Part B: Refer to Table 1 below for a range of creative physical activities noted within the predominant physical activities.

1- Modification of movements & alternative methods of movement execution		2- Physical activities encouraging curiosity & taking initiative		3- Interacting & communicating with others to find answers & propose ideas	
LEAP Intervention School	Control School	LEAP Intervention School	Control School	LEAP Intervention School	Control School
<ul style="list-style-type: none"> • Convenient height of milk crates and hay bales facilitated regular jumping/landing practice to the ground, over and on to the equipment; • Regular dragging movements of the equipment to desired spaces, rolling/bouncing/hula hooping with circular equipment; • Other movements included hiding, swinging flotation noodles, sleigh running with empty plastic sandpits; • Foam swimming noodles (normally flotation device) became an exploratory item for 'practicing grips', 'manoeuvring hands', javelin throwing, carrying/riding around the field and swinging movements against the wind. 	<ul style="list-style-type: none"> • Regular jumping up to and landing from monkey bars; • Holds on monkey bars; • Jumping and landings over obstacles, surface markings (e.g. hopscotch) and on the spot; • Flip over on monkey bars; • Sport-specific skills were evident such as unstructured basketball/soccer dribbling practice and soccer kicking were evident; • Swinging and hanging for long periods on flying foxes; • Unstructured 'downball' competitions (hit and bounce tennis ball into other squares). 	<ul style="list-style-type: none"> • Solving movement problems such as where activity boundaries would be placed to not impede the building, constructing and imaginative play; • 'Sleigh pushers/draggers/runners', 'sleigh riders', 'sleigh collectors' and orderly line of those waiting; • Using space by repositioning equipment to different locations; <p>Movable equipment initiatives:</p> <ul style="list-style-type: none"> • Rolling, stacking, sweeping, building tunnels/boats/rocket ships, balancing, hiding, clothing, sliding, jumping, landings, hula hooping, tobogganing, climbing, dragging, fencing, tug of war, instruments, & activity bases. 	<ul style="list-style-type: none"> • Activity instances of running around other children; • Having pushing competitions with hands; • Incidental activity chasing balls off courts; • Running up stairs and hanging on stair railing; • Coordinated hopscotch challenges, running and following others across spaces; • Learn to kick off the flying fox with feet to gain speed; • Coordinate obstacle course runs around fixed equipment. 	<ul style="list-style-type: none"> • Developed activity stations would consist of teams with set roles such as leader, cleaner, builder, collector/gatherer of equipment and observer of equipment; • Group communication/interactions more complex; • Working together to build, design and set up stations for physical activity; • Teamwork skills to create spaces; • Learning from other groups via process of peer observation; • Demonstrating patience when undertaking activities; • Recruitment of team members; • Negotiation skills. 	<ul style="list-style-type: none"> • Plan activity sequences on monkey bars or where to explore within school grounds; • Following the leader (and teacher) during group walking and running; • Instructing other students on specific skills and movements. • Follow leaders, learn rules being developed and happy to be included during activities; • Negotiating directions to run, targets for hoops and deciding who starts with the ball during an activity; • Regular discussion of team selections, use of spaces/borders for activities and rules; • Conduct running races to sets of equipment.

Table 1. Physical activities developed within the LEAP intervention school and control school according to creativity criteria.

Conclusions

A variety of school ground equipment provisions are important for children to undertake creative physical activities. The LEAP intervention exemplifies how the introduction of movable/recycled materials can lead to primary school children better utilising spaces, developing & designing diverse activities/movements. Combining both traditional, fixed school ground equipment can ensure primary school children have adequate opportunity to generate & develop creative physical activities.

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Improving engagement and communication between school canteen workers and the Health Promotion Service

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Improving engagement and communication between school canteen workers and the Health Promotion Service

Rosi Johnston

Illawarra Shoalhaven Local Health District, Health Promotion Service



Aim

- To provide canteen workers with an online forum to share information across a large geographical area.
- To provide canteen workers with a platform to communicate with their peers and the Health Promotion Service, sharing ideas and problem solving.
- To provide the Health Promotion Service with the means to deliver information to canteen workers as it becomes available and receive feedback and further suggestions.
- To support canteen workers to increase the availability of healthy food options.
- To provide positive reinforcement to canteen workers to encourage healthy change.



Background

- The Fresh Tastes at School NSW Healthy Canteen Strategy was first implemented in state schools in 2005, in response to increased rates of childhood obesity in Australia.
- The Strategy has had varying degrees of successful implementation within school canteens in the Illawarra Shoalhaven Local Health District (SLHD).
- Facebook has been identified as a powerful communication tool with expansive reach and interactivity.



Results

- The closed Facebook group has resulted in an increase in the number of individual canteen managers asking questions and sharing innovations, from 1 over 6 months with the open forum to more than 40 over 5 months in the closed group.
- Of the ideas shared, 75% have been Green food ideas and 25% Amber, with no Red food menu items shared, according to Fresh Tastes @ School Strategy.

Discussion

- The SLHD Health Promotion Service has facilitated 20 canteen network meetings since 2013.
- Canteen workers identified networking and sharing ideas with other canteen workers as a beneficial element of attending canteen network meetings.
- Canteen managers and staff identified a number of challenges to attending meetings on a regular basis. Challenges include: a volunteer work force, high turnover of staff, unsuitability of meeting time, other work commitments and distance to venue.
- The SLHD has a long geographical boundary stretching 250km and has a population of approximately 400 000 people and 152 schools.
- Social media platforms can facilitate interaction between group participants.
- Facebook continues to dominate the social media space, capturing 93% of users.
- From a health promotion perspective, the widespread engagement with Facebook provides a ready platform to engage with canteen workers and provides the opportunity to share information.
- After discussions with members of the canteen network it was decided to develop a Facebook page.
- The initial Canteen Communities page was set up in 2015 and open to the public. Regular posts were submitted by the Health Promotion Service providing canteen relevant information.
- Reach was high but interaction was limited due to the page being public.
- Further discussions with canteen managers indicated a closed Facebook group would provide a safe environment for open discussion and sharing of ideas.
- The closed group has the potential to address some of the challenges that have been previously identified.

Conclusion

- Preliminary findings suggest that the Canteen Communities closed Facebook group has increased canteen manager engagement and communication, and sharing of ideas between canteen coordinators has also increased.



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