Understanding the determinants of health for Australian high-performance athletes: A mixed-methods exploration of a multi-disciplinary, multi-sport panel of expert high-performance sport health practitioners

Author: Mary Therese Toomey

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Institute for Health and Sport

Victoria University, Australia

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Abstract

High-performance athletes are known to be at risk of adverse physical and mental health outcomes related to the extreme performance demands they face. Australian high-performance sport has traditionally been reactive to the healthcare needs of athletes who present having experienced compromised health, whether that be in the form of an illness, an injury, or a mental health challenge. Recently, there has been a move toward implementing limited health promotion approaches addressing identified health risks in the current athlete/sport environment. At present, there is no theoretical framework to help those working with this highly selective group to promote the development and maintenance of optimal holistic health. Moreover, the early and ongoing development of optimal holistic athlete health has not commonly been viewed as a performance requirement within sporting organisations. This research aimed to understand health and its determinants for Australian high-performance athletes from the perspective of a representative sample of expert health practitioners who currently work or have recently worked in high-performance sports healthcare. Determinants of health are factors that influence how likely we are to stay healthy or become ill/ injured. Understanding these determinants will help researchers and practitioners develop a theoretical health promotion framework that may be applied broadly across Australian high-performance sport. This study used a mixed-methods approach, including a Delphi survey and subsequent semi-structured one-to-one qualitative interviews to derive a consensus on athlete health determinants and the factors which influence these. The purpose of the qualitative interviews was to explore, more deeply, the experiences, beliefs and thinking behind participant responses to the questions posed in the Delphi

survey, to add both nuance and context to those responses. The Delphi survey was conducted at two time points over a period of three months. Descriptive statistical analysis of the Delphi survey results demonstrated that there was general recognition of the relevance of the World Health Organisation definition of health and its determinants to the health of high-performance athletes, a finding that is not usually evident in the literature, nor reflected in the provision of health services to this population cohort. Thematic analysis of the Delphi survey data, using a socio-ecological theoretical lens, revealed a need to consider a broader range of influences on athlete health than those that relate specifically to participation in high-performance sport. These include geographic isolation, access to appropriate health services, ethnicity, and socio-economic status. The interview findings revealed that there is a need to apply additional consideration to factors that can be categorized as social determinants of health in healthcare planning for, and management of, Australian high-performance athletes. This study's findings will help form a theoretical framework for Australian high-performance athlete health. Specifically, this framework would address the need for sporting organisations to create and provide health-promoting environments for their athletes and to support athletes in developing their capacity to manage better the impact of the health stressors to which they are exposed, as identified by the high-performance healthcare experts surveyed in this study.

"I, Mary Therese Toomey, declare that the Master of Applied Research thesis entitled 'Understanding the determinants of health for Australian high-performance athletes: A mixed methods exploration of a multi-disciplinary, multi-sport panel of expert high-performance sport health practitioners' is no more than 50,000 words in length including quotes and exclusive of tables, figures, appendices, bibliography, references, and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work. I have conducted my research in alignment with the Australian Code for the Responsible Conduct of Research and Victoria University's Higher Degree by Research Policy and Procedures. All research procedures reported in the thesis were approved by the VU Human Research Ethics Committee approval number (HRE20-114)”

Signature:  Date: 12.07.2021.

Mary Toomey

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List of Abbreviations

AA – Athletics Australia

ABS – Australian Bureau of Statistics

AFL – Australian Football League

AHRC – Australian Human Rights Commission

AIHW – Australian Institute of Health and Welfare

AIS – Australian Institute of Sport

AOC - Australian Olympic Committee

CA – Cycling Australia

CGA – Commonwealth Games Australia

CMT – core management team

IOC – International Olympic Committee

DTE – daily training environment

FFA – Football Federation Australia

GP – general population

HA – Hockey Australia

HBM – health belief model

NA – Netball Australia

NRL – National Rugby League

NSO – National Sporting Organisation

NSWIS – NSW Institute of Sport

NRL – National Rugby League

RA – Rugby Australia

SAL – Swimming Australia Limited

SASI – South Australian Sports Institute

SDOH – Social Determinants of HealthSSO – state sporting organisation

TA – Tennis Australia

VIS – Victorian Institute of Sport

Thesis Introduction and Overview

Sporting organisations in Australia place significant emphasis on the health and wellbeing of elite athletes. Despite the time, expertise, and money invested annually into high-performance athlete health, injury and illness continue to impact significantly on the performance potential, careers, and lives of athletes (Drew et al., 2017; Egan, 2019; Gallagher et al., 2019; Houston et al., 2017; Lo, 2018; Mayer et al., 2018; Palmer-Green et al., 2011; Pisarek et al., 2011; Raysmith & Drew, 2016). When viewed through the prism of a lengthy career in high-performance sport healthcare, including clinical and management roles, it appears that despite awareness of the need to promote athlete health and wellbeing, sporting organisations have been unable to address this issue adequately.

This deficit may exist because athlete health and wellbeing policies and practices across a broad range of individual and team participation high-performance sports in Australia are inconsistent in their application (AHRC, 2021a; AHRC 2021b). Moreover, information regarding their implementation and operation can be challenging to identify and source. For example, an extended search of multiple high-performance sporting organisation websites during March and April of 2020 found that many failed to list information regarding athlete health or wellbeing policies. This made it almost impossible to develop a comprehensive understanding of the current state of play regarding athlete health management in Australian high-performance sport. Exceptions to this were the following organisations:

- Commonwealth Games Australia (CGA) at https://commonwealthgames.com.au/about-cga/advisory-groups. (Website accessed

March 2020), which details the philosophies and principles underpinning athlete healthcare within the CGA

- Rugby Australia (RA) at https://australia.rugby/about/codes-and-policies.(Website accessed April 2020), which details a broad range of policies and procedures related to health encompassing all levels of participation in the sport
- The Australian Institute of Sport (AIS) at https://www.ais.gov.au/health-wellbeing (Website accessed multiple times between January and June 2021), which provides detailed information regarding AIS developed community engagement programs as well as education programs addressing athlete health and wellbeing issues.

Searches reveal there is little publicly available evidence to suggest that holistic athlete health and wellbeing are either well-conceived or planned for by many sporting organisations. The absence of publicly available athlete health policies can be understood to reflect an absence of relevant formalised practices relating to high-performance athlete health development and management, as corporate governance usually requires that operational practices are implemented in line with the relevant organisational policies.

Another factor of concern is the lack of an agreed, universally applicable definition of athlete health and wellbeing. Often, definitions sourced in the literature have a focus on ill-health and are quite specific to either a particular health issue or sport-centric health environment context, with a focus on specific challenges to either physical or psychological health (Drew et al., 2017a; Edouard et al., 2015; Egan, 2019; Kennedy et al., 2020; Raysmith & Drew, 2016; Wiese-Bjornstal, 2009). Additionally, organisations and researchers appear to have failed to fully appreciate that health

factors beyond sport-specific physical and psychological spheres can potentially impact athlete health and performance. For example, current strategies for managing athlete health appear to focus on athlete physical health and workload monitoring, targeted education programs addressing specific risks associated with participation in high-performance sport, competition rule changes to limit identified risks, as well as workload management (Darche et al., 2019; Edouard et al., 2015; Sotiriadou & De Bosscher, 2018). Concurrently, there is also a focus on the provision of, and access to, world-class healthcare services to ensure effective management of health challenges as they arise. However, other than the recent development of the AIS Performance Health post-graduate program, there is little available evidence to suggest that sports, in general, have considered health as a performance attribute or a life skill that can be developed and optimised for the health demands of elite training, competition and the associated life stressors experienced during an individual athlete's progress through the high-performance system. Further, there is also little evidence that sporting organisations have considered implementing strategic, progressive, holistic athlete health promotion programs, such as that proposed by Purcell et al. (2019), which are flexible to the health needs of specific individual athletes or groups of athletes. The purpose of these programs would be to empower athletes with the knowledge and skills required to be effective, competent, and informed managers of their health. It would also require sporting organisations to consider the diversity of health influences athletes may be subject to at all stages of their high-performance career, including those not explicitly related to participation in sport. This can be achieved by understanding each athlete's

exposure to and risk profile for a broader range of individual and societal determinants, as well as those directly related to participation in high-performance sport.

Health and wellbeing are proposed to comprise physical health and psychosocial health as part of a lifelong developmental journey. This broader definition of health is consistent with that outlined by the World Health Organisation (WHO). However, many sporting organisations appear to lack this conceptual understanding. It is proposed that current healthcare practices in Australian high-performance sport reflect this lack of understanding. We suggest that this problem exists because high-performance athlete health has traditionally been considered through the prism of the known health risks and challenges directly linked to physical participation in elite high-performance sport.

. We suggest that this limitation in how high-performance athlete health and healthcare is understood can be best addressed by developing a robust framework for holistic athlete health. This framework should be in line with current psychology research evidence which suggests that high-performance athlete health is complex and is moderated by multi-factorial influences, which extend beyond those traditionally associated with athletic endeavour. Additionally, it is proposed that this framework should be based on the complementary principles of health promotion and population health, to adequately address the complexity of the high-performance athlete health environment. This would then inform health policy development and practice within sporting organisations.

The focus should be on engaging the whole organisation (its organisational and operational structure, management and administrative staff, coaching staff, support staff, health service providers and athletes) in identifying optimal athlete health as an

essential performance and social attribute for high-performance athletes. We also suggest that this process should extend to ensuring that a range of people, with the appropriate level of talent in their respective fields, are identified and attracted to the organisation for the purpose of supporting optimal athlete health. Rather than each organisation approaching the development and delivery of athlete health and wellbeing programs individually, a robust framework can inform universal best practice and policy.

In order to develop such a framework, we first need to understand how health and wellbeing are currently defined and managed in the high-performance sport environment, identifying any perceived gaps in knowledge. The current study addressed this need by surveying and interviewing recognised experts in the field of high-performance athlete health. This study achieved this by using a mixed-methods methodology, including a Delphi survey and subsequent one-to-one qualitative interviews.

This research was undertaken to gather the preliminary evidence required to inform the development of the proposed theoretical health-promotion framework for Australian high-performance sport. The anticipated benefit of such a framework is that it will facilitate all high-performance athletes in experiencing robust holistic health at all stages of their sporting careers. It is anticipated that such a framework could be applied to all high-performance sports regardless of the nature of their organisational structure, funding, training, or competition.

A Delphi survey of a diverse, multi-disciplinary panel of expert practitioners in the field of high-performance athlete healthcare was conducted. Delphi surveys are a recognised tool for gathering evidence from a pool of experts, without participant

responses being compromised by undue influence from dominant personalities within the group, as the surveys are conducted anonymously. This survey was designed to explore participants' professional opinions regarding the relevance and applicability of the WHO definition of health (a state of complete physical, mental, and social wellbeing and not merely the absence of disease or infirmity) and its determinants to high-performance athlete health and healthcare. Data was subjected to both descriptive statistical and thematic analysis. Subsequent to the completion of this analysis, a series of semi-structured qualitative interviews were conducted on a one-to-one basis with a representative sample of the Delphi survey participants, to explore the thinking, beliefs, insights, and experiences behind their responses to the questions posed in the Delphi. The results of both studies are discussed in more detail in the relevant sections of this dissertation.

Once developed, the framework may provide opportunities for sporting organisations to develop and support health-promoting environments consistent with those articulated by the WHO as essential for optimal health, which in the case of the elite athlete, is known to be closely related to performance success. High-performance athlete healthcare would then become the responsibility of all rather than just the athlete and their health care providers, as is often the usual case. High-performance athlete health could then also be managed in a way that is consistent with the principles of population health policy. Bhattacharya and Bhatt (2017) describe seven foundational principles of population health; summarised as follows. Principle 1 – population health policy includes directives, plans, and courses of action. Principle 2 – population health policy emphasises the early detection, treatment, and rehabilitation of health issues.

Principle 3 – the development of population health policy occurs in response to a range of co-dependent high-level individual, organisational and environmental considerations. Principle 4 – population health policy must prioritise the need for interventions to be either generalised or individualised to address the specific and general population health needs across different demographics and regions. Principle 5 – assessment of population health policy outcomes must consider the social determinants of health. Principle 6 – evaluation of population health policy requires both normative and empirical inquiries that may be applied to all of its elements. Normative statements are judgmental, whereas empirical statements are based on fact. Combining both methods creates context and nuance. Principle 7 – effective management of population health requires alignment between organisational management and operational practice, with the population health needs having been identified through health needs assessments and input from all stakeholders. These principles were designed to empower stakeholders and inform the development of practical tools, research, and education and should remain relevant and applicable in the high-performance sports healthcare setting.

Statement of purpose

This research was undertaken for the purpose of gathering the preliminary data required to inform the development of the proposed theoretical health promotion framework for Australian high-performance sport.

Researcher Position Statement

The author would like to share her motivation for developing this project. My career has involved working as a sports and exercise physiotherapist in high-performance sports healthcare, across a range of Olympic and professional sporting environments, including individual and team sports, male, female, and underage athletes, for over thirty years. I experienced frequent challenges, as recently as within the ten years prior to 2017, in attempting to support the health and wellbeing of athletes who experienced acute, recurrent, or persistent health challenges and whose sporting careers and life, in general, were compromised by those challenges. Working within the constraints of each sporting organisation, there was often limited capacity to address those challenges pre-emptively, and, of necessity, the accepted model of treatment of presenting pathologies as the primary intervention was generally employed.

Literature Review

Establishing a definition of high-performance sport

High-performance sport can be challenging to define, with many authors using the term interchangeably with 'elite sport'. On that basis, it is of interest to understand how high-performance sport in Australia defines itself. The Australian Sports Commission (ASC) is the Australian Government agency responsible for investing in and supporting sports operations in Australia. It has two divisions, Sport Australia, and the Australian Institute of Sport (AIS). The role of the AIS is described as that of being the leader of the high-performance sport system. Sport Australia is the body responsible for driving the broader sport sector, including participation growth, and supporting the expansion of the sports industry. According to the Sport Australia website, 'High performance (HP) sport can be considered to comprise several areas of activity and investment. HP sport (both international and domestic elite competition) influences the community's perception of, and valuation placed on sport. Elite competitions are pinnacle events that showcase the highest skill levels, mastery, competitiveness, and sporting excellence. They inspire participants, spectators, and competitors, alike’. (Sport Australia, 2021).

Therefore, high-performance athletes can be understood to be those who participate in these pinnacle events. This definition appears to assign two elements to the understanding of high-performance sport; that which positions it at the elite end of the performance spectrum and that which inspires. However, it is possible that the two are not directly related. It could be postulated that each definition is associated with a particular perspective regarding high-performance sport. The perspective relating to

performance excellence could be interpreted to reflect that of a participant or contributor, where there is likely to be an expectation regarding the nature of the work required to achieve elite status, with many exponents quoting the 'rule of thumb' that, to achieve elite status in sport, at least 10,000 hours of deliberate practice for up to 10 years is needed (Druckman, 2017). The perspective regarding the power of elite sport to inspire may reflect the understanding of the community as spectator/consumer. For example, “For those who participate in physical activities, sport/ physical activity is seen to have a positive contribution to their lives (80% positive contribution). Additionally, spectator sport is popular among Australians (58% watch fortnightly and 48% weekly), and 44% follow Australia when competing internationally” (Sport Australia 2021, Community perceptions survey p 12). Also, “High-performance sport is positively perceived in Australia. Australians see that high-performance sport has a direct positive impact on national pride and our reputation as a country and as well believe – but to a lesser extent – how it has flow-on benefits for the Australian community and sport participation” (Sport Australia 2021, Community perceptions survey p 14).

A review of the existing, per-reviewed literature revealed that all sports can be classified by the social impacts they have, in addition to the nature of the sport/competition itself. That is, all sport can be said to have a social impact. De Rycke et al. (2019) queried whether there is a lack of insight into how the population perceives the impact of elite sport on society. They assessed and measured the public's beliefs regarding the positive and negative societal impacts that could be derived from elite sport by surveying a broad sample of the Belgian population. This study revealed that the Belgian population perceived elite sport to have mostly positive societal impacts.

Positive impacts were defined as tourism, national identity, international prestige, a 'feel-good' factor, and increased community sport participation. At the same time, negative social impacts, including discrimination and stereotyping, exploitation, gentrification, doping, anti-social behaviour, match-fixing, and the financial cost of governments hosting major sporting events, were also identified.

Additionally, Wann (2006) reported that in the context of high-performance sport, when compromised athlete health impacts negatively on performance, a financial and social burden on society is created. In an unpublished thesis, Gould (2019) discussed broader academic debates around the culture(s) of sport and physical activity and the place and meaning of swimming in the Australian national identity. The findings were reported as follows: "'There is a tension between the reality of Australians in the water and the hyperbolic feel-good narratives, such as a nation of swimmers and there are differences in cultural-linguistic meanings, and organisations who blur private and public service, as they vie for public funds and compete for the same customers" (Gould, 2019, p.1).

While these studies are consistent with the previously articulated definition of high-performance sport as sporting activities that have either a community or cultural impact, they create context in that the nature and extent of those perceptions may differ. As noted previously, it may also be argued that the cultural impact of sport is not limited to high-performance sport. For example, Browne-Yung et al. (2015) explored the significance of sport to urban Aboriginal Australians and concluded that whilst sport facilitated important social and cultural resources, there were limitations to its ability to reduce disadvantage for Aboriginal Australians. This may suggest that sport only has

the potential to significantly impact social and overall health when the participants and supporters feel socially included. It is not then unreasonable to suggest that a community sports club can have a significant cultural impact by being either culturally inclusive or filling a cultural gap. Relevant community examples of these scenarios in Victoria include Western Suburbs Soccer Club in Melbourne, a traditionally Greek immigrant community club, which embraced the changing face of their local community and became a haven for the youth of African origin to engage in sport in the early 2010s. Another example is Rhumbalara Football Netball Club in Shepparton, which was established in the 1990s by Paul Briggs, who is a leader in the Shepparton Yorta Yorta community. In response the recurrent exclusion of indigenous players from teams playing in local competitions over many years, the club created a culturally safe environment for young indigenous athletes to participate in sport. It could then be proposed that high-performance sport is that which has perceived social and cultural impacts that extend beyond immediately connected communities.

Alternatively, Bobo-Arce and Mendez-Rial (2013) discussed the interaction of training and sports performance, which is consistent with the definition of high-performance sport as elite sport, given that elite athletes are generally understood to train at a higher level than the non-elite. Some authors have used the term high-performance sport interchangeably with elite sport (Coutts, 2017; Sotiriadou & De Boscher, (2018). In a similar vein, others referred to elite adolescent athletes or sports (Berki, et al., 2020; Blank et al., 2016; Schubring &Thiel, 2014).

Despite its widespread use, the term 'high-performance sport' appears to lack a consistent definition. Those working in the area often refer to athletes being on the

'high-performance pathway', suggesting that the term can be legitimately applied to athletes who are not yet participating at the pinnacle of elite training and competition but on a recognised pathway to doing so. This allows for the inclusion of talent-identified or elite adolescent athletes participating in accredited competitions, at levels below those usually classified as elite, in the cohort of high-performance athletes.

For this study, high-performance sport has been defined as being that in which athletes train and participate in sports at a level that is elite, as defined by Sport Australia (p.9) (including elite under-age competitions). Having robust holistic health can be argued to be essential for the effective management of the health stressors associated with participation in sport at this level (Barbosa Filho, et al., 2018; Brown et al., 2020a; Brown et al. 2020b; Colby et al., 2020; Drew et al., 2017a; Drew et al., 2017b). Logically, this holistic health requirement should include athletes who are participating at a training or competition level, identified as being on the high-performance pathway, to facilitate their safe and effective transition to the pinnacle of elite performance**.**

A recognised definition of health

A literature search of the Medline and SPORTdiscus databases, incorporating the search terms athlete AND high-performance OR elite AND health AND/OR wellbeing, was conducted in 2017, and repeated in 2020, to discover a meaningful understanding of the definition of health and wellbeing in high-performance athletes, as well as an understanding of their theoretical underpinnings. The years searched were limited to 2000- 2020. Only peer-reviewed, English language texts were included. The listed databases were utilised as they are the ones to which high-performance sport

healthcare providers, without academic affiliations, are most often able to access through the sporting organisations for whom they work. This search yielded 122 results, most of which provided little assistance in understanding the meaning of health within the context of high-performance sport. Rather than offering a clear insight into the accepted definition of the term, the research papers reviewed commonly discussed health and wellbeing relative to the identification, onset, impact, and management of adverse health events (Clement et al., 2013; Drew et al., 2017; Edouard et al., 2013; Forte, L, 2020; Heiku et al., 2018; Jones et al. 2018; Moseid et al., 2018; Raysmith & Drew, 2016; Rice, et al. 2016). That is, when health is discussed in the context of high-performance sport, the discussion has most often focused on ill-health and its management. The exceptions were those that referred to health in the context of performance (Dijkstra et al., 2014; Stéphane et al., 2020; Tercier et al 2019).

In contrast to these limited, pathology-based, and contextual definitions, the WHO has defined health as a state of complete physical, mental, and social wellbeing, and not merely the absence of disease or infirmity. In this context, health can be understood to be about capacity (Casey et al, 2012; Sotiriadou & De Bosscher, 2018; Talbot & Verrinder, 2014). The WHO definition is seen to be universally applicable within the context of the health environment of individuals or communities. Logically, this would include the consideration of health in the high-performance sport environment. Similarly, there are broader definitions of health in other disciplines such as psychology. For example, Haas (1999) suggested that the terms' health' and 'quality of life' may be used interchangeably. The interchangeable use of these terms would appear to be consistent with the definition proposed by the WHO, which also asserts that health has

several determinants. These determinants are factors which influence how likely we are to stay healthy or become ill or injured. The literature traditionally describes three primary determinants of health. These are social determinants (SDOH), biomedical risk factors and behavioural risk factors (Anderson, A, 2016; Berki et al., 2020; Brown et al., 2020; Fisher et al., 2019; Lehman et al., 2017; Rudd R. E, 2017; Shi, L, 2019; Stokes et al., 2018; Vamos et al., 2019; Verhagen et al., 2010; Wallace et al., 2020).

Braveman and Gottlieb (2014) assert that SDOH include factors such as income, current and previous living and working environments, education level achieved, ethnicity, health literacy, current and previous employment, as well as social support networks. Key SDOH also includes early life circumstances, social inclusion/exclusion, and social capital (Links to people based on a sense of shared identity, such as family, close friends and people who share the same culture or ethnicity; links to more distant friends and colleagues; links to the broader community). (Andermann, 2016; Braveman & Gottlieb, 2014 Fisher et al., 2019; Lehman et al., 2016) (AIHW 2021; WHO 2021) Social capital could then also be understood to include links to people or groups that form structured or hierarchical relationships, such as people in positions of authority and, in the context of high-performance sport, coaches and health service providers.

Many of the key drivers of current health status are found in our previous and current everyday living and working conditions. Examples include:

- Dependent children living in the lowest socio-economic areas in Australia in 2013 were 3.6 times as likely to be exposed to tobacco smoke inside the home as those living in the highest socio-economic areas (7.2% compared with 2%) (AIHW analysis of the 2013 National Drug Strategy Household Survey: accessed Sept 2020).

- People in low economic resource households spend proportionally less on medical and health care than other households (3.0% as compared to 5.1% of standardised weekly expenditure, respectively in 2009 -10) (Australian Bureau of Statistics [ABS] 2012; accessed Jan 2021)

As described previously, health is also influenced by biomedical factors and health behaviours that are part of everyone's genetic make-up or lifestyle (Eliakum et al., 2015; LeMura et al., 2001; Mayer et al., 2018; McLeod, 2009). Biomedical risk factors are bodily states that impact a person's risk of developing an illness or an injury. These include genetic make-up, blood pressure, blood glucose levels, and body structure/composition (Nathalie et al., 2018).

Behavioural risk factors may include diet, tobacco smoking, drinking alcohol at levels and in ways identified as being unhealthy, illicit drug use and non-compliance with professional health advice. Verhagen et al. (2010) noted that the role of behaviour in sports injury prevention remains under-researched. Baum and Fisher (2014) proposed that health promotion interventions focusing on behaviour change often fail to recognise that health behaviour itself is influenced by peoples' environmental, socioeconomic, and cultural settings. More recently, criticism of health promotion approaches with a primary focus on behaviour change points to the need to embrace social theories of health as a means of better understanding the social and relational drivers of health (Heard et al., 2020)

Both biomedical and behavioural risk factors are understood to be influenced or impacted by SDOH (Stein et al., 2010). According to the WHO, the social conditions in which people are born, live, and work are the most crucial determinant of current and

future good health or ill health. As factors that affect health, social determinants can be seen as 'causes of the causes,' that is, as the foundational determinants which influence other health determinants, a consideration that is not immediately evident in the current healthcare arrangements for high-performance athletes.

This understanding of the impacts and interactions of the social determinants of health is consistent with the concept of intersectionality (Heard et al., 2020), which is based on the need to understand how health behaviours are influenced by the social and cultural systems within which a person lives and works. It has previously been used to explain and enhance understanding of why health programs with a predominant focus on behaviour change do not necessarily work. There are three key applications of intersectionality theory: as an epistemological approach (addressing the limitations of knowledge), as a methodological approach (developing deeper insights into and understanding of what is already known), and as a tool for action and intervention (using increased and expanded knowledge to develop theoretical tools and interventions) (Heard et al., 2020).

This study is an example of a combination of methodological and epistemological approaches as it seeks to identify what is already understood by the term high-performance athlete health and the limitations of that knowledge. It is proposed that the logical sequelae to this would be to use that enhanced knowledge to progress the development of a theoretical health promotion framework.

Health and its determinants in a high-performance sport setting

In the challenging environment of high-performance sport, the management of physical, physiological, and psychological health stressors can be highly complex, in

part due to the intense training and competition environments these athletes inhabit. Identified health stressors are medical, behavioural and lifestyle risk factors. These include specific determinants such as training load, history of previous injury, concurrent illness, dietary habits, sleep quality, personal hygiene, response to perceived stress, and recovery capabilities, amongst others (Bjørnsen et al,2017; Blank et al, 2016; Colbey et al, 2018; Coleby et al, 2020; Drew et al, 2017). It is possible that optimal health outcomes may be best achieved through adopting a definition of health that exceeds the dictionary definition, i.e., a state of being free from physical disease or pain (Merriam-Webster, n.d.). The WHO definition of health as 'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity' (Callahan, 1973) would appear to be a better fit in this instance.

Whilst it is not possible for sporting organisations to influence the foundations of adult health as described by the WHO (health environments in-utero, during infancy and childhood), these and their impact on the current and future health status of high-performance athletes should be recognized and considered when planning and implementing programs which aim to optimize athlete health. This increased understanding of the whole of life and the close relationship between living and working conditions and health outcomes has resulted in a greater understanding of how human health is sensitive to the physical environment and the social one. Factors such as income, education, employment status, personal power over current circumstances, and social support have all been shown to influence, strengthen, or undermine the health of individuals and communities.

When considered from this perspective, SDOH for Australian high-performance athletes may include an additional range of variables - including relationships with family and friends outside sport, relationships within sport, perceived power over personal circumstances, personal identity, and cultural background. Additional complexity is added when the non-sporting variables intersect with the SDOH present in the sporting environment. These may include factors such the culture of the sporting organisation, the coach-athlete relationship and other power relationships, relationships with peers and perceived place within the organisation as well as interactions with fans of the athlete's sport, amongst others.

Alvis-Gómez and Neira-Tolosa (2013) Identified social inequity as being endemic in Ecuador's national Paralympic sports' system. This is demonstrated by 74 % of participants only becoming recognized as sportspeople when they had competed successfully in an authorized competition without the associated Paralympic sporting organisation having previously provided appropriate conditions to enable them to overcome structural and organisational barriers. Whilst some may argue that Australia has more advanced systems and processes in place than in Ecuador, which should either limit or prevent the occurrence of such inequities. However, it is also true that in a comparable country to Australia (e.g., Germany), it has been shown that "Social inequalities in health can be explained in part by the social patterning of leisure-time physical activity, such as non-participation in sports" (Hoebel et al., 2017, Abstract p.1). In other words, the potential for someone to engage in sport in a way that is likely to lead to achieving high-performance status may be pre-determined by social factors.

When similar challenges are examined from an Australian perspective, Indigenous Australians continue to experience interpersonal, systemic, and institutional racism in the mainstream public health system, with an associated under-utilization of mainstream health services than non-indigenous Australians (Socha, 2021). This is a factor that is likely to influence the potential for young indigenous athletes to successfully enter and transition through all stages of the high-performance pathway and achieve elite status whilst maintaining optimal health.

In the context of high-performance sport, the health impacts of a range of SDOH on adolescent athletes have been documented, as have their contribution to current and future health risks and behaviours (Berki et al., 2020; Blank et al. 2016; Brown et al. 2020; Dodge & Clarke 2015; Markati et al. 2019; Martinez et al., 2017; Mayer et al., 2018; Perko et al., 2000; Trigueros et al. 2019). There is little available evidence to suggest that this knowledge has yet influenced how health services for this athlete cohort are structured at the operational level. Not only does this have the potential to limit the efficacy of management of their current health needs, but it also has the potential to compromise their future health because appropriate development of individual health capacity has not been facilitated.

Application of knowledge to the management of high-performance athlete health

It is possible to conclude that, beyond that provided by the WHO, an appropriate definition of health requires a holistic view of each person and that optimal health for each person is achieved through an individualised balance of five areas. These areas are physical, emotional, spiritual, intellectual, and social health (Anderson 2016;

Alameda 2013). In the context of high-performance sport, *physical health* should encompass each of the following:

- The necessary levels of both general and specific physiological and structural competence (including positive adaptation to and recovery from training/competition stressors) required for the desired level of physical activity and the specific sport in which the athlete participates (Keegan et al., 2019)
- Appropriate nutrition for the energy demands imposed by training and competition and that which is required for normal functioning of all organs and systems. (Kang et al., 2012)

Mental health is an encompassing term used in this context to describe the health impacts of brain function and includes emotional health, spiritual, intellectual, and social health, which have been mentioned previously. In this context, mental health describes health capacity, not ill-health. According to the World Health Organization, mental health is 'a state of well-being in which every individual realises his or her potential, can cope with the everyday stresses of life, can work productively and fruitfully, and can make a contribution to her or his community' (Galderisi et al. 2015, p 231). This definition creates individual context. Mental health can, in this way, be understood to reflect the balance between an individual's internal and external environments. Ultimately, mental health is about being cognitively, emotionally, spiritually, and socially healthy - the way we think, feel, understand our place in the world and develop relationships - and not merely the absence of a mental health condition. Good mental health is demonstrated through the capacity of a person to manage a range of critical functions, including the ability to learn (intellectual health),

the ability to feel, express and manage a range of positive and negative emotions (emotional health), the ability to form and maintain positive relationships with others (social health), as well as display a range of personal values, integrity, respect, and compassion (spiritual health) (Galderisi et al., 2015). It would seem obvious then that the characteristics that describe good mental health are highly connected to some of the previously identified determinants of health, particularly the social determinants (SDOH). It can then be argued that good mental health in Australian high-performance athletes is influenced by the environments which they inhabit within and outside of sport, and the nature of the relationships they have with other people in each of those separate environments. Creating/supporting environments which demonstrate a positive impact on mental health could be considered to constitute primary health promotion. Conversely, altering environments thought to have an adverse impact on mental health should be classified as secondary health promotion. Finally, the provision of services or programs to restore mental health is an example of tertiary health promotion.

There is no universally agreed definition of well-being as a subjective experience (Marsh,2020). At the same time, adolescent well-being has also been described as a personal and societal good in its own right (Ross et al., 2020). Further reflection allows for the conclusion that Ross and colleagues have used the term well-being to describe psychological or mental health. It has previously been described as the experience of both health and happiness. It has also generally been said to include good mental health, high life satisfaction, a sense of meaning or purpose, and an ability to manage stress. These somewhat divergent definitions can render the term confusing, and a decision has been made to omit them from further discussion beyond this initial review

of the literature and simply refer to holistic health (an optimal individual balance of psychological, physical, and physiological health characteristics).

A general tendency amongst researchers to describe athlete health and well-being separately was evident, and to describe both as significant individual contributors to either interrupted or sustained participation in sport as well as performance outcomes (Drew et al., 2017; Gabbett, 2016; Vickery et al. 2017; Williams 2018). In addition, researchers have frequently reported the adverse impact of mental health on sports performance (Donohue et al., 2018; Henriksen et al., 2020; O'Brien & Kilrea, 2020), continuing the previously identified theme of framing discussions about athlete health from the perspective of ill-health. At the same time, it is understood that within the wider community, high levels of mental health are associated with increased learning, creativity, and productivity, more pro-social behaviour, and positive social relationships, and improved physical health and life expectancy. With this in mind, researchers have recently begun to explore the development of positive mental health in the sporting environment (Carson et al., 2018; Donohue et al., 2018; Sullivan et al., 2019; Yamada et al., 2017). Each of the cited studies found that to be effective, interventions to enhance mental health should take both individual and organisational, or team-based, approaches, which is particularly relevant when considering a range of known risk factors for holistic health in the high-performance sport environment, such as the coach-athlete relationship and the culture of the sporting organisation (Baugh et al., 2020; Berki et al., 2020; Horn, 2019; Purcell et al. 2019).

Health literacy has also recently been identified as an essential tool for facilitating the development of positive mental health in this environment (Carson et al., 2018; O'Brien

& Kilrea, 2020; Sullivan et al., 2019). It is, therefore, also suggested that improved understanding of and skills in health literacy should be a fundamental element of any strategy to optimise the holistic health capacity of Australian high-performance athletes.

Adolescent athlete health

Abbott et al. (2005) argue that talent identification of adolescent athletes is based on flawed understandings of what constitutes talent, which is usually based on genetically driven performance determinants. They asserted that a review of traditional talent identification processes in sport and their theoretical underpinning (Abbott & Collins, 2002) highlighted that potentially talented athletes are often overlooked due to an inappropriate conceptualization of talent and that the selection of individuals based on physical or performance characteristics such as strength or possession of a particular technique reflects a limited and narrow definition of talent. Others have expanded on this to examine the influences of psychological, physiological, and situational (environmental) variables on the performance of elite adolescent athletes (Colgan 2007). That is, health, as described by the WHO, can be viewed as a fundamental requirement for performance in elite adolescent athletes.

The gap in the literature

There is a notable absence of peer-reviewed literature exploring the need for adolescent high-performance athletes to develop holistic health competencies, particularly those related to and influenced by the SDOH, as essential health and performance attributes for sustained sporting success and balanced, productive lives outside sport. The possible health and performance benefits of doing so, in parallel with the development of sport-specific technical skills and athletic performance attributes

from the time of athlete entry into the high-performance pathway, have only recently been explored by Stephane et al. (2020). In their findings, these authors identified the emergence of three major elements: 1. The power of interdisciplinarity and innovation to promote healthy sport. 2. Adolescence is a fundamental period to raise awareness of health issues among athletes and those around them. 3. The need for strong institutional and political support of health promotion in sport.

Illness and injury have also often been seen as the inevitable outcome of the combined impacts of the athlete's current training and competition environments (Thebe, 2008). Consequently, injury and illness continue to negatively impact athlete performance (Drew et al., 2017a; Gabbett, 2016; Kennedy et al., 2020; Raysmith et al., 2016; Vickery et al., 2017; Williams 2018). Alternatively, Stephane et al. (2020) and Tercier et al. (2019) assert that health is fundamental for performance and should be developed in adolescent athletes.

Further, there is an almost complete absence of peer-reviewed literature discussing the broad application of health promotion principles in the high-performance sport environment. The literature available was found to have variable limitations in the approaches taken. Problems categorised as athlete health or wellbeing issues were generally viewed through a narrow lens, resulting in compartmentalised and highly specific risk reduction and management programs, with a significant emphasis on managing known risks in the current athlete environment, through the application of both secondary (interventions to establish early diagnosis and prompt treatment of a disease, illness or injury to prevent more severe problems developing) and tertiary (interventions aimed at rehabilitation following illness or injury significant enough to limit

participation) health promotion strategies (Balk & Englert, 2012; Houston et al. 2017; Wiese-Bjornstal, 2009). This is consistent with the previously identified trend of discussing health in high-performance sport from the perspective of ill-health. Only a limited amount of literature addressed the application of the principles of primary health promotion (interventions designed to prevent the development of illness or injury before the process begins) was discovered. This frequently resulted in a focus on generic athlete or sport-specific factors, including risk reduction and management programs, often involving load management recommendations (Gabbett, 2016; Soligard, 2016), as well as athlete-centred education programs. Most of these strategies appear to place an onus on the athlete to be ultimately responsible for their health management, with the assistance of health service providers, without ensuring that they have acquired the knowledge and skills to do so effectively or ensuring that they operate within a supportive health environment, underpinned by robust policies and procedures. This may be understood to be indicative of the absence of an adequate health literacy environment.

As presented by Gabbett (2016), Soligard (2016) and others, these recommendations are essential. However, they are most likely to benefit in a sporting environment in which the early development of broad-based individual health competencies has been prioritised and supported using the principles of health promotion and which also provides a supportive health environment underpinned by improved individual and organisational health literacy. Promoting health through different settings can take different forms and should ideally include primary, secondary, and tertiary health promotion elements.

There is a need to address this gap by developing a theoretical health promotion framework for Australian high-performance sport, based on the development of improved individual and organisational health literacy, such as is seen in the context of the management of population health challenges. However, only Stephane et al. (2020) and Tercier et al. (2019) discussed the need for sporting organisations to implement strategies for emerging high-performance athletes to develop the health capacity necessary to effectively manage the health stresses of the high-performance athlete lifestyle. This may explain, in part, why athletes continue to experience recurrent or persistent illness, injury, and mental health challenges as a regular part of their high-performance athlete experience.

Health promotion

When considered from a socio-ecological perspective, health promotion involves processes that contribute to the development of health-supporting environments and healthful behaviours (Bracht & Kingsbury, 1990; Jackson et al., 2006; Johnson et al., 2020; Simons-Morton, 2013). This perspective proposes that people can only take part in the health promotion process effectively when they have a clear insight into the social and environmental factors that affect health and well-being. Effective health promotion programs, which utilize this approach, tend to operate on several levels or fronts, simultaneously focusing not just on the individual or population at risk but also on the local and global environmental conditions that contribute to health and health behaviours (Simons-Morton, 2013).

As previously identified, one of the issues of concern in the context of utilizing a socio-ecological approach is health literacy. Health literacy includes the skills and

knowledge of a person/ people to access, understand, and use available information to make decisions, and take action about health and healthcare (Rudd, 2017). The health literacy environment describes the way services are provided and the organisational and physical structures of health service delivery that make it easier or harder for people to access, understand and use information and services (Yeh & Ostini, 2020). These definitions can be applied to both the individual and the organisation. Health literacy has also been recognised as a key to creating better social and physical environments (Cho et al., 2020).

There is no consensus on measuring health literacy (Tian et al., 2020). Health literacy requires a level of cognitive, language and social skills sufficient to allow the individual to understand and use information in ways that promote good health. It empowers individuals by improving their capacity to access health knowledge and developing their skills to use it effectively (Guo et al., 2020). Health literacy encompasses all aspects of health and its determinants. It is, therefore, a potent and vital tool in driving health promotion programs. Health literacy requires health education, which extends beyond just disseminating information and encourages critical thinking about and analysis of that information. This applies at both the individual and organisational levels. If improved health literacy is to make a difference to how health impacts high-performance athlete performance and quality of life, it must not just empower athletes with the health knowledge required to manage their health effectively, it must also empower sporting organisations with the knowledge and skills necessary to create and maintain health-promoting environments (Bjørnsen et al., 2017; Bröder et al., 2020; Nash et al., 2021). This would require all stakeholders to be provided with the

opportunity to develop an awareness of the complexity of high-performance athlete health and the factors that may influence it and an understanding of how those influences could be most effectively managed, moderated, or optimised.

Health promotion in the context of high-performance sport athlete health

Athlete health and wellbeing have previously been linked to athlete participation patterns and performance outcomes (Drew et al., 2017a & b; Gabbett, 2017; Gallagher et al. 2017; Smythe et al. 2019). The attainment and maintenance of a level of health capacity sufficient to effectively manage the health demands of high-performance sport participation should then be considered a performance attribute. It would seem logical then, that sports should prioritise the development of this level of athlete health capacity. Doing so would have the potential to ensure that athlete participation, performance and progress through the high-performance system are not unduly limited or compromised by illness or injury. However, this would not preclude the usual timely deployment of appropriate personnel, resources, and services to manage compromised athlete health if this situation arises (secondary and tertiary health promotion).

Considering the implementation of a model that encompasses primary, secondary, and tertiary health promotion may also indicate a recognition that each athlete's possession of appropriate holistic health capacities can be viewed as a significant performance attribute, as well as an essential life skill for the 'here and now' and for the longer term. It has been argued that this should commence with the athlete's entry into the high-performance pathway and continue through to their transition out of sport (Baird, 2002; Bracht & Kingsley, 1990; Casey et al., 2012). It may also be understood to indicate a commitment to addressing the moral and legal responsibilities

of sporting organisations to the health and wellbeing of their athletes. (DeMartini, 2014; Heng, 2014; Schneider et al., 2008; Voicu & Voicu, 2018). Achieving these goals would have the potential to ensure that the high-performance environment can support athletes in having agency over their health while still maintaining a focus on athlete development and training to achieve the goal of performance success, which may differ somewhat from most usual practices (Theberge, 2007).

Similar strategies have been employed in workplace health programs, which focus on addressing team member health risks while at the same time recognising the importance of the environment for the successful operation of the business (Doran et al., 2018). In other words, it is possible to implement employee/athlete health promotion strategies without compromising performance, with a resultant mutual benefit for the individual and the organisation. Based on the knowledge gained through the conduct of this literature review, it is recommended that sporting organisations recognise and act upon these issues to address the power imbalance that exists within the hierarchical structure of high-performance sports organisations, which can limit the athlete's voice in the management of their health. This problem is evident in the case of athletes being selected to compete when injured, where the consequences have the potential to be catastrophic (Fruchart et al., 2020). Pertinent current examples relate to the legal action which has recently been initiated against several sporting organisations and their insurers by athletes experiencing the long-term health consequences of competing whilst affected by a head injury. By empowering athletes to have a voice in their health management, sporting organisations may facilitate improved athlete health and performances and better manage their legal liability. Today, when an athlete is seriously

injured while playing a sport, it is not uncommon for legal action to follow. The likelihood of this is significant when the athlete can allege that a previous injury or the environmental factors that contributed to the injury increased their risk of sustaining the current injury (Heng, 2014: Schneider et al., 2008).

Settings-based Approaches to Health Promotion

A settings-based approach to health promotion has previously been widely applied in education settings, healthcare settings and workplaces. Taking a settings-based approach to health promotion means addressing the contexts within which people live, work, and play and making these the focus for intervention. This will usually require consideration of the needs and capacities of people found in different settings. Such approaches are described in detail in the WHO Healthy Workplace Framework document (Burton, 2010). However, other than a recent publication by Orygen (Watson, et al, 2021), most of the currently available peer-reviewed literature only discusses sport as a vehicle for promoting health more broadly and has often failed to consider the need to ensure the provision of health-promoting environments for the athletes themselves. Based on the findings of this research the development of a health promotion framework, utilising a settings-based approach for Australian high-performance sport will be recommended. It is proposed that this framework could be modelled, in part, on the WHO Healthy Workplace Framework.

Rationale and Aims

As discussed, there is a need to understand how athlete health is defined, understood and contextualised in high-performance settings. Auditing current understandings is the starting point for developing a framework for promoting a holistic

health model. As such, this study used a mixed-methods design to capture current understandings of a diverse group of high-performance sport healthcare practitioners. Ultimately, it is expected that the results of this study will provide the foundational evidence required to inform the development of a health promotion framework for Australian high-performance sport. The intent is that this framework will support sporting organisations in creating health-promoting environments underpinned by appropriate organisational structures and operational policies at all stages of the high-performance athlete pathway. Ideally, this would incorporate a positive health impact in all policies and practices. At the same time, it is also intended that it should achieve results at the individual level, empowering athletes with the knowledge and skills to be effective managers of their own health.

It is expected that the findings of this research will also make a significant contribution to the academic literature around high-performance athlete health through the development of broader insights into the determinants of health for the high-performance athlete cohort.

This study was, therefore, designed to gather data to answer these primary questions:

- Do practitioners consider the WHO definition of health-relevant and applicable in the context of high-performance sport, and why?
- According to practitioners, what are the applicable WHO defined, general or specific determinants of health for Australian high-performance athletes?

- Why are athletes', coaches' and sports administrators' understanding of health important when considering developing and delivering high-performance sports healthcare programs?
- What do practitioners perceive to be the potential enablers of and barriers to implementing a health promotion framework for Australian high-performance sport?

Methodology

Design

This study utilised a sequential mixed methods design consisting of a Delphi survey conducted over two rounds, which informed the development and conduct of a second study. This second study consisted of one-to-one qualitative interviews with a representative sample of Delphi survey participants. The structure of these interviews was informed by the Health Belief Model (HBM) and the Theory of Planned Behaviour (Alhamad & Donyai, 2021; Hartley et al, 2018). These theoretical models were selected as they both have a demonstrated relationship with health literacy, which has previously been identified as a critical element when applying socio-ecological theory as proposed in the conceptual framework for this study

Conceptual framework and Theoretical lens

It is critical that the proposed theoretical health promotion framework best meets the needs of Australian high-performance sports and athletes. The principles of health promotion have their basis in the WHO definition of health and its determinants. Therefore, it was decided that the applicability of the WHO definition of health and its determinants would be tested by conducting two studies. A socio-ecological model

provided a theoretical framework for analysing the qualitative components of this study, as many health-promotion researchers have used it to address the requirement for integrated action at the individual, community, and societal levels under the Ottawa Charter for Health Promotion (Wold & Mittlemark, 2018). A socio-ecological model describes the interactive characteristics of individuals and environments that underlie health outcomes (Golden and Earp, 2012). This process was augmented by the inclusion of questions informed by both the health belief model (HBM) and theory of planned behaviour (TPB) for the one-to-one interviews conducted in Study Two. These theoretical models were used because of their alignment with health literacy (Panahi, et al, 2019; Peyman, et al, 2015), which was identified as being a significant issue to address during Study One. McLeroy et al (1988), cited in Golden and Earp (2012), presented five levels of influence specific to health behaviour: intrapersonal factors, interpersonal processes and primary groups, institutional factors, community factors, and public policy.

This research used an interpretivist theoretical approach. Interpretivism emphasises qualitative analysis over quantitative analysis. This approach is well suited to the current research questions as the reasoning and beliefs behind participant responses were of most interest. The study utilised a sequential explanatory mixed methods design. This allowed the focus to be placed initially on the Delphi survey results, which then informed the second qualitative phase. Mixed method designs are beneficial because they allow researchers to explore a range of perspectives and discover relationships within the research questions (Shorten & Smith, 2017). Specifically, the study consisted of a Delphi survey, delivered online using the Qualtrics

platform, and subsequent one-to-one, semi-structured, qualitative interviews with a representative sample of survey participants, designed to add depth and nuance to the findings of the Delphi survey.

The Delphi research method was initially developed to forecast future scenarios and has been used to determine the range of opinions on matters (including health promotion), test questions of policy or clinical relevance, and explore (or achieve) consensus on disputed topics. There are three types of Delphi methods discussed in the existing literature. These are the classical, decision-making, and policy Delphi methods (Franklyn & Hart 2007). The classical Delphi is used to ascertain the facts about a specific situation from the perspective of the survey participant. A real-world example of this may be seen in police interviews with witnesses to a crime. The decision-making Delphi is used to encourage collaborative decision making. Idea generation about a topic is the purpose of the policy Delphi method (Franklyn & Hart 2007). The policy Delphi method was used in the current study. The objectives of the policy Delphi method are to: Ensure that all possible options have been tabled for consideration; estimate the impact and consequences of any particular option and to examine and estimate the acceptability of all the individual options (McGeoch et al. 2014). An added benefit of using a Delphi survey is that it is conducted anonymously, and participants can provide responses without undue influence from dominant individuals within the group (Bolger & Wright, 2015; Dagenais, 1978; Greatorex & Dexter, 2000; Marchais-Roubelat & Roubelat, 2011; Silva et al., 2019). The Delphi survey method was chosen for the current study as it was considered a practical way of engaging with participants. It allowed for the inclusion of participants who were

dispersed across all states, in a timely and cost-effective manner, with the additional benefit of being conducted without compromising participant safety during the period of COVID-19 restrictions to travel and face-to-face interaction. Further benefits regarding the confidentiality of participant responses were also identified as necessary in gathering responses that were not influenced by the opinions of dominant individuals, as has been previously discussed.

Study One

Study One involved conducting a Delphi survey of experts in high-performance sport healthcare. A Delphi survey is an iterative process and was selected for use in this study because it is a recognised way of reaching a consensus regarding a defined subject on which there is little available information, meaning that the opinions of experts can be said to be reasonably authoritative (Birko et al., 2015; Bolger & Wright, 2011). The Delphi survey was designed to determine the professional opinions of the identified experts regarding the applicability of the WHO definition of health and its determinants in the context of high-performance sport. It also captured their perceptions regarding the importance of athletes', coaches' and sports administrators' understanding of health which are considered fundamental to the successful development and delivery of innovative high-performance sports healthcare programs.

Participants

Participants were recruited purposively. Inclusion criteria included current or recent high-level appointments in a high-performance sport healthcare setting, professional peer recognition as experts in their field and/or a high publication ranking in their field of expertise.

A select group (n=40) of expert high-performance sport healthcare practitioners from the professions of sports and exercise medicine, sports and exercise physiotherapy, sports and exercise psychology and sports dietetics was identified after an exhaustive search of websites related to National Sporting Organisations (NSO's), including the Australian Football League (AFL), National Rugby League (NRL), Hockey Australia (HA), Football Federation Australia (FFA), Swimming Australia Limited (SAL), Netball Australia (NA) and Athletics Australia (AA) and/or National and State-based high-performance training institutes. These included the Australian Institute of Sport (AIS), New South Wales Institute of Sport (NSWIS); Victorian Institute of Sport (VIS); Queensland Academy of Sport (QAS); West Australian Institute of Sport (WAIS) and the South Australian Sports Institute (SASI).

Additionally, the websites of relevant professional associations were searched, where possible, to identify practitioners who had been peer-recognised as discipline-specific experts in the practice of high-performance sport healthcare. Finally, a detailed search of the academic literature was undertaken to identify practitioners with multiple publications in high-ranking peer-reviewed journals who could reasonably be held to have the required level of expertise for inclusion in the study. The size of the participant group was determined to allow for the inclusion of equal numbers of potential participants (n=10) from each of the four identified healthcare professions (Sports Dietitians; Sports and Exercise Physicians; Sports and Exercise Physiotherapists; Sports and Exercise Psychologists).

Publicly available email addresses could only be located for 37 of the identified experts. At that point, it was decided that a reserve list of practitioners who met at least

two of the inclusion criteria should be developed because of concern regarding possible attrition during the conduct of the survey. This group was identified by different means, including a search of LinkedIn profiles and conference presentations at the Sports Medicine Australia National Conference in the preceding twenty years. This group was composed of a multi-disciplinary cohort of eleven highly experienced practitioners who met two or more of the inclusion criteria of high-performance sport recognition, peer recognition or academic recognition. Of the reserve list identified, only one accepted the invitation to participate in this study, in addition to the 13 who responded in the affirmative from the original list of identified experts. Fourteen participants then commenced the Delphi survey; 11 completed Round 1. Of those 11, six then completed Round 2. A detailed list of participants, categorised by profession, gender and participation in each element of this research is included in Table 1 (p 40).

All the participants were known to the student researcher, and each has between fifteen and thirty years of experience in high-performance sport. Seven participants were Sports and Exercise Physiotherapists, five were Sports and Exercise Psychologists and only two Sports Dietitians participated. Only one Sports and Exercise Physician initially accepted the invitation to participate and was subsequently unable to complete Round 1 of the survey and has not been included in the results. As none of those 14 panellists were Sports and Exercise Physicians, which was thought to have the potential to skew the survey results and is, therefore, a potential limitation to this study, contact was made with the Research Manager at the Australian College of Sports and Exercise Physicians. The College agreed to promote the project in regular communications with their membership. Despite members of the College having been advised of the project

and invited to submit expressions of interest in participating, no enquiries regarding participation were received**.** Finally, participants included seven females and seven males.

Participant ID	Profession	Gender	Delphi Rnd 1 complete	Delphi Rnd 2 complete	1:1 interview complete
1	Sports Dietitian	F	Y		
2	Sports and Exercise Psychologist	F	Y	Y	Y
3	Sports and Exercise Physiotherapist	F	Y		
4	Sports and Exercise Psychologist	F	Y		
5	Sports and Exercise Psychologist	M	Y		
6	Sports and Exercise Psychologist	M	Y		
7	Sports and Exercise Physiotherapist	M	Y	Y	Y
8	Sports and Exercise Physiotherapist	F	Y		
9	Sports and Exercise Physiotherapist	F	Y		
10	Sports and Exercise Physiotherapist	M	Y		
11	Sports Dietitian	F	Y	Y	Y
12	Sports and Exercise Physiotherapist	M	Y	Y	Y
13	Sports and Exercise Psychologist	M	Y	Y	Y
14	Sports and Exercise Physiotherapist	M	Y	Y	

Table 1 : Participant demographics and participation patterns

Materials

Delphi Survey Round 1:

Round 1 of the Delphi comprised 13 questions of which 10 required a quantitative response, using a five-point Likert scale. The remaining three questions

were qualitative in nature and asked participants to provide a rationale for their responses to each of the quantitative questions under the grouped headings of:

1. Relevance and applicability of the WHO definition of health in the high-performance sport healthcare setting
2. Relevance and applicability of the WHO listed determinants of health in the high-performance sport healthcare setting
3. The importance of health literacy for all stakeholders in the high-performance sport environment in optimizing the health management of athletes

   A typical question from this group is as follows: ‘Please provide a written explanation for your response to the three previous questions’. Examples of these questions and the responses they elicited can be found in Tables 2-4 and have been included in the Results section of this thesis

   Delphi Survey Round 2:

The second round of the Delphi Survey repeated the quantitative questions which were posed in Round 1, with the addition of de-identified information regarding the grouped Round 1 response patterns. This round only contained one qualitative question, which asked participants to provide an explanation for any decision to change a Round 1 response. This question was included for the purpose of identifying a perception of the need for change as well as a level of preparedness to change

Procedure

Ethical approval for this project was provided by the VUHREC (Appendix E). The Round One Delphi survey questions were developed sequentially, commencing with two questions regarding the applicability and relevance of the WHO definition of

health for this population group. This was followed by a series of questions regarding the WHO categorized determinants of health in the order in which they are usually listed in the literature, commencing with the SDOH. These initial questions were designed to explore participant insights into key issues that may influence health behaviours in Australian high-performance athletes as a specific group within the general population. This involved formulating the questions to tie the WHO definition of health and its determinants to the health environments of Australian high-performance athletes. Subsequent questions focused on identifying potential barriers to and facilitators of action on health promotion, as well as ways in which these could be addressed. Once developed, the questionnaire was trialled by a highly experienced Sports and Exercise Physiotherapist and Academic. Having received positive feedback from that person, the questionnaire was then made available to those participants who had agreed to participate in the Delphi. The experts answered both open and closed questions over two rounds. It was initially proposed that this survey would be undertaken over three rounds. However, a high level of consensus was already evident after Round 1, at which time, the decision was made to shorten the survey to just two rounds. Both rounds of the survey have been attached. (See Appendix C).

Subsequent to the completion of Round 1, the 14 panellists who participated in the survey were provided with their individual Round 1 results as part of the invitation to participate in Round 2. This is recommended when using the Delphi technique as it helps participants consider their responses in light of those of their peers (Greatorix & Dexter, 2000). Thus, in the second round, the experts were encouraged to revise their

earlier answers in light of the responses of other panel members, as previously discussed.

During both rounds of the Delphi survey, reminder emails were sent to those participants who had either failed to complete a survey once started and to those who failed to complete either Round in the requested timeframe. Most participants responded to these reminders and engaged in discussion about resolving the issues raised. However, none of those contacted about failure to complete a survey, subsequently did so (3 participants).

Study Two

Study Two comprised a series of one-on-one interviews with a representative sample of Delphi survey participants, based on profession, and was designed to provide greater depth and nuance to the findings from Study One. Specifically, the interview questions were designed to explore, in greater depth, the experts' perceptions regarding barriers and enablers to the introduction of a broadly applicable framework for high-performance athlete health promotion.

The development of the questions to be posed during the interviews was informed by the Health Belief Model/HBM (Quine et al., 2000; Skinner et al., 2015) and the Theory of Planned Behaviour (Alhamad & Donyai, 2021). These theories *are consistent with the use of a socio-ecological framework for analysis of participant responses as this framework* is dependent on a high degree of health literacy to function optimally (Bamuya et al, 2021; Golden & Earp, 2012)

Regarding health literacy, the HBM focuses on identifying and understanding individual beliefs about health, its determinants and management, and is then used to

predict individual health behaviours. The Theory of Planned Behaviour was devised to explain an individual's likelihood of engaging in a particular behaviour at any given time or place. It has been used previously to explain a wide range of positive and negative health behaviours, which is consistent with the application of health literacy. It was decided that the knowledge gained through this approach could support the integration and possible modification of existing models of health and healthcare when constructing the proposed theoretical health promotion framework.

Of initial interest with regard to the HBM and Theory of Planned Behaviour were the bio-psychosocial and behavioural theories of wellbeing (Bartley 2016), which are relatively unexplored concepts when discussing high-performance athlete health. These theories were applied in the development of questions asked of the participants during the qualitative interviews. After further discussion, it was decided that it would be of greater benefit to use the socio-ecological model as a framework for the analysis of the research findings and to provide the basis for any recommendations to be made regarding the development of a health promotion framework for high-performance sport. The socio-ecological model describes the multi-directional and dynamic interplay between societal and individual factors which influence health and is therefore a more appropriate model to use when discussing the development of a resource intended to address both organisational and individual behaviours impacting on high-performance athlete health**.** This model allows the practitioner to extend healthcare beyond the patient, including the family and community, and place as much emphasis on prevention of illness and health promotion as on the treatment of the illness or injury (Dogar, 2007;

Saini, 2014). This is considered to be of particular relevance when exploring the influence of the HBM on high-performance athlete health.

The HBM can be used to identify key decision-making points that influence health behaviors by:

- Gathering information by conducting a health needs assessments to determine where risks lie and where interventions should be targeted.
- Improving insight into the risk of adverse health outcomes associated with risk behaviours.
- Assisting in the identification of barriers to action.

Additionally, it is proposed that the application of behavioural theory to address issues identified using the theory of planned behaviour could be effective in formulating health promotion strategies to be directed at policy and decision makers. The health literacy of a person in a position of power can be understood to have a potentially significant impact on organisational policies and operations that impact on the health environment of high-performance athletes.

Participants

A representative sample of participants in the Delphi survey, reflecting both a professional and gender balance of Delphi participants and the diversity of Round 1 responses, was identified. This initial group was comprised of nine participants. Those identified were contacted using the email addresses on record and invited to participate in this additional study. Of those invited, five accepted, completed informed consent documentation (see Appendix G) and subsequently took part in the interviews.

For the interview participants, pseudonyms have been used to ensure confidentiality. This final group of participants provided a representative balance of participants in the Delphi by profession. Two females and three males participated in this study.

It may be argued that five qualitative interviews may not be sufficient to reach saturation (the point at which data collection produces little or no new information relative to the research question). However, Guest et al. (2020) cite multiple authors who demonstrated that the first five to six interviews produced most of the new information in the dataset and that little new information was gained with increased sample size. They subsequently reported that 70-90% of identified themes were identified in the first six to ten interviews. On that basis, the decision to proceed was confirmed. Subsequently, five one-on-one qualitative interviews were completed. Saturation was determined to have been achieved, when analysis of interview transcripts demonstrated no additional themes emerging.

Materials

These interviews were designed to elicit more nuanced and detailed responses to the Delphi questions and followed a semi-structured interview schedule (see Appendix F). The following excerpts are provided as examples of the types of questions included in the interview schedule.

- Questions influenced by the Health Belief Model:

Can I ask you now to provide a further insight into your thoughts regarding SDOH? Can you elaborate on what you think may be described as a SDOH impacting on a high-

performance athlete? Can you tell me why that is? Are there any other examples you could provide?

- Questions influenced by the theory of planned behaviour:

What do you believe are the advantages of implementing a strategy to improve high-performance sports administrator health literacy? Do you believe there are any disadvantages in doing so? What factors or circumstances would need to be in place to enable the implementation of such a strategy? What factors or circumstances do you believe would make it difficult to implement such a strategy?

Procedure

As with Study One, those who had agreed to participate were again contacted by email and asked to provide preferred contact details, plus a date and time for the student researcher to conduct the interviews. One participant expressed a preference for undertaking the interview by video conference, which was agreed. All other interviews were conducted via telephone.

The one-on-one interviews were then completed over several weeks on the dates and at times nominated by the participants.

All interviews were recorded using two recording methods to ensure that data could be stored on separate devices for improved data protection. The recording devices used were the inbuilt voice recorder on the student researcher's computer and an Olympus VN-541PC. All interviews were then transcribed using Otter Voice. The student researcher then edited the transcriptions while repeatedly listening to each of the recordings and corrections made when words and phrases had not been transcribed accurately.

Each interview recording was listened to at least three times during the transcription and editing process. In addition, edited transcriptions were read and re-read multiple times. Specific phrases were identified within each interview and coded for the establishment of themes using Braun and Clarke's six-step process, which will be discussed in more detail when describing the process of data analysis. Coding focused on exploring and identifying the barriers to and enablers of implementing the proposed theoretical health promotion framework. Once potential themes had been identified, these were reviewed to ensure that they could be consistently applied across the dataset. Once this had been confirmed, results were written up.

Data analysis

During the process of conducting the second round of the Delphi survey, the range of the answers decreased and converged towards consensus (See Appendix D). Descriptive statistical analysis of responses to the closed/quantitative questions from both rounds of the Delphi survey was completed. This involved identifying the percentage of participants who selected particular responses to each question and was conducted using the statistical software incorporated within the Qualtrics platform. According to Szulc (1965) the number of participants in this study was not sufficient to support more detailed, in-depth statistical analysis. Although we were interested in the percentage of participants who provided these responses, of greatest interest was understanding their rationale for providing those responses. In this instance, descriptive statistical analysis of the quantitative results was augmented by thematic analysis the qualitative responses, using Braun and Clark's (2006) six-step process. The previously described socio-ecological model was utilized to provide a framework for this process

and to ensure trustworthiness of the themes identified. The steps involved in this process were as follows: 1. Transcribing, reading, and re-reading each interview and taking note of preliminary ideas emerging from the data; 2. Initial codes were generated; 3. Codes were collated into potential themes, which were informed by the student researcher's experience of working in high-performance athlete healthcare, in addition to the application of the socio-ecological theoretical lens; 4. Themes were reviewed to determine whether they worked in relation to the coded extracts and the complete data set; 5. Each theme was reviewed, defined, and named; and 6. Results were written up and further reviewed during this process. (Braun &Clarke, 2006). At this point it was determined that saturation had been achieved.

Results and Discussion

This research addressed the following questions:

- Do practitioners consider the WHO definition of health-relevant and applicable in the context of high-performance sport, and why?
- According to practitioners, what are the applicable WHO defined, general or specific determinants of health for Australian high-performance athletes?
- Why are athletes', coaches' and sports administrators' understanding of health important when considering developing and delivering high-performance sports healthcare programs?
- What do practitioners perceive to be the potential enablers of and barriers to implementing a health promotion framework for Australian high-performance sport?

The first three questions were addressed in Study One. The final question was explored in Study Two

The results of both studies will now be presented and discussed in the context of informing the development of policies and programs required to facilitate the creation and implementation of the proposed theoretical health promotion framework

Study One

Delphi Survey Round 1

As previously discussed, round 1 of the Delphi was comprised of both quantitative and qualitative questions. The results of the quantitative questions will be addressed first and are presented below. A complete transcript of the Delphi survey results is attached in Appendix D.

Quantitative Responses

Question one related to the perceived relevance of the WHO definition of health as ‘a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity’ (WHO 1948) relative to high-performance athlete health. There was a high level of consensus regarding its relevance, with almost 93% of respondents describing it as either very or highly relevant, as illustrated in Figure 1. This result indicates that most of the experts surveyed believe that the WHO’s broad definition of health is relevant in the high-performance athlete context. It does not, however, tell us why they believe this

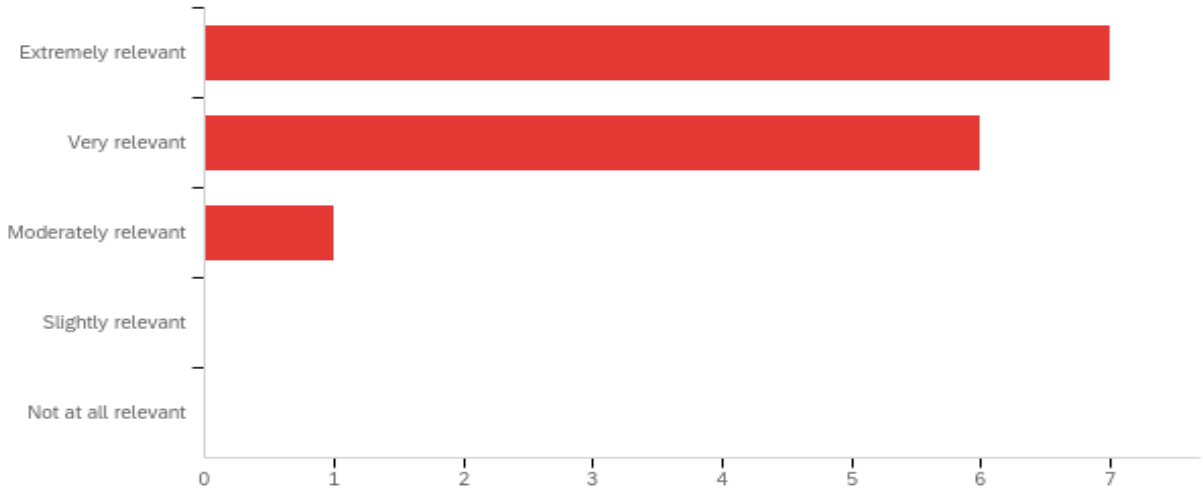

Figure 1: - Relevance of WHO definition of health

Questions 3-5 asked about the perceived relevance of the three determinants of health (SDOH/ biomedical risk factors/ behavioural risk factors), as described by the WHO, to the health of high-performance athletes. The percentage identifying each of these as either very or extremely important was generally above 80%. (See Figures 2a, b and c). These results indicate that the experts surveyed believe that the WHO listed determinants of health are relevant in the context of high-performance athlete health. However, they do not tell us why the experts believe these to be important or their perceived relative importance. Additionally, these results do not provide any insight into the experts' understanding of each determinant and their possible interactions.

It is possible that the high level of perceived relevance attached to behavioural risk factors may be attributable to the high percentage of sports and exercise psychologists within the survey panel, who have exposure to behavioural theories of health. This will be discussed in more detail when considering the responses to the qualitative question addressing this issue.

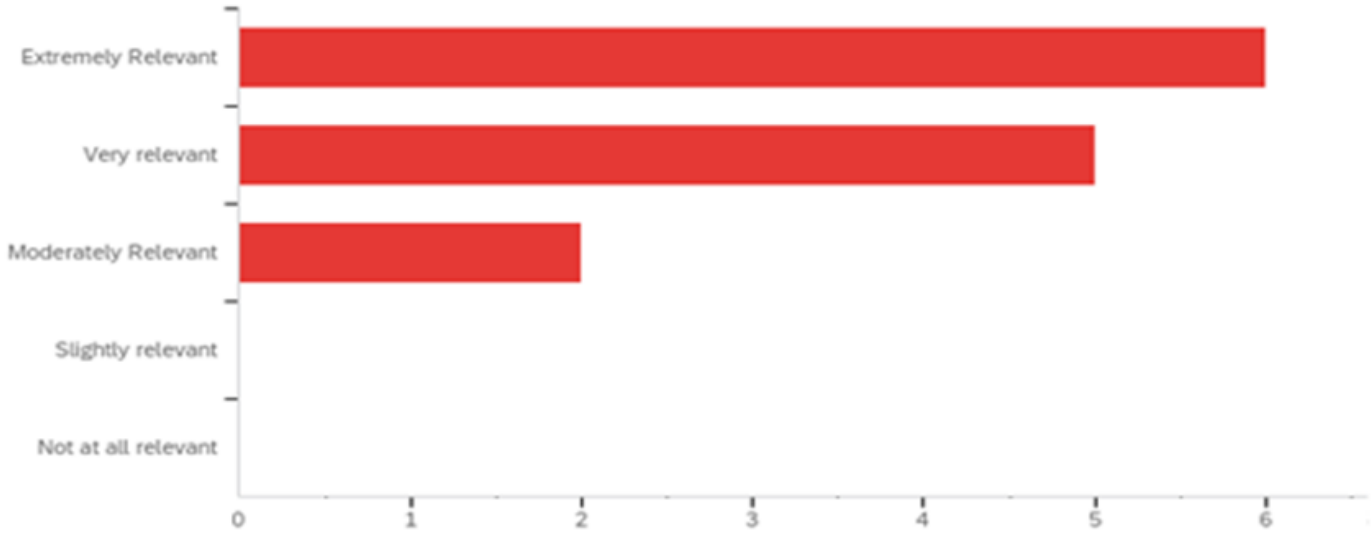

Figure 2a;- Relevance of SDOH

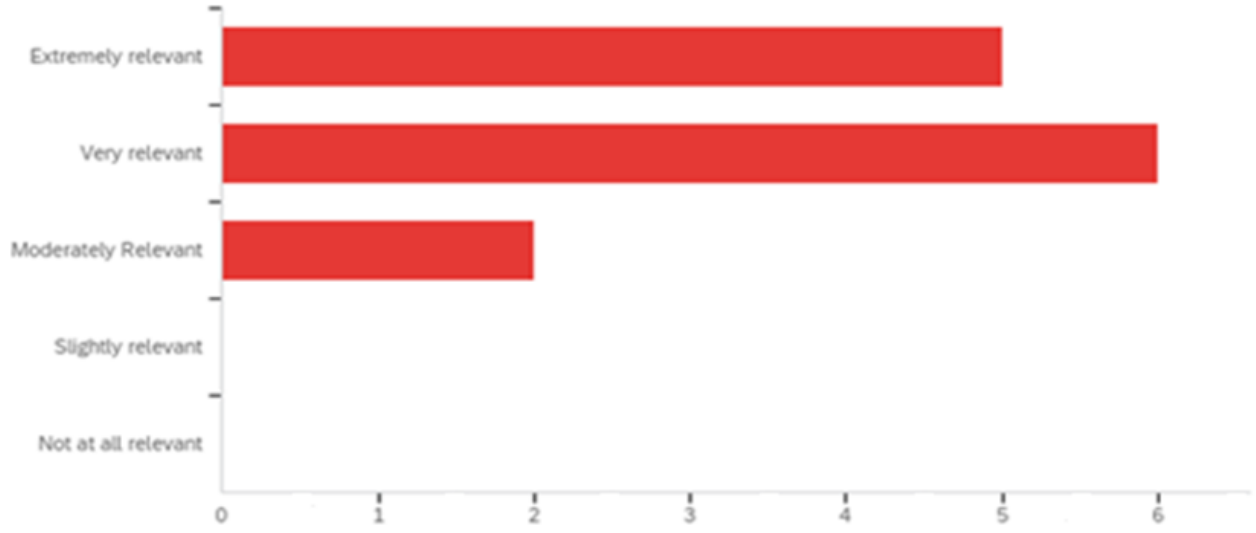

Figure 2b:- Relevance of biomedical risk factors

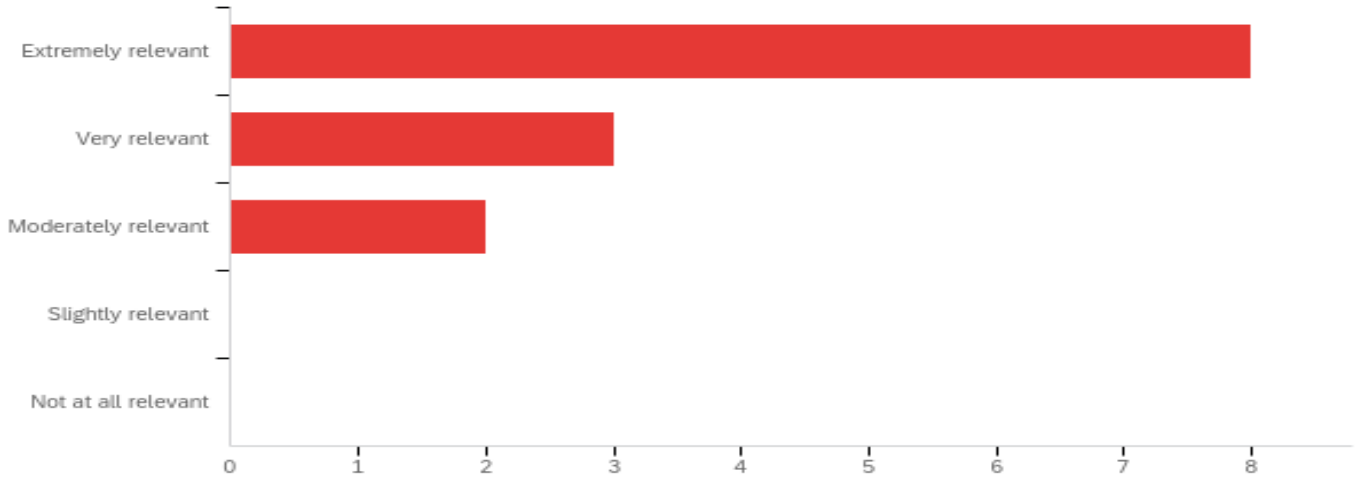

Figure 2c:- Relevance of behavioural risk factors

Questions 7-9 asked participants to identify the perceived importance of athlete/coach/sports administrator health literacy in ensuring optimal high-performance athlete health. Health Literacy can be defined as the ability of an individual to access, understand, and utilize appropriate information to manage their health better (Bae & Yoon, 2021). Responses are provided graphically in Figures 3 a, b, and c. These responses were of particular interest. The high level of importance attached to athlete and coach health literacy was somewhat expected. However, the high level of importance placed on sports administrator health literacy was more significant than expected. It appears that the participants recognized and understood the emphasis that needs to be placed on health literacy at both individual and organizational levels in applying the WHO definition of health and its determinants to the management of high-performance athlete health. (Cho et al., 2020).

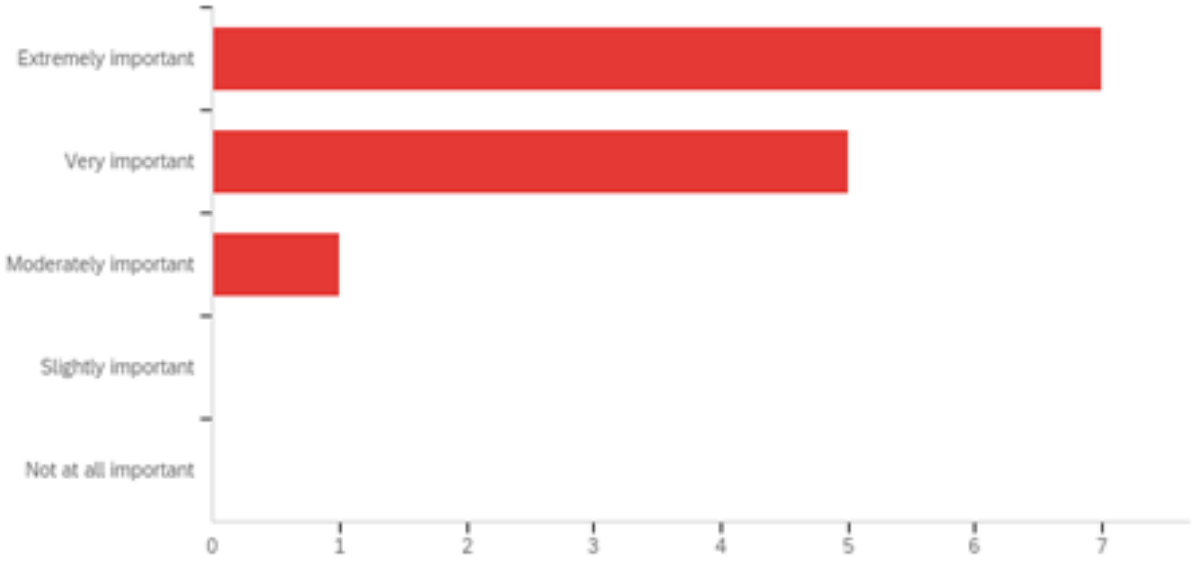

Figure 3a: Importance of athlete health literacy

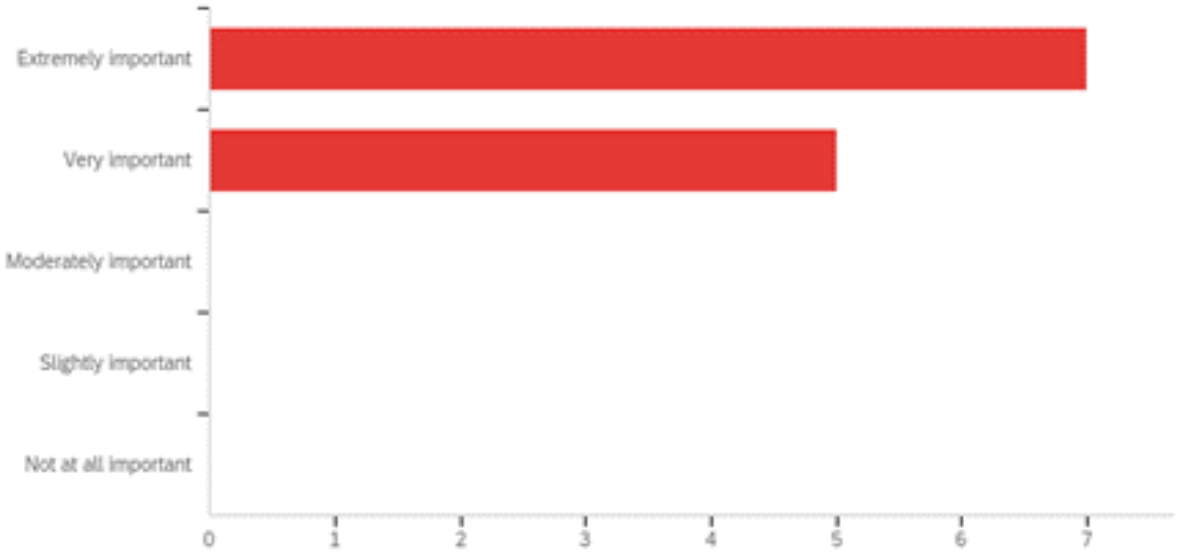

Figure 3b: Importance of coach health literacy

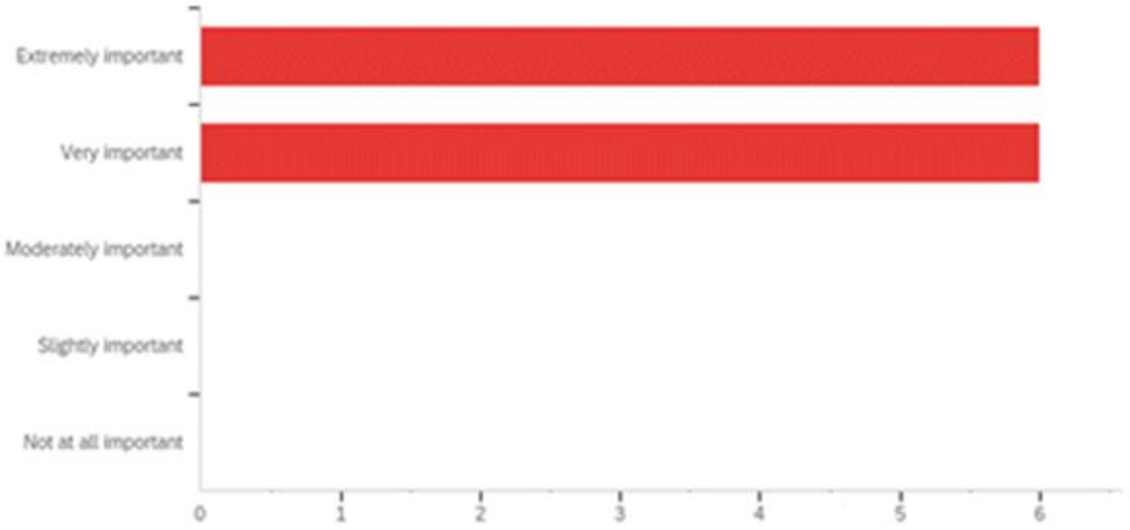

Figure 3c: Importance of high-performance sports administrator health literacy

Questions 10-12 addressed the perceived relevance of a health literacy environment for athletes/ coaches/ sports administrators in managing high-performance athlete health. The health literacy environment describes how health information and services are provided and how easily they can be accessed or used (Rowlands et al,.2012). The results from this portion of the survey are illustrated graphically in Figures 4 a, b ,and c.

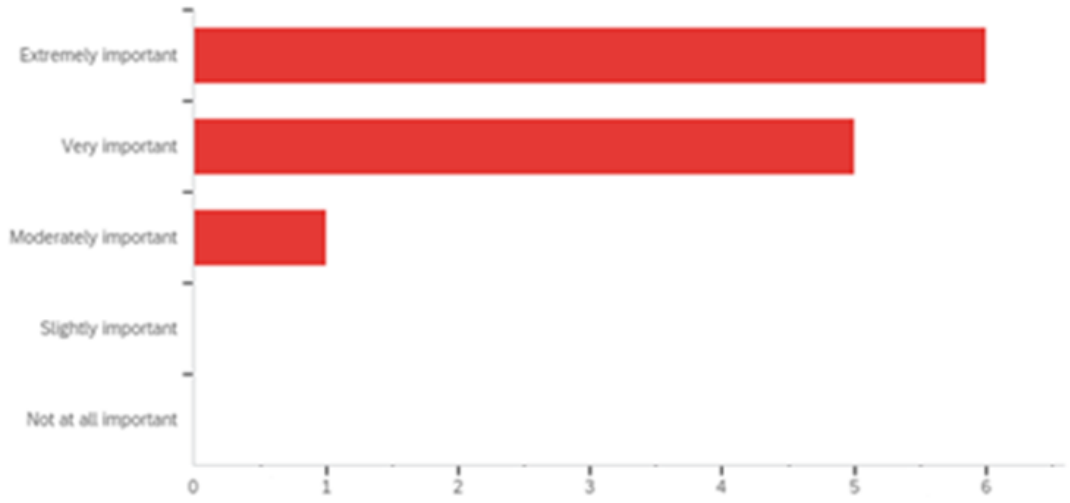

Figure 4 a: - Importance of a health literacy environment for high-performance athletes.

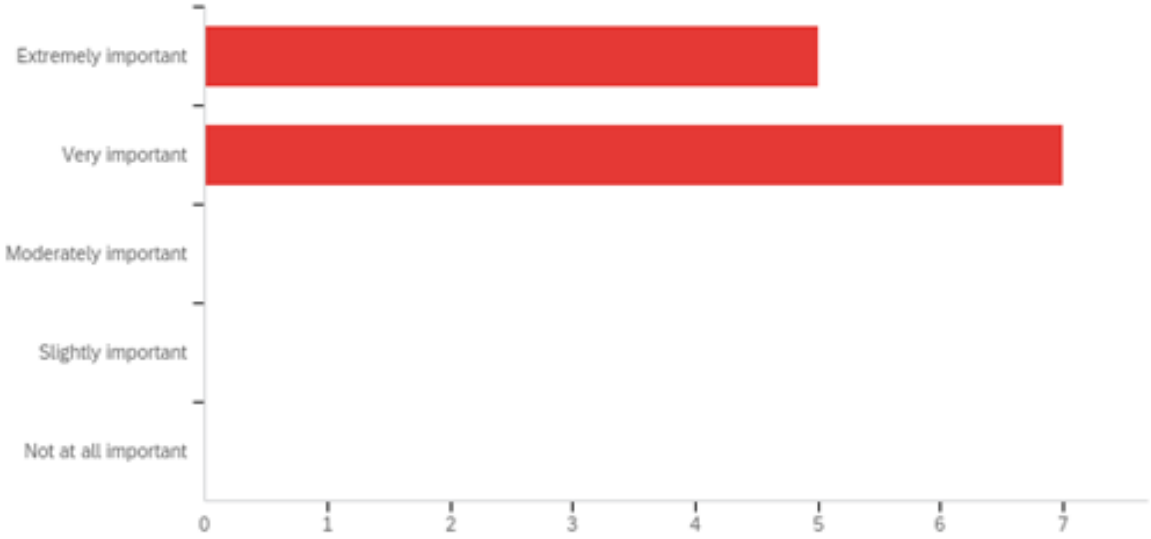

Figure 4 b: - Importance of a health literacy environment for coaches.

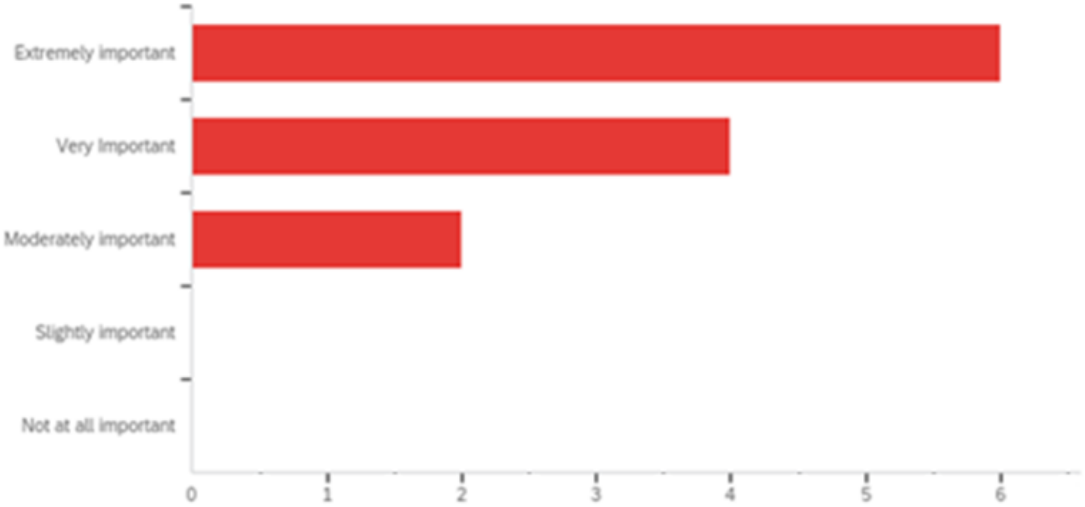

Figure 4 c: - Importance of a health literacy environment for sports administrators.

Generally, the participants valued the importance of the health literacy environment, particularly for coaches. Whilst the responses regarding the health literacy environment for athletes and coaches were in the range expected, the responses

indicating that most participants regarded health literacy environment for high-performance sports administrators as being either extremely or very important were unexpected and are considered a significant finding. A recent paper by Gorczynski et al. (2021) reported on the prevalence of mental health challenges in elite athletes and the level of concern expressed about this issue, by athletes, coaches, and sports administrators. Additionally, these authors discussed seven recent position statements aimed at preventing and treating mental health symptoms and disorders in elite athletes, by addressing both individual and systemic factors. Each statement was reported to have included a recommendation to utilize education-based interventions, specifically those with a focus on increasing mental health literacy, including 'concepts related to knowledge of effective self-management strategies, challenging mental disorder stigma, awareness, and use of mental health first-aid to assist others, and the facilitation of help seeking behaviors'. (Gorczynski et al, 2021)

These authors were unable to provide clarity as to how improved mental health literacy can address the specific needs of each individual high-performance athlete, but also addressed cultural and environmental influences that facilitate prevention and treatment of mental health challenges or disorders. They concluded by proposing strategies for best practice and research in mental health literacy within elite sport. The themes identified and issues discussed in their paper are consistent with the premise of this research project. Their findings and subsequent recommendations are also consistent with the findings of this study.

Of additional interest was the limited importance attached to the health literacy environment for athletes by one participant. This interest will be discussed when addressing the questions that require a qualitative response.

Qualitative Responses

Question 2 addressed the topic of the perceived relevance and applicability of the WHO definition of health to high-performance athlete health. It asked participants to explain the reasoning behind their response to Question 1. A representative sample of responses is provided in Table 2 (p 54). Whilst there was a high level of consensus regarding the applicability of the WHO definition of health to high-performance athlete health, it is evident from the responses to this question that there was a diversity of thinking behind the responses to Question 1. The following comments demonstrate this diversity: ‘’I think that it has relevance, but it is important to note that the training loads and other characteristics of high-performance sport necessarily mean that HP athletes will, at times, be tired, sore (and) subject to pressure. It is aspirational rather than realistic” and “This is the accepted definition worldwide, and experience says that it holds equally well here’’. A detailed list of responses is provided in Table2. This diversity of reasoning was explored more deeply whilst undertaking thematic analysis and will be discussed in detail at the end of this chapter. Additionally, the limitations associated with the style of data collected (open-ended questions) is acknowledged, as it does not guide the participants to consider this problem from a common perspective, thereby creating a diversity of responses, which can be difficult to place into identified themes.

Question	Responses

Please explain your response relating to the relevance of the WHO definition of health.	‘‘We often get caught up in the focus of performance and physical health and lose sight of the broader health picture’’. ‘‘This is the accepted definition world-wide, and experience says that it holds equally well here’’. ‘All of the WHO factors are significant in the context of the athlete's OVERALL health. but the degree to which different factors contribute to the IMMEDIATE health of the athlete may vary’’. “I think that it has relevance, but it is important to note that the training loads and other characteristics of high-performance sport necessarily mean that HP athletes will, at times, be tired, sore (and) subject to pressure. It is aspirational rather than realistic’’.

Table 2: - Sample of responses providing reasoning regarding the applicability of the WHO definition of health

Similarly, Question 6, which addressed the perceived relevance and applicability of the WHO listed determinants of health, invited the participants to explain their responses to the questions regarding the SDOH, biomedical and behavioural risk factors. The responses to this question were diverse and ranged from the comment that “All three are essential” to the more complex statement that 'It is impossible to separate external factors as not impacting overall well-being and performance. So, for example, if an athlete has issues or concerns away from sport, it will show up in performance, and also physical/mental health can be impacted” and the more specific statement that “Social determinants are most relevant”. This diversity of responses indicated that some participants possessed a high level of insight into the nature, interplay, and priority of the WHO determinants of health and that some lacked this level understanding. An indicative sample of responses is provided in Table 3.

Question	Responses
Please explain your response relating to the relevance of the WHO listed determinants of health.	‘All three are important. To some extent biomedical risk factors need to be well understood and managed. The social and behavioural determinants are modifiable and probably have a greater amplification over some of the biomedical factors.’ ‘All factors are important but may vary in their specific importance given changing context of the instantaneous circumstances that the athlete finds themselves in’. ‘It's impossible to separate out external factors as not having an impact on overall well-being and performance. If an athlete has issues or concerns away from sport it will show up in performance and also physical/mental health can be impacted. Elite athletes are heavily scrutinised, and will often try to cover up issues, but this can make the longer-term effect on health, well-being, and performance worse’ ‘Social determinants are most relevant because they determine the degree to which the athlete has access to the resources/environment needed to train optimally and compete at the relevant level. Any realistic discussion of athlete health needs to recognise that at some times, HP athletes straddle a fine line between health and problems.’ ‘I am not 100% sure what the researcher’s perception of social determinants is, or behavioural risks.’

Table 3:- Examples of rationales provided for responses to Q3-5

Finally, Question 13 asked participants the same question concerning the issue of health literacy and the health literacy environment, which were addressed in questions 7-12. Responses included comments such as: ”My response would be slightly different for each group above”, indicating that health literacy and the health literacy

environment were not considered equally important for each of the nominated groups in the development and maintenance of high-performance athlete health by this respondent, and “Everyone needs to be on the same page (coaches, athletes, and administrators”. Additionally, another participant recognised that “Importantly, staff, both medical and sport science in high-performance environments have a very poor understanding of these. We cannot overlook the reality that medical and health staff poorly understand population health and epidemiology.” This comment supported one of the conclusions reached following analysis of participant responses. It may be that some high-performance sport healthcare providers lack adequate training in and understanding of the epidemiological factors influencing high-performance athlete health, other than those related to physical participation in training and competition (Hapeta et al., 2019; McCoy, 2012; Purcell et al., 2019). Furthermore, there is a notable absence of literature addressing this issue, other than that related to either the specific holistic health challenges faced by Indigenous athletes or the factors contributing to athletes developing mental health problems. Finally, one participant commented that “health is complex, so it is essential that multiple components and levels within the social-ecological framework are on the same page when it comes to mental health and well-being; literacy is a critical foundation” suggesting that high-performance athlete health is influenced by a diversity of, sometimes competing, factors which requires a high degree of insight to ensure that all influences are recognised, considered and managed to ensure optimal health management for the athlete.

Conversely, another participant commented that “Having the environment supporting high levels of literacy is ideal, but I believe that high individual levels of

literacy are probably more important because a well informed and determined athlete and coach will probably still be able to navigate the environment regardless.”. This can be interpreted as a belief that an athlete can be healthy within an environment, which is not structured to optimise this. This may be correct, but it is also likely to be a much more complicated task and impossible for an inexperienced high-performance athlete unless a highly literate coach supports them. A representative sample of responses is provided in Table 4 (p. 62).

Question	Responses
Please provide an explanation for your response to the previous questions regarding health literacy	‘My response would be slightly different for each group above. In principle, public health campaigns seek to raise awareness of these factors…. my responses are related to whether we need to make all these groups literate or we change the system to ensure the factors are addressed’. ‘Importantly, staff, both medical and sport science in high performance environments have very poor understanding of these, and so while it’s important for coaches and administrators to have this knowledge we cannot overlook the reality that medical and health staff poorly understand population health and epidemiology.’ ‘While the focus of health literacy education is often the end user in this case the athlete, within sport both coaches and team management / team culture are critically important to athlete attitudes and behaviours.’ ‘Everyone needs to be on the same page (coaches, athletes, and administrators), and have a thorough understanding of what it takes, and the strategies required, for optimal athlete health and well-being (and performance success). ‘Having the environment supporting high levels of literacy is ideal but I believe that high individual levels of literacy are probably more important because a well informed and determined athlete and coach will probably still be able to navigate the environment regardless.’ ‘Health is complex, so it is essential that multiple components and levels within the social ecological framework are on the same page when it comes to mental health and well-being; literacy is a critical foundation’.

Table 4:- Examples of rationales provided for responses to Q 7-12

In the context of high-performance sport, health literacy and the health literacy environment are particularly relevant when considering organizational policies and procedures and their potential impact on high-performance athlete health. It was also of interest to gain a level of insight into the extent of participants' understanding of these issues, as demonstrated by the following comments:

- "Health is complex so it is essential that multiple components and levels within the social ecological framework are on the same page when it comes to mental health and well-being; literacy is a critical foundation."
- "While the focus of health literacy education is often the end user, in this case the athlete, within sport both coaches and team management / team culture are critically important to athlete attitudes and behaviours."

These comments indicate an understanding of the role of coaches in the development and maintenance of high-performance athlete health. Additionally, they reflect an emerging consensus that sports administrator health literacy is important, particularly regarding the development and maintenance of organizational culture, which was identified as being of critical importance to athlete health. The work of multiple researchers supports this (Duffy et al., 2021; Gorczynski et al., 2021; Heard et al., 2020; Heward et al. 2007; Horn, 2019). Amongst the listed papers, Duffy, et al explored how coaches' mental health literacy and role perceptions would relate to their capacity to provide helping behaviours to young high-performance athletes with mental health challenges. Their results suggest that developing coaches' knowledge, competence, and beliefs may enable them to engage more effectively in these helping behaviours,

within the sporting environment. Additionally, Heward and co-authors discuss capacity building, with regard to health promotion, at individual and organizational levels, a process which requires the delivery of appropriately developed and directed education programs.

This recognition of the need for both coach and sports administrator health literacy can be understood to reflect an appreciation of environmental influences on athlete health. It also addresses the proposition that high-performance athlete health is complex and subject to many intersecting influences as suggested by the following comment: It's impossible to separate out external factors as not having an impact on overall well-being and performance. If an athlete has issues or concerns away from sport it will show up in performance and also physical/mental health can be impacted". Influences that occur within the sport itself must also be considered (Drew et al., 2017b; Lienhart et al., 2019; Palmer-Green et al., 2011; Schneider et al., 2019). For example, "Everyone needs to be on the same page (coaches, athletes, and administrators), and have a thorough understanding of what it takes, and the strategies required, for optimal athlete health and well-being (and performance success)".

These responses demonstrate an awareness of the role of the sporting organization, its coaches, and administrators in creating and managing these environments and the subsequent impact of those on the athlete's health. They also indicate an awareness of the potential health impacts of the athlete's broader socio-ecological environment .

Regarding the participant who did not attribute the same importance to athlete health literacy as the rest of the survey participants (Figure 3a, p 51), this response may

indicate a limited understanding of the importance attributed to health literacy. It may also suggest that this participant considers high-performance athletes to be 'receivers of health services and advice' rather than active participants in their own health management.

Delphi Survey Round 2

As previously discussed, the second round of the Delphi survey repeated the quantitative questions asked during Round 1. Additional information regarding each individual participant's Round 1 responses for each question were also provided, along with statistical information regarding the diversity of de-identified group responses from the first round of the survey. The results for Question 1, which addressed the perceived relevance and applicability of the WHO definition of health, have been interpreted as indicating a shift toward a higher level of consensus regarding the relevance of the WHO definition of health and its determinants to the health of Australian high-performance athletes (Figure 5).

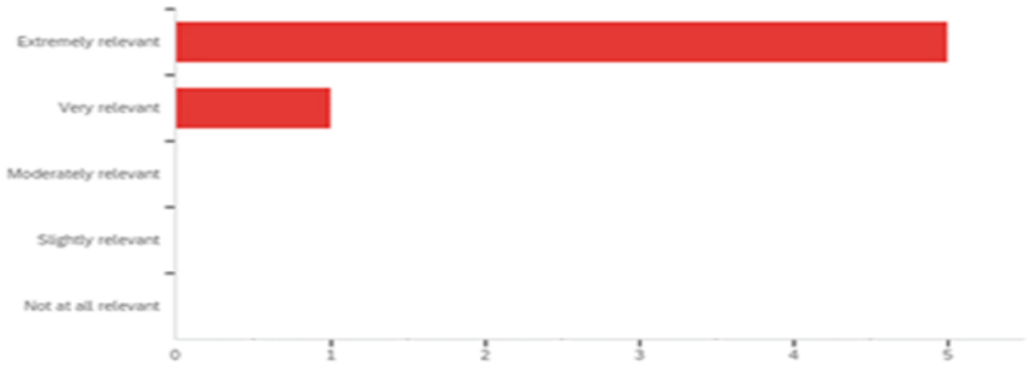

Figure 5:- R2 Q1 responses

It is interesting to compare this result with the same question for Round 1 (Figure 1 p 48), in which only 57% of participants identified the definition as being extremely relevant, as compared to 80% in this round. We acknowledge that although this has been interpreted as a shift toward a higher level of consensus, it may also reflect the reduction in participant numbers for the second round. Additionally, it may indicate that those who did not rate it as highly in Round 1 chose not to participate in the second round of the Delphi survey.

The decision to interpret the responses to Question 1 as a shift toward a higher level of consensus is supported by the responses to the questions regarding the relevance of the SDOH and the importance of health literacy/the health literacy environment for sports administrators to high-performance athlete health (Figures 6 & 7). 100% of participants in Round 2 rated the SDOH as being either very or highly relevant. Again, 100% of participants identified sports administrator health literacy as being either very or extremely important, confirming the findings from Round 1. These are considered the most important of the quantitative findings from the Delphi survey as they suggest additional consideration of factors with significant potential to impact on high-performance athlete health, which have not often been discussed in the context of Australian high-performance sport (Drew et al., 2017a; Gorczynski et al., 2021; Register-Mihalik et al., 2017; Sabato et al., 2017; Theberge, 2007).

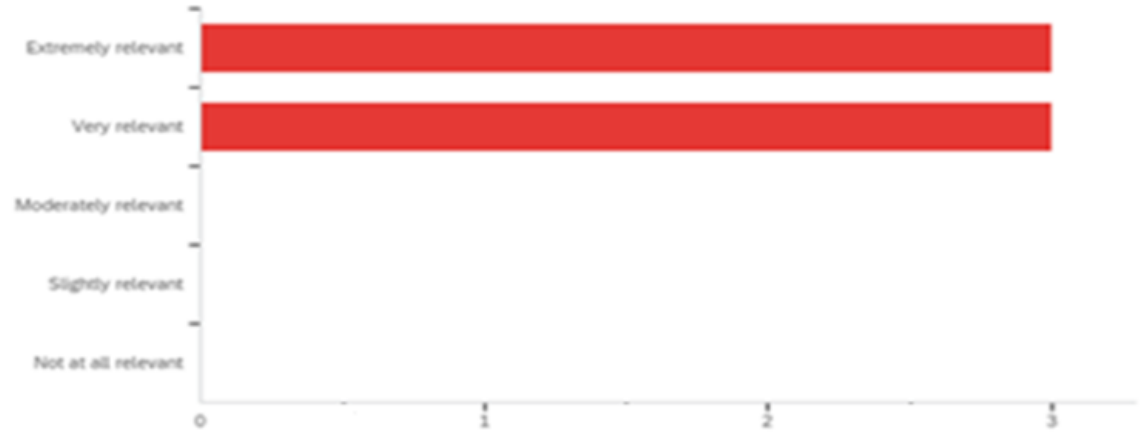

Figure 6:- responses regarding the relevance of SDOH to high-performance athlete health

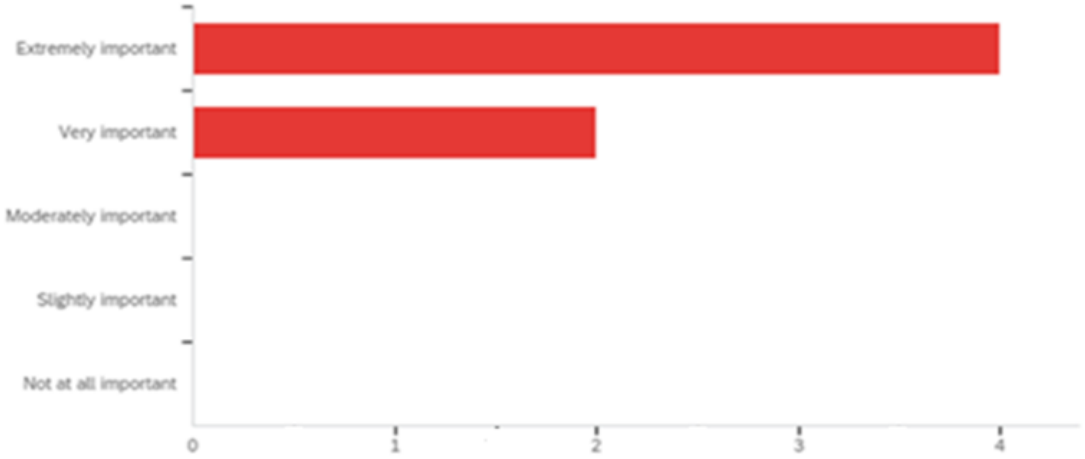

Figure 7: responses regarding the importance of sports administrator health literacy

The responses to the one qualitative question included in Round 2 of the Delphi survey can be understood to support this interpretation of the results from the quantitative questions in this Round. This question asked participants to nominate the questions where they had changed their responses and whether they felt comfortable doing so. This question was considered necessary for establishing the reliability and veracity of the survey findings and identifying a need for and preparedness to

participate in change. A sample of responses is provided in Table 5 (p 64). There was a general acknowledgement of the importance of health literacy, which, as discussed previously, is fundamental to understanding the function of the social determinants of health and the principles of health promotion.

Question	Responses
Q11 If you have changed any of your responses, please tell us which questions you did this for and whether you felt comfortable doing so.	Questions 5 and 6 I changed from Very important to Extremely important….Initially I was thinking that the health literacy aspect was perhaps not as important for the athletes and coaches as for administrators, as administrators are often those in charge of budgets and support for athlete support programs
	….although health literacy may also be able to be developed by athletes and coaches as part of a high-performance program, but if the administrators don't have sound health literacy, then some programs may not even get to the stage where they can be funded and implemented
	Coaches and athletes can have great health literacy but if administrators don't then it becomes difficult to create comprehensive athlete high-performance programs.
	I think the health literacy environment and mindset is very important. Is it the personal responsibility of the athlete or is the administrator who decides on the priority of use of resources and culture that is the key to implementation?
	Questions 7 and 8 …after reconsideration that followed seeing the consensus of responses. I was comfortable to change these upwards as I already saw these as highly important, but also rationalised that not all athletes or coaches necessarily have the capacity of achieving extremely high levels of health literacy despite the benefits this would bring

Table 5:- Sample of responses to qualitative question in Round 2

These responses can also be understood to support the usefulness of undertaking Delphi surveys when exploring issues related to health where there is little available research evidence. The comments regarding the reasoning behind altering responses can then be understood to indicate that participants had comfortably achieved a level of consensus regarding health promotion and the factors that influence this in the high-performance sport environment

Overall summary of the Delphi Findings.

The overall results of the Delphi survey are summarized in Figure 8 (p 65). The culmination of the Delphi saw a consensus among the experts that the WHO definition of health and its determinants were both relevant and applicable. Relevance relates to a general belief that these definitions are important when discussing high-performance athlete health. Applicability relates to an understanding that these definitions could be utilized in planning and delivering athlete healthcare in high-performance sport environments (i.e., change is possible). This suggests that when prompted and provided with a holistic definition of health and its determinants, the experts viewed it as relevant to their professional experiences and understood that these could be applied to the management of high-performance athlete health. This finding suggests a need and desire to broaden our current conceptualizations of athlete health. This finding was derived mainly from the quantitative components. When exploring the qualitative rationales and understandings behind this consensus, varying levels of insight into epidemiology and health promotion were found. Findings also suggest that there are currently possible limitations to the applicability of a health promotion framework based

on the WHO definition of health and its determinants, related to the organisational and operational structures of most high-performance sporting organizations, in addition to how health is viewed by those involved in these organizations. These limitations include that some participants appeared to have a narrow view of athlete health and only discussed it in a sport-centric context. More broadly, the qualitative responses indicated that some participants failed to consider the health influences of the athlete's life outside their sporting involvement when commenting on their health (i.e., failing to recognize that athletes are more than just athletes). As such, the findings point to some limitations in understanding these issues that may reflect an industry-wide deficiency that could hinder the rollout of an Australian high-performance athlete health promotion framework.

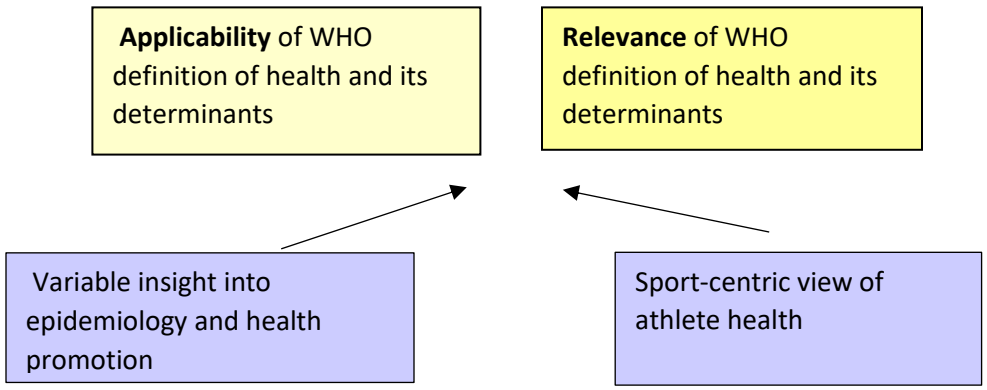

Figure 8: - Illustration of the themes which emerged following thematic analysis

Each of the identified themes will now be discussed individually.

Variable insight into epidemiology and health promotion

Participant responses demonstrated varying degrees of insight into the principles of epidemiology, population health and health promotion, as evidenced by the following

comments regarding the WHO definition of health and its determinants: “This is the accepted definition worldwide, and experience says that it holds equally well here”, “I believe the whole person (individual) cannot be separated from the performer, i.e. all aspects of their being/state matters – which I think is captured by The World Health Organization (WHO) definition which is outlined as a state of complete physical, mental and social well-being.”, and “It is aspirational rather than realistic” are indicative of the range of responses. Finally, one participant commented that “I am not 100% sure what the researchers perception of social determinants is, or behavioural risks”, despite these terms having been explained in detail in the information provided to participants, which may suggest a lack of familiarity with the terminology in this context. It was of significant interest to discover that highly qualified and experienced practitioners had such apparent differences in their awareness of these issues, with some experts demonstrating limited insights into broader epidemiological considerations regarding high-performance athlete health. The following comments can be understood to be examples of this limitation:

> I think that it has relevance, but it is important to note that the training loads and other characteristics of high-performance sport necessarily mean that HP athletes will, at times, be tired, sore (and) subject to pressure. It is aspirational rather than realistic’’.
>
> “To some extent biomedical risk factors need to be well understood and managed. The social and behavioural determinants are modifiable and probably

have a greater amplification over some of the biomedical factors”

Analysis of participant responses using a socio-ecological framework suggested that SDOH and behavioural determinants were not well-understood or fully considered by some participants, as suggested by the following comment:

“All factors are important but may vary in their specific importance given the changing context of the instantaneous circumstances that the athlete finds themselves in”

When considered through a socio-ecological lens, the following comments were considered to demonstrate a higher level of insight into the SDOH and behavioural risk factors.

“It's impossible to separate out external factors as not having an impact on overall well-being and performance. If an athlete has issues or concerns away from sport it will show up in performance and also physical/mental health can be impacted”

“Everyone needs to be on the same page (coaches, athletes, and administrators), and have a thorough understanding of what it takes, and the strategies required, for optimal athlete health and well-being (and performance success)”

Other experts explicitly recognized and identified this limitation, suggesting some awareness of its potential impact on the health management of high-performance athletes:

> “Importantly, staff, both medical and sport science in high performance environments have a very poor understanding of these, and so while it is important for coaches and administrators to have this knowledge, we cannot overlook the reality that medical and health staff poorly understand population health and epidemiology.”

Sport-centric view of athlete health

The majority of participants demonstrated a tendency to take a limited view of athlete health and appeared to consider it primarily in the context of sports-specific risk factors, as demonstrated by the following responses: "I think that it has relevance, but it is important to note that the training loads and other characteristics of high-performance sport necessarily mean that HP athletes will, at times, be tired, sore (and) subject to pressure" and "All factors are important but may vary in their specific importance given changing context of the instantaneous circumstances that the athlete finds themselves in". These comments may be interpreted as perceiving that participation in high-performance sport is the athlete's primary health risk factor. These views also appear to be consistent with how discussions regarding high-performance athlete health are often framed in the academic literature (Clement et al., 2013; Drew et al., 2017a; Edouard et al., 2013; Forte, L, 2020; Heiku et al., 2018; Jones et al. 2018; Moseid et al., 2018; Raysmith & Drew, 2016; Rice et al. 2016), with a primary focus on the unique health stressors associated with participation in high-performance sport.

Others took a broader view and demonstrated a perception of athletes as more than just athletes. They considered factors other than physical participation in sport as potential high-performance athlete health risk factors. This broader consideration of

health influences beyond those specifically related to participation in sport was evident in the following responses: "We often get caught up in the focus of performance and physical health and lose sight of the broader health picture" and "It is impossible to separate out external factors as not having an impact on overall well-being and performance. If an athlete has issues or concerns away from sport, it will show up in performance, and physical/mental health can be impacted". This consideration of the possible influence of determinants of health beyond those specifically related to participation in high-performance sport can be understood to indicate a more in-depth appreciation of the complexity of high-performance athlete health and its determinants, a factor not often discussed in the academic literature.

High Perceived Relevance of WHO definition of health and its determinants

Those participants who demonstrated greater insight into epidemiology, population health and health promotion were most likely to identify the WHO definition as being relevant, as evidenced by the statement ‘’This is the accepted definition worldwide, and experience says that it holds equally well here’’. Alternatively, as mentioned previously, one participant suggested ‘’I think that it has relevance, but it is important to note that the training loads and other characteristics of high-performance sport necessarily mean that HP athletes will, at times, be tired, sore (and) subject to pressure’’. The qualifications in this statement appear to convey a perception that high-performance athlete health is unique and cannot be adequately described by a generic, holistic health descriptor, therefore missing one of the significant strengths of the WHO definition of health, in that it allows for individual context.

High Perceived Applicability of WHO definition of health and its determinants

Those participants who felt that the WHO definition was highly relevant generally indicated that it was applicable, with most indicating that this could be achieved through improved health literacy, with a particular focus on high-performance sports administrators. Relevant comments include: "Having the environment supporting high levels of literacy is ideal" and "although health literacy may also be able to be developed by athletes and coaches as part of a high-performance program, but if the administrators don't have sound health literacy, then some programs may not even get to the stage where they can be funded and implemented".

From a population health and epidemiological perspective, the SDOH are prioritised in health promotion programs. However, some participant responses initially indicated a lack of awareness of the social determinants' significant role in the development and maintenance of health (Stellefson et al., 2019; Talbot & Verrinder, 2014; Wold & Mittlemark, 2018). Alternatively, one participant commented that: "Social determinants are most relevant because they determine the degree to which the athlete has access to the tools/resources/environment needed to train optimally and compete at the relevant level, as well as the relative absence of distractions or deterrents from making full use of opportunities", suggesting a level of insight into health promotion principles regarding the impact of improved health literacy in understanding the role of the SDOH. Adopting an approach consistent with this insight may potentially contribute to a positive change in the understanding and management of high-performance athlete health.

Theoretical Integration and Recommendations based on the Delphi

This section discusses the findings in the context of the existing literature to inform recommendations for developing a framework for elite athlete health. In addition, the findings illuminate how the participants understand high-performance athlete health and the reasoning that informed their responses regarding the relevance and applicability of the WHO definition of health and its determinants to this population group.

Part of the complexity of high-performance athlete health is that regardless of background, age, gender, ethnicity, sport, or years in the system, high-performance athletes usually train and compete very close to the upper limits of physical, physiological and psychological health capacity, and consequently spend a significant amount of time very close to, or exceeding, their threshold for failure, as described by Gabbett (2016), and others (Balk & Englert, 2020; Drew et al., 2017a & b; Raysmith & Drew, 2016; Schneider et al., 2019). It is possible that this challenge could be effectively managed through improved organisational and individual health literacy, as suggested by the findings of our research. This would impact the health-promoting environment of the organisation positively. The experts participating in this study appeared to understand this challenge and frequently referred to a need for improved health literacy amongst the identified groups within high-performance sport as a means of addressing this. For example, one expert commented “health is complex, so it is essential that multiple components and levels within the social ecological framework are on the same page when it comes to mental health and well-being; literacy is a critical foundation”.

High-performance athlete health may currently be difficult to manage because the most common healthcare model in Australian high-performance sport has usually been reactive to the health needs of athletes (Hurley, 1991). Under such arrangements, healthcare professionals often spend their time managing athlete illnesses and injuries around the ongoing pressures for high-performance athletes to participate in demanding training and competition schedules (Dijkstra et al., 2014; Palmer-Green et al., 2014). Additionally, they have not always been routinely engaged in the daily training environment where they would have the opportunity to engage proactively with athletes, coaches, and others on issues related to high-performance athlete health (Dijkstra et al., 2014; Palmer-Green et al., 2014).

A possible solution to this problem has been proposed by Wells et al. (2020), who suggested the appointment of a core management team (CMT), including personnel such as sports scientists and coaches, to coordinate the management of high-performance athletes with disordered eating. This concept could potentially be expanded to encompass all aspects of the health management of every athlete participating in a particular program. They also highlighted the need for effective and timely communication in managing these athletes, something that is extremely difficult when health service providers are not co-located with others in the CMT. Additionally, Thistlethwaite (2012) pointed to the understanding that delivering complex health care requires a team-based and collaborative approach underpinned by effective communication. Improved organisational and individual health literacy would underpin such arrangements and facilitate effective communication.

High-performance athlete health and healthcare may be complex because high-performance athletes often lack the health skills or capacity to ensure optimal personal management of their health whilst training and competing at the highest level (Abbott et al., 2005; Chamorro et al., 2016; Maher, 2007). As an example, athlete development programs have been described as a continuum that begins with the acquisition of movement skills through to lifelong engagement and proficiency, with no reference being made to the development of individual skills in health management (Clearinghouse for sport, 2020). Again, this problem could be effectively addressed with improved individual and organisational health literacy. The management of athlete health is optimised in sporting environments that are structured to include health promotion as part of their usual operation, as suggested by the findings of the current investigation.

These issues may be compounded by a limited understanding of the principles of epidemiology, population health and health promotion (Baird, 2002). This limitation could be effectively addressed by the implementation of additional training in these areas for high-performance sport healthcare providers, something that has recently been addressed by the AIS, which has partnered with the University of Canberra in delivering a Master of Applied Clinical Epidemiology program, with a specific focus on the epidemiology of high-performance sports injuries and illnesses. This can be described as exploring and seeking a deeper understanding of the distribution and determinants of sports injuries and illnesses in the high-performance athlete cohort. It is proposed that an improved understanding of epidemiology has potential to support the development of a health promotion approach to high-performance athlete healthcare.

Adopting such an approach should facilitate the identification and implementation of appropriate holistic preventative and management strategies, which is consistent with the premise of this research.

High-performance athlete health and healthcare may be considered complex because there has been little consideration of the complex interactions and subsequent health impacts of broader cultural and social influences, which appear to have not usually been considered as significant influencers of high-performance athlete health (Brown et al., 2020). This is consistent with another of the identified themes: there is a risk of a focus on sport-specific health issues and failing to adequately consider the impact of broader health influences, particularly the SDOH, on high-performance athlete health. A recent paper by Thomas et al. (2019) has explored this issue while exploring factors identified as influencing the early development of world-class Caribbean track and field athletes. Key factors identified were (1) a conducive sporting environment, (2) a functional social support network, and (3) appropriately directed organisational input. It is interesting to note the inclusion of and priority given to a functional social support network in addition to a supportive sporting environment, as athletes completed this survey. This is consistent with recognising the impacts of the broader social environment on the athlete and acknowledging the need for a supportive sporting environment, both of which have been identified as essential contributors to high-performance athlete health in the current research. Perhaps the athletes recognised something which sporting organisations have not? Additionally, each factor identified relates to different aspects of the athlete environment, which is consistent with the application of SDOH. The importance of cultural and social environments to the holistic

health of the individual has been clearly articulated by the WHO, as has been previously described and is relevant to the findings of the Delphi, which identified a tendency to get caught up in issues related to physical health.

High-performance sporting environments can be highly insular, as organisations seek to develop and nurture professional/elite high-performance athletes in environments that have been controlled and optimised for that outcome (Dijkstra et al., 2014). It is possible that this may result in a failure to appreciate that high-performance athletes are also members of other population cohorts, which have their own recognised health risks. For example, athletes with a disability, athletes from ethnically diverse populations, or those from socially and financially disadvantaged backgrounds, as well as those whose sporting commitments mean they are separated from family and their close social support network, may require this additional consideration of their health risk or capacity profiles (Berki et al., 2020; Colgan, 2007; Light et al., 2021; Mccoy, 2012; Neesham & Garnham, 2012;). Each identified sub-population to which an athlete also belongs is associated with known health risks to the individual, in addition to those associated with their athlete identity. This is consistent with the concept of intersectionality, as previously discussed. These holistic health risks should then be considered in the health development and management of those athletes. Adopting a less insular and introspective approach can create space for considering and addressing a more comprehensive range of high-performance athlete health influences could then be possible, which is consistent with my research findings.

Describing the WHO definition of health as aspirational rather than realistic may indicate a mindset fixed in the previously identified traditional reactive healthcare model,

in which illness and injury are understood to be a normal part of the high-performance athlete experience (Raysmith & Drew, 2016). It also fails to acknowledge that it is unlikely that an athlete will produce exceptional performances, with a well-managed risk of developing either a subsequent injury or illness, if they have not initially developed the holistic health characteristics required to support that performance (Drew et al., 2017(b); Kennedy et al., 2020).

The high level of relevance attached to behavioural risk factors reported by the participants in the Delphi may be attributable to the high percentage of sports and exercise psychologists within the survey panel. They are expected to have exposure to or expertise in behavioural health theories. However, it may also indicate one of the identified themes, being reflective of a limited understanding of the principles of both epidemiology and health promotion. In this circumstance, the possibility is that some of the experts have not fully appreciated the pre-eminent role of the SDOH as the 'causes of causes', with identified impacts on both biomedical and behavioural risk factors.

Additionally, in this environment, when theoretical discussions regarding social determinants of health are conducted, there can be a tendency to focus the discussion on outliers, or those identified as having problems (Aunola et al., 2018; Brown et al., 2020; Clement et al., 2013; Coakley, 1992.) It is not surprising then that high-performance sport healthcare experts who may lack expertise in the epidemiology of illness and injury may fail to consider the influence of factors such as organisational culture, ethnicity, socio-economic status, or life before and outside high-performance sport as social determinants of health. It is worthwhile noting that, increasingly, these factors are considered in the management of illness and injury in mainstream

healthcare (Cho et al., 2020; Deatrick et al., 2019; Farrington et al., 2015; Grandes et al., 2008; Talbot & Verrinder 2014).

It is concerning when considering the development of a theoretical health promotion framework for Australian high-performance sport, to discover the apparent limited exposure of some expert high-performance sport health practitioners to the principles underpinning population health and its promotion. However, given the previously identified usual arrangements for high-performance athlete health management and healthcare delivery, it is not surprising. For example, in an environment that largely uses a biomedical healthcare model and is primarily structured around treating and managing existing illness and injury, it is unlikely that one will need to develop expertise in the disciplines of epidemiology, population health and health promotion to complete the requirements of one's role. The findings suggest that there is a need for change, with some initial insights as to how this could occur provided by the data related to the importance of health literacy and the health literacy environment. Cho et al. (2020) assert that health literacy on social determinants of health has been recognised as a key to creating better social and physical environments. Because the principles of both health promotion and population health are seen to be broadly applicable, this assertion should also hold true for high-performance athlete health.

There was general agreement regarding the importance of athlete health literacy although, initially, the rationale for this was unclear. There was also an awareness of the importance of coach health literacy in managing athlete health, perhaps because of the recognised link between coach-directed training load and the coach-athlete relationship and athlete health (linking the environment and health).

There was also general recognition of the need for improved organisational health literacy to ensure the funding for and provision of appropriate athlete health programs and services. At the same time, a lack of recognition of the potential impact of sports administrator health literacy on the day-to-day functioning of the athlete environment (organisational culture) and its potential impact on the development and maintenance of high-performance athlete health was evident in the responses of some participants. All of these issues, once again, suggest a specific focus on the current high-performance athlete sport training and competition environments as the primary environmental influences on the health of an athlete, with limited acknowledgement of the potential health impacts of the broader sporting and social environments on the health of the high-performance athlete.

Having identified a need for improved organisational health literacy, none of the participants suggested how this could be achieved. This may be indicative of a limited understanding of the applicability of the principles of population health and health promotion among some participants and how these could be operationalised in this context (Bae &Yoon, 2021; Duffy et al., 2021; Pelikan et al., 2019; Rowland et al., 2012). It may also indicate an acceptance of the status quo. Additionally, it may suggest a belief that change is difficult within the current organisational structure, which may identify the need for structural/organisational change. It may also be that participants were not directly asked to provide suggestions regarding ways in which change may be undertaken, but rather to indicate where change could be implemented. This challenge could be effectively addressed by employing a recognised change model, such as Kotter's 8-stage model (Pollack & Pollack, 2015) aimed at each of the areas in which

the need for change was suggested. Based on the findings of the current study and integrating the approach taken in the AHRC (2021) report, which was written in response to issues related to the abuse of athletes in gymnastics, the following recommendations are made:

- Recommendation 1: Develop a web based educational resource with modules designed for specific groups of users (high-performance sport administrators, coaches and athlete), with different levels of health knowledge.
- Recommendation 2: Create a requirement for healthcare providers who either currently work in high-performance sport or are seeking to do so, to undertake additional education in the fields of epidemiology, population health and health promotion, in line with the program developed collaboratively by the AIS and the University of Canberra.
- Recommendation 3: Encourage targeted groups (sports administrators/ coaches/ athletes/ healthcare providers) to engage in the learning opportunities provided
- Recommendation 4: Publicize the high-performance athlete health promotion framework and each of its elements widely.
- Recommendation 5: Engage sporting organizations in ongoing conversations about high-performance athlete health
- Recommendation 6: Encourage and promote athlete empowerment over their own health.
- Recommendation 7: Create accountability to ensure that sporting organizations facilitate participation in this program.

- Recommendation 8: Review governance practices to identify opportunities for organizational change.

From a socio-ecological perspective, participants did not comment in-depth on policy and procedure. Consequently, this has been identified as a further limitation of this study. It is proposed that this limitation should be addressed by expanding this study to include high-performance sports administrators, in the future.

Each of the listed recommendations is consistent with the findings of the Delphi as well as the application of the principles of both health promotion and population health (pp 6-7). This is because they recommend creating health-promoting environments through education programs targeted toward specific individuals/groups or identified needs, emphasising health literacy and the SDOH. They also point to the need for organisational change as part of this process and are intended to create change at all levels within the organisation under review, which is also consistent with the findings of Delphi. Additionally, they emphasise the need for individual and organisational health literacy to create a health-promoting environment.

Previously identified issues relating to immersion in a reactive healthcare delivery model of healthcare may not necessarily result in a fixed mindset regarding athlete health and its management. However, the capacity to comfortably upgrade responses during the second round of the Delphi survey may indicate a growth mindset. This may warrant another study in the future to assess this using the "Theories of Intelligence Inventory", which classifies participants on a 6-point scale ranging from a fixed mindset (1) to a growth mindset (6) (Jegathesan et al., 2016).

Finally, it is possible that improving health literacy at both organisational and individual levels may be a beneficial strategy (Savitz, 2004) in advancing the management of Australian high-performance athlete health and healthcare. However, despite achieving a high level of consensus over both rounds of the Delphi survey, the lack of clarity regarding how this could be addressed suggested a need for further research.

Study 2

Qualitative Interview Findings

Thematic analysis of the qualitative interview transcripts provided deeper insights into the findings of the Delphi, which have been important in formulating final recommendations from this research. Analyses produced themes relating to the barriers and enablers of a health promotion approach to high-performance athlete healthcare. The following four themes were ultimately identified.

1. Level of understanding of epidemiology and population health
2. Normalizing elite athlete ill health and injury
3. The nature of the relationships between clubs, sporting organisations and their governing bodies (state, national and international).
4. The Australian Context
    a. geographic issues/ remote athletes and coaches
    b. the specific health challenges faced by indigenous athletes
    c. access to appropriate healthcare services within different federal and state-based organisational structures

These themes and a collection of the data extracts that lead to their identification are included in Table 6, (p 90) and are described in detail below.

Theme 1: Level of understanding of epidemiology and population health.

As participants explored the WHO definition of health and its determinants more deeply, most focused on health as a state of being actively well across all health domains and discussed the relationships between the WHO determinants of health in more complex ways. "When I started in this role, I would say I would have rated my health literacy reasonably. I would not have said it would have been an expert, but I would have rated it reasonably highly. It took me about three to four months to realize what little I actually knew." (R). R also said: “The part which resonates with me, significantly, is that it's not just saying someone who's not sick. But someone who is actively well. And my view is that a significant proportion of health clinicians in a range of different disciplines still don't necessarily consider that or even understand that particularly well.” At the same time, some participants appeared to struggle to conceptualize the ways in which these determinants could be applied explicitly to high-performance athletes and appeared to understand them primarily as a broader concept. ‘'Optimal health? For me, my understanding is that people's ability to function well or thrive. So optimal, physical, psychological, emotional well-being is where people are in the best kind of functional state in terms of their health and well-being as possible.'' (F).

Consequently, despite differing levels of insight, broad agreement regarding the relevance and applicability of the WHO definition of health and its determinants to high-performance athlete healthcare remained evident.. Higher levels of insight were most

evident in responses from those practitioners known to have undertaken further studies in epidemiology. Epidemiology developed as a health discipline in the 1970s, and its definition has gradually been evolving since that time. Most recently, it has been defined as the study of the distribution of health and disease in specific population groups and the factors that influence those (Fretot et al., 2018). Insight into the epidemiology of illness and injury in high-performance athletes would significantly benefit the development and subsequent implementation of the proposed health promotion framework. This need was reinforced by L's statement that: "It comes to the individual susceptibility models. If you can change the behaviours and lower the environmental exposure, then that holds". Therefore, higher levels of understanding of epidemiology were associated with greater insight into the relevance and applicability of the WHO definition of health and its determinants, by participants. Consequently, this can be seen to be an enabler of the development of the proposed health promotion framework.

Conversely, lower levels of understanding of epidemiology amongst participants were associated with less insight into the reasons for the relevance of the WHO definition of health and its determinants and have therefore been identified as a barrier to the implementation of the proposed framework. The following comment from F: “I think that there's a baseline sense of optimal functioning for any human being. But obviously, when we're thinking about the context of applying it to particular high-performance situations, depending upon that sport, might require you to increase, maximize, apply certain elements of that in slightly different ways”.

Theme 2: Normalizing elite athlete ill health and injury

An understanding that what optimal holistic health for high-performance athletes looks like will vary between individuals was evident. It also became evident that several participants understood illness and injury to be a routine part of the life of a high-performance athlete. This finding is consistent with the previously identified reactive health care model utilized in most Australian high-performance sport settings. L said, "because undertaking elite athlete activities is by its nature unhealthy" and F said, "when we think about high-performance, often that's actually pushing people or they're pushing themselves to that kind of next level". Additionally, K said, "A lot of them at that young age don't mind testing things out and challenging themselves". This can be understood to be a barrier to implementing a health promotion framework, as athletes are often seen to push themselves to, or beyond the limits of their current health capacity, to either produce exceptional performances, impress coaches, or team selectors. The challenge with this type of approach relates to whether it actually helps or ultimately harms. The possibility is that having achieved performance success, an athlete who is performing at the limit of their health capacity may then become either ill or injured and not be able to maintain that level of performance success.

This potentially compromising behaviour is normalized and taken to indicate the performance mindset required to progress through the high-performance system. This situation also highlights the need to implement the proposed health promotion framework to facilitate and support the development of health-promoting environments, to better manage this performance pressure on athletes while also improving athlete health literacy. To do so would create the benefit of providing all stakeholders with more insight into the potential health impacts of decisions made regarding training and

competition loads. M also stated, "Hard to conceptualize, implement health strategies with multiple stakeholders involved with different levels of knowledge and goals (coaches can be toxic)". This theme leads to consideration of the findings of Purcell et al. (2019), who stated that: 'The International Olympic Committee's (IOC's) recent Expert Consensus Statement on mental health in elite athletes provides a comprehensive analysis of, and recommendations for, the treatment of both high prevalence and more complex mental health disorders in the elite sporting context' (p1) and 'Currently, there is no comprehensive framework or model of care to support and respond to the mental health needs of elite athletes' (p1).

These statements suggest that, despite the recognition of mental health issues being prevalent in elite athletes, at that time, no steps had been taken to address this issue proactively. The most reasonable explanation for this omission may be that athletes exhibiting symptoms of mental health challenges have become normalized, or there is a lack of insight into the need for change. As previously discussed, this reasoning would be consistent with a reactive healthcare system. This limitation can be understood as a barrier, which needs to be overcome to facilitate the development and implementation of the proposed health promotion framework. Analysis of this potential barrier led to additional consideration of other possible impediments to change, each of which would need to be overcome to implement the proposed health promotion framework. Participants frequently identified the organizational structures and operational practices of Australian high-performance sport as possible barriers to implementing a health promotion framework based on the WHO definition of health and

its determinants. Considering these issues led to the identification of the next theme to emerge.

Theme 3: The organization and operation of high-performance sport.

The organization and operation of high-performance sport was identified as a theme in participant responses during the qualitative interviews. R addressed this issue succinctly, saying ‘‘the biggest challenges often come in managing relationships between different stakeholders.” L added a more detailed insight into this issue, saying “you have organizational, and we have multiple organizations, influence on the same individual; either state Institutes, the National Institutes, the state sports, the National Sports, and also international federations involvement.” Further, M stated: - “I think it's challenging, but I don't think it's a huge ask. You have to look broader; if you are really going to improve the health of the system, you've got to look further than the individuals. And most definitely look at the organizational drivers. Often, we focus too much on the individuals and their behaviour and not enough on the system.”

These comments address the complex administrative and operational structures of sporting organizations and identify them as a potential barrier to the implementation of the proposed health promotion framework, a situation which would require strategic management. High-performance sports in Australia do not have consistent structures, operating systems, and governance practices (Sport Australia, 2021). This can be considered a potential barrier to the implementation of the proposed health promotion framework. This suggests an imperative for the proposed health-promotion framework to have operational and structural flexibility to be able to accommodate these differences.. In this case the implementation of a health promotion framework would

require an approach that is flexible to the structures of different sports, without losing focus on its primary intent. Interventions would also need to be appropriately developed, designed, and delivered for specific individuals or groups within an organization. Once again, this approach is consistent with the principles of population health, in that it proposes undertaking interventions at both the individual and organizational level.

Therefore, the development and implementation of the proposed health promotion framework for Australian high-performance must consider and address these challenges. Additionally, it must work within the broader Australian context, which was the next theme identified.

”.

Theme 4: The Australian Context

In some ways, this was the most complex of the themes. It encompasses a range of governmental, structural, social, demographic, and geographic issues that could influence the implementation of a broadly applicable health promotion framework for Australian high-performance sport. Primarily, these issues were identified as barriers, which would need to be overcome. Specifically, multiple layers of and different types of high-performance sport governance, as previously discussed; different health systems; cultural differences, as well as access to services in more remote locations were identified as potential barriers which would need to be addressed in the development and implementation of the proposed health promotion framework. L articulated this in

the following way: "And then more broadly, you'll have the Australian context, and also the regional Australia context in that in Australia, health is provided by the states".

Additionally, R said: "One of the issues that we continue to need to address here is equal access to health care. Despite our best efforts, we've got regional athletes and, in some cases, international athletes who don't necessarily have the same access (to healthcare) as the metro athletes living around the corner".

As previously noted, L also said, "it comes to the individual susceptibility models; if looking at the epidemiological triangles of host, agent and environment, if you can change the behaviours to lower the environmental exposure then that holds. The problem with behavioural based interventions is that many of the social and medical determinants of health are beyond the individual's control". This provided some additional context to M's comment: "And then you think about some of the athletes who might be elite, but they're not necessarily only focusing on their training; they're studying, some of them work, even at the elite level". This also reinforced the importance of the following comments: "How do we work with those people from different backgrounds and different levels of education and understanding prior to coming into contact with us?" (R) and "If we think about the indigenous athletes, being able to manage and assimilate into the biggest cities lifestyle and things like that" (K) This final comment was supported by L, who said: "Determinants are the same for all athletes, but indigenous athletes are more likely to be impacted by SDOH that relate to their experience of the Australian context." This comment was understood by the researcher to mean that all athletes engaged in a particular sporting environment are exposed to the same SDOH within that environment and that Indigenous athletes were

mentioned as an example of a specific population within the cohort of high-performance athletes who are subject to additional SDOH, which may either compound or negate the influence of the sport related SDOH

Therefore, the primary considerations related to the Australian context were identified as relating to:

1. The different ways in which health services are managed and provided by the different states and the Commonwealth.
2. Equal access to healthcare
3. Cultural issues/uniquely Australian SDOH

Each of these considerations can then be identified as barriers, in that individually, as well as together, they impose additional complexity to the development of the proposed health promotion framework. These critical issues will need to be addressed in developing the framework to overcome the limitations they may pose to the health development and management of high-performance athletes. Equally, they also reinforce the need for such a framework in ensuring the optimal development and management of high-performance athlete health. The Health-promoting School framework (https://www.who.int/images/default-source/infographics/health-promotion/who-hps-infographic_q3_1.jpg?sfvrsn=dbc3ccb0_3) is therefore suggested as a possible template for this proposed theoretical Australian high-performance sport health-promotion framework. With regard to the provision and management of health services in Australia, public health services are funded by the Commonwealth and managed by the states, employing different models. For example, in Queensland, all

public healthcare is managed by Queensland Health. Victoria employs a different model in which healthcare is managed by regional health services (i.e., Goulburn Valley Health and Barwon Health). Other states and territories use variations of these models (Dixit & Sambasivan, 2018). Conversely, the provision of private health services is regulated by the Commonwealth and is either privately funded by the individual or by private health insurance, with gap payments, to cover out of pocket expenses, available for some services through Medicare. The complexity of healthcare funding and management arrangements in Australia can then be understood as another potential barrier to implementing the proposed health promotion framework. Any proposed health promotion framework for Australian high-performance sport would require detailed discussion regarding implementing elements related to the provision of and access to appropriate levels of healthcare relative to each system. It would also require operational flexibility to function effectively within these different systems.

Equal access to healthcare is different to the organizational structure and operation of health services. For example, according to Dwyer, et al (2019) the main location of employment for those working in high-performance sport athlete support positions was in metropolitan areas (87%). Additionally, they demonstrated that this workforce is predominantly male (76.0%), less than 35 years of age (50.3%) and primarily located on the eastern seaboard of Australia (69%) . This can be understood to create a barrier to accessing appropriate health services for regionally located athletes. High-performance athletes who live in more remote locations may then need to travel long distances to access the required level of health support, consequently incurring financial and social costs (time away from school/work, etc.) that can be

difficult to manage. Additionally, this travel requirement is potentially disruptive to training schedules and may negatively impact the athlete's development and is considered a limitation of the current system. The lack of regionally located high-performance sport healthcare providers would therefore remain a possible barrier to implementing the proposed health promotion framework. This understanding is reinforced by the following comment from R: “Despite our best efforts, we've got regional athletes and, in some cases, international athletes who don't necessarily have the same access to healthcare as metro athletes, living around the corner.”

Cultural issues are equally challenging and diverse. For example, cultural beliefs around health and its management were identified as an issue, particularly concerning topical issues such as vaccine hesitancy. With reference to this issue, R said: “But then also, not just how do we work with those people from different backgrounds and different levels of education and understanding prior to coming into contact with us. But how do we leave them as hopefully better, more well-rounded.” Equally, issues related to cultural disadvantage and its potential impacts on athlete health were identified, particularly regarding the health of indigenous athletes. In this context, K said ““If we think about indigenous athletes (from remote communities), to being able to manage and assimilate into the biggest cities lifestyle and things like that can have a huge impact when they're taken away from their family units, and then they have to try to adjust to a new social situation that can affect physical and mental health.” These observations are consistent with the literature regarding the health impacts of sports participation on indigenous Australians (Browne-Yung et al., 2015). They are, therefore, a possible barrier to implementing the proposed health promotion framework and must

be addressed in its development. Therefore, effective implementation of a health promotion framework would require that each of the factors listed under the theme of 'The Australian Context' be considered and addressed. Of particular interest in this theme is the realization that most of the issues identified by participants were considered to be barriers to the implementation of the proposed theoretical health promotion framework. It is therefore likely that implementing change may be difficult.

There was general agreement amongst participants in the qualitative interviews that each of the identified barriers to the implementation of the proposed health promotion framework for Australian high-performance sport could be addressed with improved individual and organizational health literacy, which is consistent with the literature (Bae & Yoon, 2021; Duffy et al., 2021; Rowland et al., 2012).

This agreement is reflected in the following comments:

"If you're really going to improve the health of the system, you've got to look further than the individuals. And most definitely look at the organizational drivers." and "Hard to conceptualize, implement health strategies with multiple stakeholders involved with different levels of knowledge and goals (coaches can be toxic)." as well as "My view is that a significant proportion of health clinicians in a range of different disciplines still don't necessarily consider that or even understand that particularly well." plus "Sports specific example of risk effective based approaches are challenged particularly from how they are derived in the literature. So, in terms of a public health, theoretical construct of risk, it will broadly apply that as risk factors for injury and illness in sport. Currently, these are not very applicable, but poorly utilized in that people don't understand what the risks are

Themes	Data Extracts
Level of understanding of epidemiology and population health	“When I started in this role I would say I would have rated my health literacy reasonably. I wouldn't have said it would have been an expert, but I would have rated it reasonably highly (….) it took me about three to four months to realize what little I actually knew.” **(Interview with R)** “The part which resonates with me, significantly, is that it's not just saying someone who's not sick. But someone who is actively well. And my view is that a significant proportion of health clinicians in a range of different disciplines still don't necessarily consider that or even understand that particularly well.” **(Interview with R)** “Sports specific example of risk effective based approaches are challenged particularly from how they are derived in the literature. So, in terms of a public health, theoretical construct of risk, it will broadly apply that as risk factors for injury and illness in sport. Currently, these are not very applicable, but poorly utilized in that people don't understand what the risks are. An example would be looking at training loads and workloads as a risk factor. But they're not a risk factor, they’re an exposure and exposures are different to risk factors.’ **(Interview with L)** ‘WHO definition relates to a broad definition of health, including mental health, which has not always been well recognized in high-performance sport.” **(Interview with M)** Optimal health doesn’t mean exactly the same thing for every individual. Context matters. (**Most participants)** “It comes to the individual susceptibility models; if looking at the epidemiological triangles of host, agent, and environment, if you can change the behaviors to lower the environmental exposure then that holds. The problem with behavioral based interventions is that many of the social and medical determinants of health are beyond the individual's control.” **(Interview with L)**

	"Optimal health? For me, my understanding is that ability for people to be functioning well or thriving. So optimal, physical, psychological, emotional well-being is where people are in the best kind of functional state in terms of their health and well-being as possible." **(Interview with F)** "I think like being able to have systems in place that allow people to access, good health care when they need it, and being able to live in an environment that supports healthy life, physically and mentally, I guess." **(Interview with K)**
Normalizing elite athlete ill health and injury	"Hard to conceptualize, implement health strategies with multiple stakeholders involved with different levels of knowledge and goals (coaches can be toxic)." **(Interview with M)** "Because undertaking elite athlete activities is by its nature unhealthy. So, the definition holds the priority of it would change." **(Interview with L)** 'When we think about (….) high-performance, often that's actually pushing people or they're pushing themselves to that kind of next level,' **(Interview with F)** "We can provide information, but then the players or the athletes are actually doing, and a lot of them at that young age don't mind testing things out and challenging themselves." **(Interview with K)** "We certainly invest a lot more time and energy (in measuring performance; so, it suits our scientific models and our need for numbers, I think." **(Interview with M)** "The other part which resonates with me, significantly, which is we're not merely just saying someone who's not sick. But someone who is actively well. And I think, my view is that a significant proportion of health clinicians in a range of different disciplines still don't necessarily consider that or even understand that particularly well." **(Interview with R)**

Challenges related to the different organizational structures and operational practices of sporting organisations and their governing bodies (local/state/national/international	"You have organizational, and we have multiple organizations influence on the same individual; either state Institute's the National Institutes, the state sports, the National Sports, and also international federations involvement." **(Interview with L)** "In sport, I believe that there are other social determinants on top of the general societal ones that may or may not contribute to health, such as coaching motives and behaviors, funding of sports, duty of care of the organisation for their health. These are similar to wider societal ones but within themselves are somewhat context specific. Coaching behaviours, funding of sports, organisational structures." **(Interview with L)** "It's interesting to see the way that those big sporting organizations, once teams are selected, or once groups of athletes are selected to represent, in this case, usually Australia, at major benchmark events. They go out of their way to try and create a team culture. So even when you've got groups of individual athletes, who don't really have any significant interplay between each other in terms of the outcomes that each of them can generate for others." **(Interview with R)** **"**Some of the athletes find those factors very difficult to manage. And that can have a big effect on mental health as well. So, it kind of depends on how far reaching the issue with that particular athlete." **(Interview with K)** "Well, I think that's the that's the constant tension, isn't it? Is what are the non-negotiable things from an organizational perspective, that rule that we hold our athletes to standards to, for them to meet, let's say, from a behavioural perspective, versus what potentially suits the individual" **(Interview with R)** "That inherent factor doesn't necessarily always mesh with a more organization or institution or conflict kind of thought process around what presents on behalf of the organization." **(Interview with R)**

	" The biggest challenges often come in, in managing relationships between different stakeholders." **(Interview with R)** "If you're really going to improve the health of the system, you've got to look further than the individuals. And most definitely look at the organizational drivers." **(Interview with M)** "When we're thinking about the context of applying it to particular high-performance situations, depending upon that sport, might require you to kind of, you know, I guess, increase, maximize, apply, you know, certain elements of that in maybe, slightly different ways." **(Interview with F)** "Hard to conceptualize, implement health strategies with multiple stakeholders involved with different levels of knowledge and goals (coaches can be toxic)." **(Interview with M)** "Part of my role is to try and (get) our health care providers to try and shift their focus from engaging with broken athletes. To engage with as many unbroken athletes as possible **(Interview with R**)
The Australian Context	"Their culture and ethnicity definitely would have had an impact." **(Interview with K)** "Being able to have systems in place that allow people to access, you know, good health care when they need it, and being able to live in an environment that supports healthy life, physically and mentally.' **(Interview with K)** "One of the things that I look at is indigenous culture, overrepresented is in the sporting landscape, and probably very much under supported and not really well understood." **(Interview with M)** "But then also, not just how do we work with those people from different backgrounds and different levels of education and understanding prior to coming into contact with us. But how do we leave them as hopefully better, more well-rounded." **(Interview with R)**

	“Indigenous athletes would still have the same determinants of health as an any indigenous person in Australia. So, they're more likely going to have a social limitation on their health that was partly created by the Australian setting.” **(Interview with L)** “From a psychology perspective; behaviour, is it connected to attitude, so what attitudes might I have inherited or role modelled or seen or learned.” **(Interview with F)** “Despite our best efforts, we've got regional athletes and, in some cases, international athletes who don't necessarily have the same access to healthcare as metro athletes, living around the corner.” **(Interview with R)** “If we think about the indigenous athletes (from remote communities), to being able to manage and assimilate into the biggest cities lifestyle and things like that (….) can have a huge impact when they're taken away from their family units, and then they have to try to adjust to a new social situation that can affect physical and mental health.” **(Interview with K)** “It comes to the individual susceptibility models; if looking at the epidemiological triangles of host, agent, and environment, if you can change the behaviors to lower the environmental exposure then that holds. The problem with behavioral based interventions is that many of the social and medical determinants of health are beyond the individual's control.” **(Interview with L)** ‘The other example with risk in sport is that there's something which is called a time to event problem’. **(Interview with L)** “You have organizational, and we have multiple organizations influence on the same individual, either state Institutes the National Institutes, the State sports, the National Sports, and also international federations

	involvement. And then more broadly, you'll have the causes of causes, and you have the Australian context, and also the regional Australia context in that in Australia, health is provided by the states." **(Interview with L)** 'And then you think about some of the athletes who might be elite, but they're not necessarily only focusing on their training. Some are studying, some of them work, even at the elite level." **(Interview with M)**

Table 6:- Themes identified

Based on the qualitative findings, the following considerations have been identified as factors to be addressed in the development of initiatives to improve both individual and organisational health literacy: 1) a need to respect individual awareness and understanding; 2) the need for health literacy education programs to be easily accessible and flexible to different individual and organisational needs, an issue which could be addressed by the previously proposed web-based resource with different modules developed to address the identified needs of specific target groups in high-performance sport (administrators, coaches, athletes and health service providers). Also, it is clear that we need to enable control, or perceived control, of health determinants, as was made evident in Theme 4. The perception that there are factors out of our control is demotivating to all involved, and if these factors are real, they need to be managed and addressed. Addressing these issues can be understood to be fundamental to the development of the proposed health promotion framework.

Conclusions

The current study aimed to establish the applicability of the WHO definition of health and its determinants for Australian high-performance sports and was conducted utilising a mixed-methods methodology. This involved conducting a Delphi survey, which asked an expert panel of high-performance sport healthcare providers a series of questions regarding the applicability of the WHO definition of health and its determinants in a high-performance sport setting, followed by a study comprised of one-to-one qualitative interviews with a representative panel of the Delphi participants. After the study, a significant level of consensus regarding the relevance and applicability of the WHO definition of health and its determinants was evident. In addition, insights into

barriers to implementing a holistic health promotion framework for Australian high-performance sport were provided. The identified barriers included the complex organisational and operational limitations of Australian high-performance sporting organisations, including a lack of appropriate health literacy amongst high-performance sports administrators and coaches. At the same time, it was of particular interest to note the initial apparent lack of insight amongst some members of a diverse panel of highly regarded expert high-performance sport health practitioners into the principles underpinning epidemiology, population health and health promotion, as well as their relevance to and applicability in high-performance sport healthcare.

Once these barriers became evident to participants, a need for improved health literacy was identified as being the most crucial issue to address. Initially, there was no clarity as to how this could be best achieved. Potential enablers (appropriately targeted interventions, an empathetic approach, education about why change is needed) to improving health literacy within a diverse range of stakeholders in high-performance sport were proposed. Proposed solutions regarding the need to create change at both individual and organisational levels were consistent with the principles of health promotion and population health strategies (Bhattacharya & Bhatt, 2017; Casey et al., 2012; Curry, 2005; Heward et al., 2007; Hancock, 2018).

Based on these findings the following guidance for the development of a framework is suggested:

1. The framework must address the need for both organisational and individual capacity building

2. It must include diverse elements designed to address the specific health literacy needs of diverse groups within the high-performance sport community.
3. It must place a significant emphasis on social determinants of health, including those that relate specifically to the high-performance sport environment as well as those that impact on the athlete in a broader societal context
4. It must include specific requirements for additional education regarding the epidemiology of injuries and illness in sport for high-performance sport healthcare practitioners
5. It must place an emphasis on the development of health capacity as both a performance attribute and a personal attribute in emerging elite athletes
6. It must be flexible to different sport organisational and operational structures.
7. It must create both individual and organizational accountability for high-performance athlete health.
8. It must recognize and seek to influence the impact of determinants of high-performance athlete health which exist outside/beside their sporting involvement.

These recommendations can primarily be identified as being systems-based interventions.

Limitations

When interpreting the findings of this study, it is important to consider the methodological limitations. While the participant group of 14 may appear relatively small, it is consistent with the average number (n=17) of respondents in other published Delphi studies (O'Neill et al., 2016). A response rate of 36% for an on-line survey approximates the usual engagement rate (O'Neill et al., 2016) and should be sufficient

to generate meaningful data. That said, the lack of sufficient diversity in the participant pool may create a challenge in using the data to inform and drive the process of meaningful change in the way in which high-performance athlete healthcare is both envisioned and operationalized in Australian high-performance sport. Additionally, whilst the number of participants in the qualitative interviews was judged to be sufficient to achieve saturation, it is acknowledged that the number of participants only just met the minimum requirement and is a possible limitation to this study.

Additionally, amongst a recognised number of limitations of the Delphi method are the following: the outcome is largely dependent on the researcher formulating the initial questionnaire correctly; a different panel may reach a different conclusion; an over inflated sense of self belief and confidence amongst panel members may be mistaken for expertise or competence (Keeney et al., 2006). That said, one of the attractions of the Delphi process as a research tool is that it places the research findings in a specific time and place, which can be used as a fixed reference point for future research.

Further studies

It is recommended that to a limited version of this study with a cohort of Sport and Exercise Physicians be undertaken, so that a medical perspective may be included in recommendations. Based on the findings of this study, it is recommended that additional studies explore the level of health literacy of a range of high-performance sports administrators, elite coaches and current, or recently retired elite high-performance athletes. Each of these recommendations will ensure that a comprehensive dataset has been gathered to inform the establishment of a baseline requirement for the content and structure of the proposed health promotion framework

for Australian high-performance sport. This research has been conducted in a globally challenging period in terms of the impact of the COVID 19 pandemic on population health. The specific challenges this has created with regard to high-performance athlete health (the psychological demands of extended periods of time in sporting hubs, away from extended family and friends; fears and anxieties regarding risk of exposure to COVID 19; mandatory vaccination and vaccine hesitancy; health role modelling) have all been confounding issues in facilitating the health development and management of high-performance athletes and warrant future research. Additionally, it is recommended that research is undertaken to explore the level of epidemiological understanding of high-performance sport healthcare providers for the purpose of developing recommendations regarding the content and nature of ongoing professional development programs for those working in this healthcare environment.

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Appendix A

Preliminary Information for Proposed Research Participants

The aim of this survey is to try and achieve consensus amongst a panel of expert health practitioners as to the global determinants of health for Australian high-performance athletes, with a focus on the WHO determinants of health and their applicability in this environment

As I am known to or have worked with most of the likely participants in this project (which makes this project a form of insider research), at this point it is important that I make sure that you are aware of the ethical risks of insider research, which are primarily as follows

- there is potential that it can compromise the voluntary nature of consent to participate
- it is possible that participants may feel obliged to provide the responses they believe the researcher is looking for

These risks have been managed in two ways

- voluntariness of participation has been addressed in the informed consent, which forms the first page of the survey and can be viewed once you have been given access to it.
- survey questions have been structured in such a way as to control for a perception of a preferred response

A Delphi methodology was chosen for this research because it allows for input from a panel of experts in the area under investigation, without the risk of dominant individuals influencing the outcome, such as may occur with face-to-face group discussions. The integrity of this research is dependent on each participant providing individual responses that haven't been unduly influenced or altered by the input of others. For this reason, it is important that you do not discuss your participation in this project with

professional colleagues, who may have also been invited to participate. If you should choose not to participate, please be assured that this decision will be treated with respect.

The intent is that this research will produce a 'real-world' data set, which will then be subject to detailed analysis, and the results synthesized with knowledge gained from the academic literature. It is expected that this synthesis will result in the development of the evidence required to inform the creation of a theoretical health promotion framework for Australian high-performance sport

Additional information for participants

Information for survey participants:

This survey has been developed in order to gain your professional insights into the relevant determinants of health for Australian high-performance athletes. The results of this survey will be synthesized with knowledge gained from a focused review of the academic literature to provide the preliminary evidence required for the development of a theoretical health promotion framework for Australian high-performance sport.

Determinants of health are factors that influence how likely we are to stay healthy or to become ill or injured. These include social determinants, biomedical risk factors and behavioural risk factors.

Social determinants include factors such as income, education level achieved, health literacy, current and previous employment as well as social support networks.

Biomedical risk factors are bodily states that can contribute to the development of illness or injury.

Behavioural risk factors include action as diverse as risky alcohol consumption, using illicit drugs, poor eating behaviours and non-compliance with health advice.

As this survey contains questions specifically addressing health literacy, it is important to include definitions of terms used in those questions at this point:

Health literacy is the skills and knowledge of a person to access, understand and use information to make decisions, and take action about health and healthcare.

The health literacy environment is the way services are provided, and the things that make it easier or harder for people to access, understand, and use information and services.

Appendix B

CONSENT FORM FOR PARTICIPANTS TO PARTICIPATE IN RESEARCH

We would like to invite you to be a part of a study that aims to gather the data required to underpin the development of a theoretical health promotion framework for Australian high-performance sport

The aim of this research project is to gain an understanding of the professional opinions of a diverse group of expert practitioners in the field of high-performance sport healthcare, regarding the applicability of the World Health Organisation Determinants of Health in that environment

This will be done by conducting a three-round Delphi survey.

CERTIFICATION BY PARTICIPANT

I, _____(name), certify that I that I am voluntarily giving consent to participate in the study: **"Promoting health in Australian high-performance sport"** being conducted electronically, using the Victoria University Qualtrics platform, by Mary Toomey.

I certify that the details of the study, including the risks and safeguards associated with participating in the current study, have been fully explained to me by Mary Toomey and that I consent to participating in the Delphi survey and communicating openly with the researcher.

☐ By checking this box, I acknowledge that I have been fully informed of the risks of insider research

☐ By checking this box, I acknowledge that I have made the decision to participate in this study armed with the knowledge of those risks.

I certify that I have been advised that I will have the opportunity to have any questions answered prior to the commencement of the study, and that I understand that I can withdraw from this study at any time, and that this withdrawal will not jeopardize me in any way.

I have been informed that the information that I provide will be kept confidential by the researchers, however I am aware that my confidentiality cannot be assured completely. Thereupon, I certify that I will assume responsibility for my own privacy and for the integrity of the data I provide by not discussing my participation in this project with others.

Signed:

Date:

Chief Investigator: Dr. Peter Gill

Student Researcher: Mary Toomey

If you have any queries or complaints about the way you have been treated, you may contact:

Dr. Peter Gil
peter.gill@vu.edu.au
(03) 9919 5641

Or the student researcher:

Mary Toomey

mary.toomey@live.vu.edu.au

You may also contact the Ethics Secretary, Victoria University Human Research Ethics Committee, Office for Research, Victoria University, PO Box 14428, Melbourne, VIC, 8001, researchethics@vu.edu.au or (03) 9919 4781 or 4461.

Appendix C

Start of Block: Block 1

CONSENT FROM PARTICIPANTS TO PARTICIPATE IN RESEARCH We would like to invite you to be a part of a study that aims to gather the data required to underpin the development of a theoretical health promotion framework for Australian high-performance sport The aim of this research project is to gain an understanding of the professional opinions of a diverse group of expert practitioners in the field of high-performance sport healthcare, regarding the applicability of the World Health Organization's Determinants of Health survey.

Informed Consent
I certify that I that I am voluntarily giving consent to participate in the study: "Promoting health in Australian high-performance sport" being conducted electronically, using the Victoria University Qualtrics platform, by Mary Toomey. I certify that the details of the study, including the risks and safeguards associated with participating in the current study, have been fully explained to me by Mary Toomey and that I consent to participating in the Delphi survey and communicating openly with the researcher. By checking the consent box at the bottom of this section and by providing my name where requested, I acknowledge that I have been fully informed of the risks of insider research. I further acknowledge that by doing so, that I have made the decision to participate in this study armed with the knowledge of those risks. I certify that I have been advised that I will have the opportunity to have any questions answered prior to the commencement of the study, and that I understand that I can withdraw from this study at any time, and that this withdrawal will not jeopardize me in any way. I have been informed that the information that I provide will be kept confidential by the researchers, however I am aware that my confidentiality is also dependent on my maintaining discretion regarding my participation in this research, for the purpose of ensuring that my responses are not unduly influenced by the opinions of others. Thereupon, I certify that I will assume responsibility for my own privacy and for the integrity of the data I provide by not discussing my participation in this project with others.

Chief Investigator: Dr. Peter Gill Student Researcher: Mary Toomey

If you have any queries or complaints about the way you *have been treated, you may contact Dr. Peter Gil*
peter.gill@vu.edu.au
(03) 9919 5641 Or the student researcher:

Mary ToomeyMary.toomey@live.vu.edu.au

Please provide your name for the purpose of confirming your consent to participate in this research project

_____

I consent

○ Yes (1)

Information for survey participants: This survey has been developed in order to gain your professional insights into the relevant determinants of health for Australian high-performance athletes. The results of this survey will be synthesized with knowledge gained from a focused review of the academic literature to provide the preliminary evidence required for the development of a theoretical health promotion framework for Australian high-performance sport. Determinants of health are factors that influence how likely we are to stay healthy or to become ill or injured. These include social determinants, biomedical risk factors and behavioural risk factors. Social determinants include factors such as income, education level achieved, health literacy, current and previous employment as well as social support networks. Biomedical risk factors are bodily states that can contribute to the development of illness or injury.
Behavioural risk factors include action as diverse as risky alcohol consumption, using illicit drugs, poor eating behaviours and non-compliance with health advice
As this survey contains questions specifically addressing health literacy, it is important to include definitions of terms used in those questions at this point:
Health literacy is the skills and knowledge of a person to access, understand and use information to make decisions, and take action about health and healthcare.
The health literacy environment is the way services are provided, and the things that make it easier or harder for people to access, understand, and use information and services.

As Delphi surveys are conducted anonymously, there are no known risks attached to your participation in this research

The World Health Organization (WHO) has defined health as a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity. Please indicate on the scale below how relevant you believe this definition is to Australian high-performance athlete health

- ○ Extremely relevant (1)
- ○ Very relevant (2)
- ○ Moderately relevant (3)
- ○ Slightly relevant (4)
- ○ Not at all relevant (5)

Please provide a written explanation for your response to the previous question

_____

_____

_____

_____

_____

Using the same scale please indicate how relevant social determinants of health are to the development and maintenance of health in Australian high-performance athletes:

- ☐ Extremely Relevant (1)
- ☐ Very relevant (2)
- ☐ Moderately Relevant (3)
- ☐ Slightly relevant (4)

☐ Not at all relevant (5)

Using the same scale once again, please indicate how relevant biomedical risk factors are to the development and maintenance of health in Australian high-performance athletes:

○ Extremely relevant (1)

○ Very relevant (2)

○ Moderately Relevant (3)

○ Slightly relevant (4)

○ Not at all relevant (5)

Using the same scale once again, please indicate how relevant behavioural risk factors are to the development and maintenance of health in Australian high-performance athletes:

☐ Extremely relevant (1)

☐ Very relevant (2)

☐ Moderately relevant (3)

☐ Slightly relevant (4)

☐ Not at all relevant (5)

Please provide a written explanation for your response to the three previous questions

_____

_____

_____

_____

_____

Bearing in mind your responses to the previous questions, using the same scale, please indicate your professional opinion regarding the importance of athlete health literacy in managing Australian high-performance athlete health:

- ○ Extremely important (1)
- ○ Very important (2)
- ○ Moderately important (3)
- ○ Slightly important (4)
- ○ Not at all important (5)

Bearing in mind your responses to the previous questions, using the same scale, please indicate your professional opinion regarding the importance of coach health literacy in managing Australian high-performance athlete health:

- ○ Extremely important (1)
- ○ Very important (2)
- ○ Moderately important (3)
- ○ Slightly important (4)
- ○ Not at all important (5)

Bearing in mind your responses to the previous questions, using the same scale, please indicate your professional opinion regarding the importance of sports administrator health literacy in managing Australian high-performance athlete health:

- ○ Extremely important (1)
- ○ Very important (2)
- ○ Moderately important (3)

- ○ Slightly important (4)
- ○ Not at all important (5)

Using the same scale once again, please indicate your professional opinion as to the importance of a health literacy environment for athletes in epitomizing Australian high-performance sport healthcare:

- ○ Extremely important (1)
- ○ Very important (2)
- ○ Moderately important (3)
- ○ Slightly important (4)
- ○ Not at all important (5)

In addition, using the same scale, please indicate your professional opinion as to the importance of a health literacy environment for coaches in optimizing high-performance sport healthcare:

- ○ Extremely important (1)
- ○ Very important (2)
- ○ Moderately important (3)
- ○ Slightly important (4)
- ○ Not at all important (5)

Finally, using the same scale, please indicate your professional opinion as to the importance of a health literacy environment for sports administrators in optimizing high-performance sport healthcare:

- ○ Extremely important (1)

○ Very Important (2)

○ Moderately important (3)

○ Slightly important (4)

○ Not at all important (5)

Please provide a written explanation for your responses to the previous questions regarding health literacy

_____

_____

_____

_____

_____

End of Block: Block 1

Round 2 of promoting health in Australian high-performance sport Delphi

Q1

We invite you to review your response to the following question from the first round of this survey on the basis of the results obtained. Data analysis showed that 46.15% of recorded responses identified it as extremely relevant. Another 46.15% identified it as being very relevant and 7.69% as moderately relevant.

The World Health Organization (WHO) has defined health as a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity

Please indicate on the scale below how relevant you believe this definition is to Australian high-performance athlete health

- ☐ Extremely relevant
- ☐ Very relevant

- ☐ Moderately relevant
- ☐ Slightly relevant
- ☐ Not at all relevant

Q2

Once again, we invite you to review your response to the following question from the first round of this survey on the basis of the results obtained. Data analysis showed that 41.67% of recorded responses identified social determinants as being extremely relevant. 41.67% also identified them as very relevant and 16.67% as moderately relevant.

Using the same scale please indicate how relevant social determinants of health are to the development and maintenance of health in Australian high-performance athletes:

- ☐ Extremely relevant
- ☐ Very relevant
- ☐ Moderately relevant
- ☐ Slightly relevant
- ☐ Not at all relevant

Q3

Again, we invite you to review your response to the following question from the first round of this survey on the basis of the results obtained. Data analysis showed that 41.67% of recorded responses also identified biomedical risk factors as extremely relevant and another 41.67% as very relevant. Again 16.67% identified them as moderately relevant

Using the same scale once again, please indicate how relevant biomedical risk factors are to the development and maintenance of health in Australian high-performance athletes:

- ○ Extremely relevant
- ○ Very relevant
- ○ Moderately relevant
- ○ Slightly relevant
- ○ Not at all relevant

Q4

And again, we invite you to review your response to the following question from the first round of this survey on the basis of the results obtained. Data analysis showed that 58.33% of recorded responses identified behavioural risk factors as extremely relevant and 25% as very relevant. 16.67% identified them as moderately relevant

Using the same scale once again, please indicate how relevant behavioural risk factors are to the development and maintenance of health in Australian high-performance athletes:

- Extremely relevant
- Very relevant
- Moderately relevant
- Slightly relevant
- Not at all relevant

Q5

As with the previous questions we invite you to review your response to the following question from the first round of this survey on the basis of the results obtained. Data analysis showed that 50% of recorded responses identified this as being extremely important, 41.67% as very important and 8.3% as moderately important

Bearing in mind your responses to the previous questions, using the same scale, please indicate your professional opinion regarding the importance of athlete health literacy in managing Australian high-performance athlete health:

- Extremely important
- Very important
- Moderately important
- Slightly important
- Not at all important

Q6

Once again, we invite you to review your response to the following question from the first round of this survey on the basis of the results obtained. Data analysis showed that 54.55% of responses identified this as extremely important and 45.45% as very important

Bearing in mind your responses to the previous questions, using the same scale, please indicate your professional opinion regarding the importance of coach health literacy in managing Australian high-performance athlete health:

- Extremely important
- Very important
- Moderately important
- Slightly important
- Not at all important

Q7

Again, we invite you to review your response to the following question from the first round of this survey on the basis of the results obtained and to update it if you would like. Data analysis again showed that 54.55% of recorded responses identified this as extremely important and 45.45% as very important.

Bearing in mind your responses to the previous questions, using the same scale, please indicate your professional opinion regarding the importance of sports administrator health literacy in managing Australian high-performance athlete health:

- Extremely important
- Very important
- Moderately important
- Slightly important
- Not at all important

Q8

And again, we invite you to review your response to the following question from the first round of this survey on the basis of the results obtained and to update it if you would like. Data analysis showed that 54.55% of recorded responses identified this as extremely important, 36.36% as very important and 9.09% as moderately important

Using the same scale once again, please indicate your professional opinion as to the importance of a health literacy environment for athletes in epitomizing Australian high-performance sport healthcare:

- Extremely important
- Very important

- Moderately important
- Slightly important
- Not at all important

Q9

Again, we invite you to review your response to the following question from the first round of this survey on the basis of results obtained and to update it if you would like. Data analysis showed that 45.45% of recorded responses identified this as extremely important, and 54.55% as very important.

Using the same scale, please indicate your professional opinion as to the importance of a health literacy environment for coaches in optimising high-performance sport healthcare:

- Extremely important
- Very important
- Moderately important
- Slightly important
- Not at all important

Q10

And for the final time we invite you to review your response to the following question from the first round of this survey on the basis of results obtained and to update it if you would like. Data analysis showed that 54.55% of recorded responses identified this as extremely important, 27.27% as very important and 18.18% as moderately important.

Finally, using the same scale, please indicate your professional opinion as to the importance of a health literacy environment for sports administrators in optimising high-performance sport healthcare:

- Extremely important
- Very important
- Moderately important
- Slightly important
- Not at all important

Q11

If you have changed any of your responses, please tell us which questions you did this for and whether you felt comfortable doing so.

Appendix D

Default Report
Promoting health in Australian high-performance sport
February 7th, 2021, 5:27 pm MST

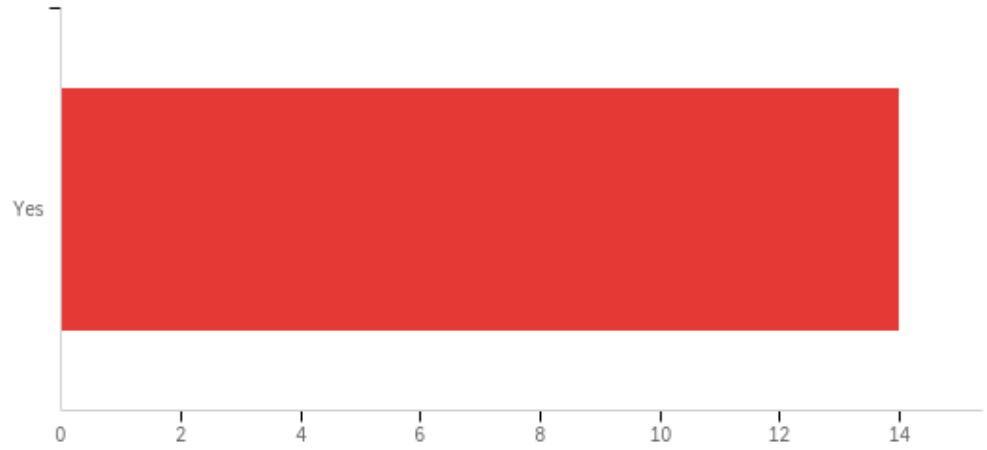
Q_RecaptchaScore

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Q_RecaptchaScore	0.90	0.90	0.90	0.00	-0.00	14

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Q_RecaptchaScore	0.90	0.90	0.90	0.00	-0.00	14

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Q_RecaptchaScore	0.90	0.90	0.90	0.00	-0.00	14

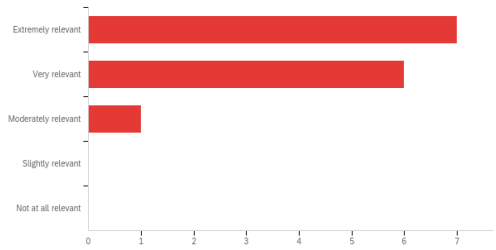
Q23 - I consent



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	I consent	1.00	1.00	1.00	0.00	0.00	14

#	Answer	%	Count
1	Yes	100.00%	14
	Total	100%	14

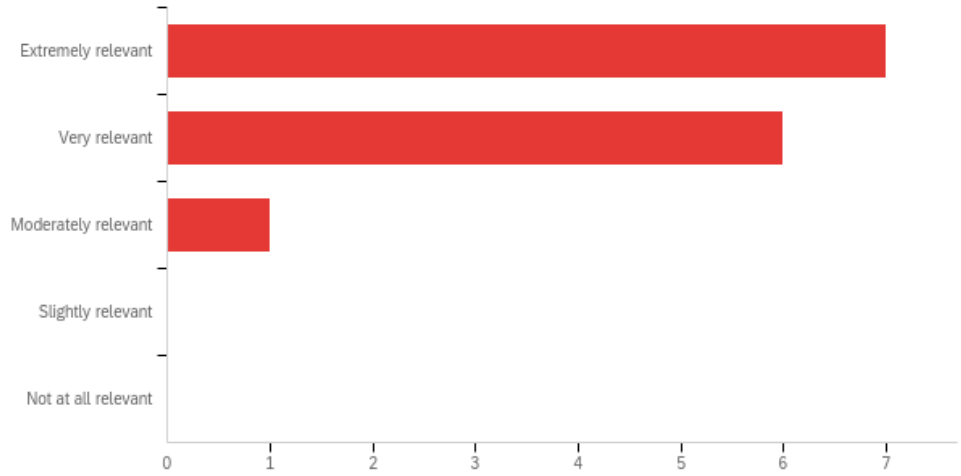
Q2 - The World Health Organization (WHO) has defined health as a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity. Please indicate on the scale below how relevant you believe this definition is to Australian high-performance athlete health



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	The World Health Organization (WHO) has defined health as a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity. Please indicate on the scale below how relevant you believe this definition is to Australian high-performance athlete health	1.00	3.00	1.57	0.62	0.39	14

#	Answer	%	Count
1	Extremely relevant	50.00%	7
2	Very relevant	42.86%	6

3	Moderately relevant	7.14%	1
4	Slightly relevant	0.00%	0
5	Not at all relevant	0.00%	0
	Total	100%	14

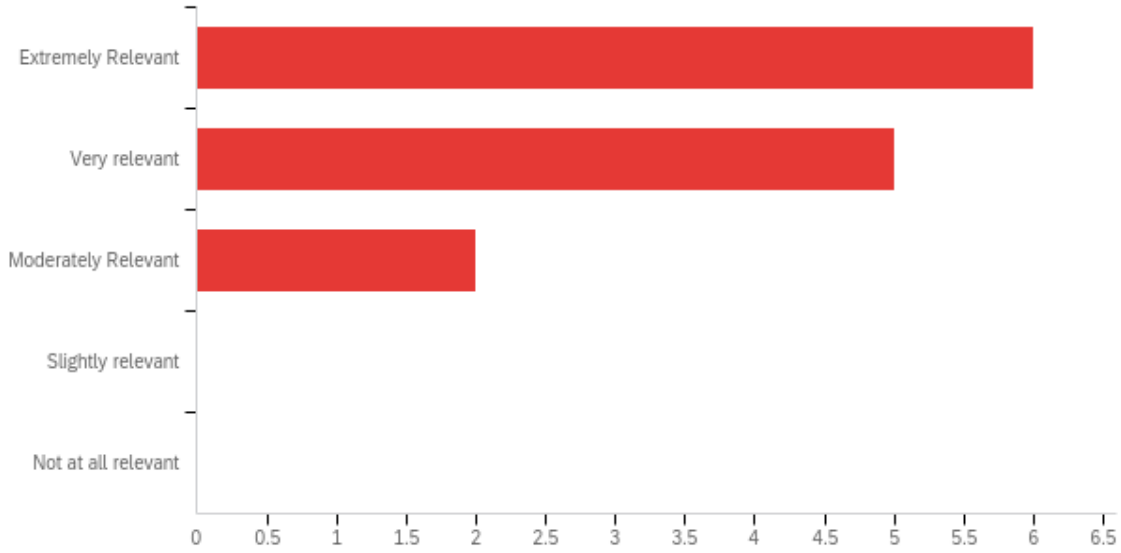


Q3 - Please provide a written explanation for your response to the previous question

Please provide a written explanation for your response to the previous question
The importance of not only dealing with illness but to aim for a state of complete and enduring health is so important for our elite athletes. We often get caught up in the focus of performance and physical health and lose sight of the broader health picture.
This is the accepted definition world-wide. The AIS have adopted this, and experience says that it holds equally well.
I stopped short of saying ‘extremely relevant’ because even though this is a worthy goal and elite athletes are often perceived as pinnacles of health in reality they often are physically and emotionally operating close to or even beyond the boundary between good health and pushing themselves too hard and consequently sustaining physical injury, acquiring illnesses due to suppressed immune systems, or suffering psycho-social problems due to their heavy training schedules and / or emotional focus on sporting success being paramount in their lives.
Never before has there been more of a focus on athlete health and well-being. I have worked with elite sport for over 20 years and in that time have seen

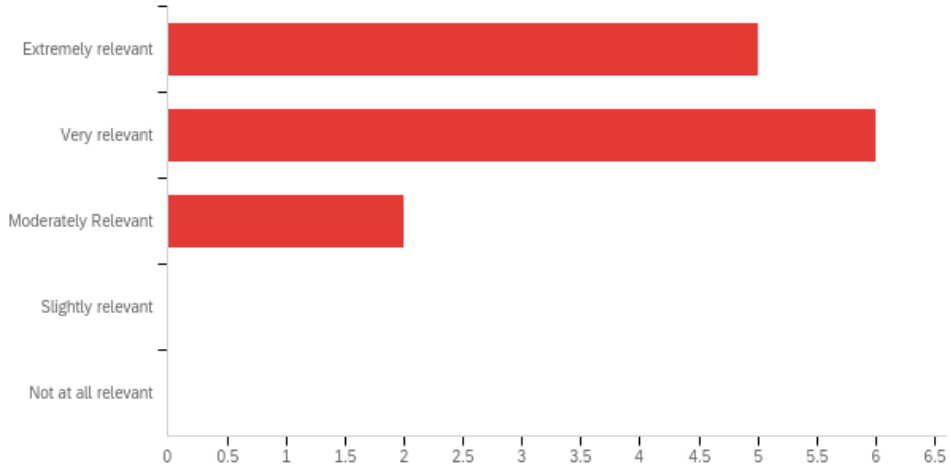
significant positive change in terms of the approach towards mental health, general health and wellness and quality of life away from sport.
what exactly is meant by the term "complete"? I'm unsure that we can ever be complete...personal preference I guess
An athlete's health and conversely unhealth and experience thereof is not linear but encompasses many complex interactions. The experience of their "disease" is modulated by many factors hence cannot be viewed as this in isolation.
When mental health education and understanding is focused on mental illness, we have missed the boat. Mental health should be about staying healthy.
All of the WHO factors are significant in the context of the athlete's OVERALL health. but in the middle of competition, or during a tough training session, the degree to which different factors contribute to the IMMEDIATE health of the athlete may vary
I believe the whole person (individual) cannot be separated from the performer, i.e., all aspects of their being/state matters - which I think is captured by The World Health Organization (WHO) definition where is outlined as a state of complete physical, mental, and social well-being. infirmity
I think that it has relevance, but it is important to note that the training loads and other characteristics of high-performance sport necessarily mean that HP athletes will, at times, be tired, sore, subject to pressure and a number of other characteristics that could not be described as "maximally" charged with all the characteristics described by WHO. It is aspirational rather than realistic
For athletes to perform at their best, they need to be healthy and well across ALL facets - physical, mental, social, etc...

Q4 - Using the same scale please indicate how relevant social determinants of health are to the development and maintenance of health in Australian high-performance athletes:



#	Answer	%	Count
1	Extremely Relevant	46.15%	6
2	Very relevant	38.46%	5
3	Moderately Relevant	15.38%	2
4	Slightly relevant	0.00%	0
5	Not at all relevant	0.00%	0
	Total	100%	13

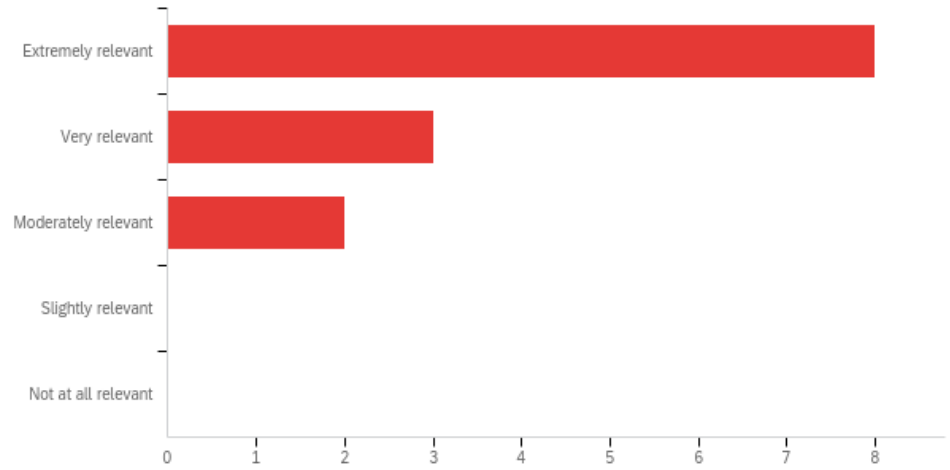
Q6 - Using the same scale once again, please indicate how relevant biomedical risk factors are to the development and maintenance of health in Australian high-performance athletes:



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Using the same scale once again, please indicate how relevant biomedical risk factors are to the development and maintenance of health in Australian high-performance athletes:	1.00	3.00	1.77	0.70	0.49	13

#	Answer	%	Count
1	Extremely relevant	38.46%	5
2	Very relevant	46.15%	6
3	Moderately Relevant	15.38%	2
4	Slightly relevant	0.00%	0
5	Not at all relevant	0.00%	0
	Total	100%	13

Q8 - Using the same scale once again, please indicate how relevant behavioural risk factors are to the development and maintenance of health in Australian high-performance athletes:



#	Answer	%	Count
1	Extremely relevant	61.54%	8
2	Very relevant	23.08%	3
3	Moderately relevant	15.38%	2
4	Slightly relevant	0.00%	0
5	Not at all relevant	0.00%	0
	Total	100%	13

Q9 - Please provide a written explanation for your response to the three previous questions

Please provide a written explanation for your response to the three previous questions
I think all three are important. To some extent biomedical risk factors need to be well understood and managed. The social and behavioural determinants are modifiable and probably have a greater amplification over some of the biomedical factors. For instance, if an athlete has a family history of heart disease, then the social and behavioural determinants are the most modifiable and if addressed may present the best solutions to prevention health. Without addressing these then treatment of early disease is the best-case scenario.
The three factors are all relevant to athletes, coaches, and staff. While people in sport feel they are different, they are still human and fall within these parameters of population health. They are very applicable - it is simply that the determinants are population specific as they are for other special populations such as indigenous people etc. The constructs hold.
I first need to qualify my responses to all 3, that for some people they are extremely relevant, while for others they may be less so. For example, in the case of biomedical risk factors, some that have been identified may have a genetic component that puts some people more at risk than others, for example risk of cardiovascular disease and therefore sudden cardiac arrest during sport. It also depends to what extent the risk factors are modifiable or non-modifiable, for example musculoskeletal risk factors such as sub-optimal strength ratios or poor neuromuscular control may be corrected with appropriate exercises whereas risk factors associated with variations in boney morphology are harder to address. Similarly, health literacy as a risk factor can be improved but remains present until it is. To summarize, similar to what is often talked about when discussing sports injury and illness prevention, some risk factors are modifiable and some or not modifiable, some represent a high likelihood of a negative outcome while some less so, some represent a risk of an outcome with a catastrophic impact while for others a risk of a minor impact. But even for the “lucky ones” with low-risk ranges for all three determinants I think it is important to assess which risk factors are present and develop an individualized plan to even further reduce the risk they pose for the goal of protecting the athlete’s health and wellbeing to improve their ability to perform well and sustain their career as long as possible. Even that last sentence needs further qualification as improving their performance is good for their team / coach / country / fans etc, but also should always be in the context of remembering their individual goals and aspirations as an individual with dignity and the right to self-determination, not just a commodity.
It's impossible to separate out external factors as not having an impact on overall well-being and performance. If an athlete has issues or concerns away from sport it will show up in performance and also physical/mental health can be impacted.

Elite athletes are heavily scrutinized, and will often try to cover up issues, but this can make the longer-term effect on health, well-being, and performance worse.

all 3 elements are critical; deficiencies in one or more is unlikely to enable people to have "complete" health

Identification of biomedical risk factors provide an objective means of guiding injury prevention with measurable outcomes to determine efficacy. Identification of social risk factors contribute to this but an athlete's response to this may be variable so could potentially be of less importance overall Identification of behavioural risk factors is important to allow individualization of approach in developing injury prevention directed towards that individual and in ensuring appropriate messaging/delivery in maintenance of health.

It is a little tricky to respond given that I am not 100% sure what the researchers perception of social determinants is, or behavioural risks.

See previous answer. All factors are important, but may vary in their specific importance given changing context of the instantaneous circumstances that the athlete finds themselves in.

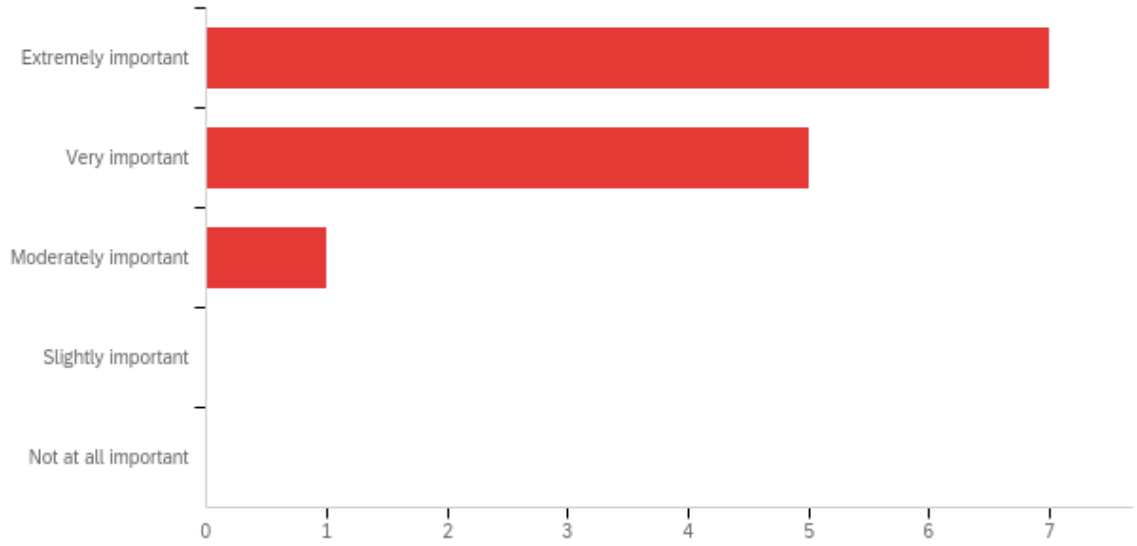
I think behaviors has the potential to drive/influence the other variables. The social aspect might influence behaviors to an extent - but this is not always the case. I.e., behaviors are not necessarily defined by social circumstances. Behaviors has the potential to impact medical factors in both directions.

Social determinants are most relevant because they determine the degree to which the athlete has access to the tools/resources/environment needed to train optimally and compete at the relevant level, as well as the relative absence of distractions or deterrents from making full use of opportunities. The definitions of biomedical determinants and behavioural determinants are a little more problematic because the aspirational aspects associated with these will clash with some of the characteristics needed to be successful in HP sport. It is not realistic to think that all HP athletes can train and compete at the highest level across all sports without, at least occasionally, participating in some behaviours or exhibiting some biomedical characteristics that would be judged as "harmful" or "sub-optimal" without the context of training loads and competition demands. It would be a whitewash to suggest that the highest level of any domain (sport, academia, business etc) is achieved without some shift away from population norms of social/physical/mental health. People who are at the far ends of a bell curve will usually have some differences to those in the middle. Any realistic discussion of athlete health needs to recognize that at some times, HP athletes straddle a fine line between health and problems.

The ability to understand and identify biomedical risk factors, social and behaviour determinants are all important when considering high performance athletes and the ability to support their wellbeing in order to perform at their peak. Athletes are human beings that are faced with similar challenges as the average person is

across all areas other than sport related ones - and therefore they all need to be considered in the context of performance.

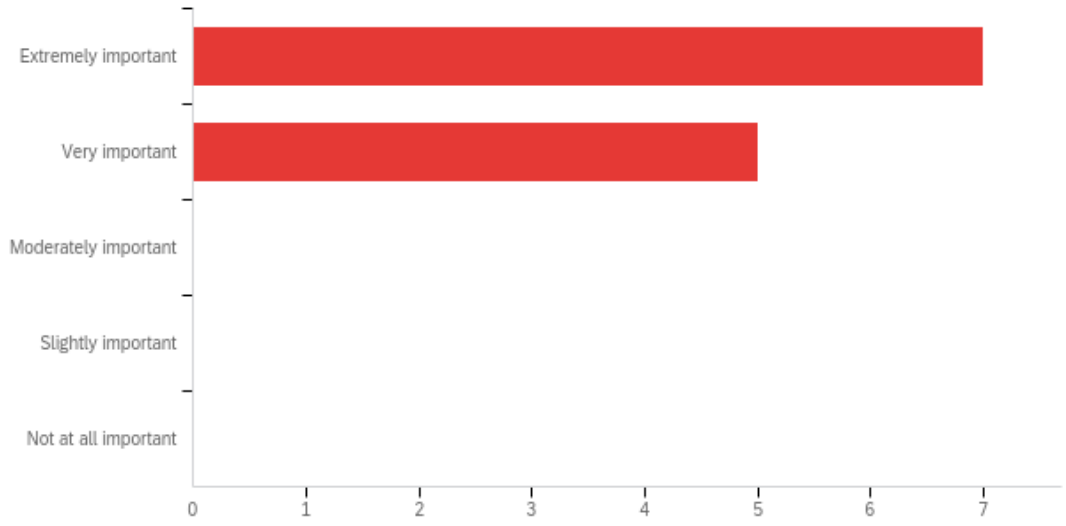
Q10 - Bearing in mind your responses to the previous questions, using the same scale, please indicate your professional opinion regarding the importance of athlete health literacy in managing Australian high-performance athlete health:



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Bearing in mind your responses to the previous questions, using the same scale, please indicate your professional opinion regarding the importance of athlete health literacy in managing Australian high-performance athlete health:	1.00	3.00	1.54	0.63	0.40	13

#	Answer	%	Count
1	Extremely important	53.85%	7
2	Very important	38.46%	5
3	Moderately important	7.69%	1
4	Slightly important	0.00%	0
5	Not at all important	0.00%	0
	Total	100%	13

Q14 - Bearing in mind your responses to the previous questions, using the same scale, please indicate your professional opinion regarding the importance of coach health literacy in managing Australian high-performance athlete health:

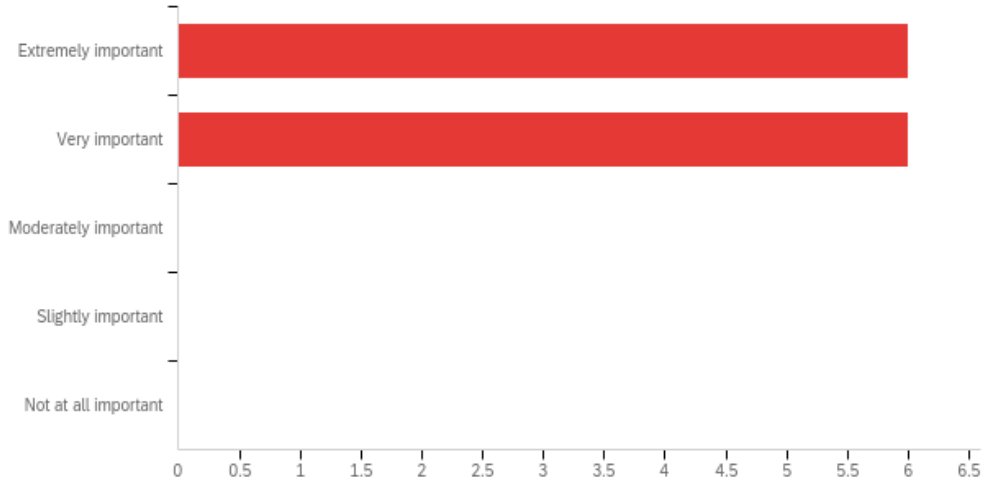


#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Bearing in mind your responses to the previous questions, using the same scale, please indicate your professional opinion regarding the importance of coach health literacy in managing	1.00	2.00	1.42	0.49	0.24	12

	Australian high-performance athlete health:						

#	Answer	%	Count
1	Extremely important	58.33%	7
2	Very important	41.67%	5
3	Moderately important	0.00%	0
4	Slightly important	0.00%	0
5	Not at all important	0.00%	0
	Total	100%	12

Q15 - Bearing in mind your responses to the previous questions, using the same scale, please indicate your professional opinion regarding the importance of sports administrator health literacy in managing Australian high-performance athlete health:

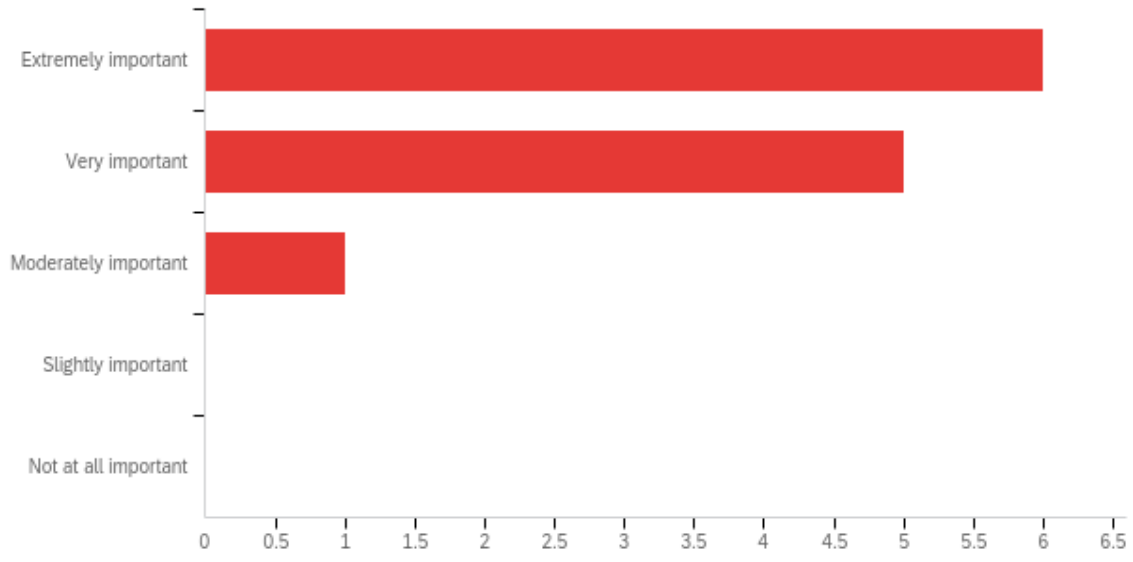


#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Bearing in mind your responses to the previous questions, using the same scale,	1.00	2.00	1.50	0.50	0.25	12

please indicate your professional opinion regarding the importance of sports administrator health literacy in managing Australian high-performance athlete health:						

#	Answer	%	Count
1	Extremely important	50.00%	6
2	Very important	50.00%	6
3	Moderately important	0.00%	0
4	Slightly important	0.00%	0
5	Not at all important	0.00%	0
	Total	100%	12

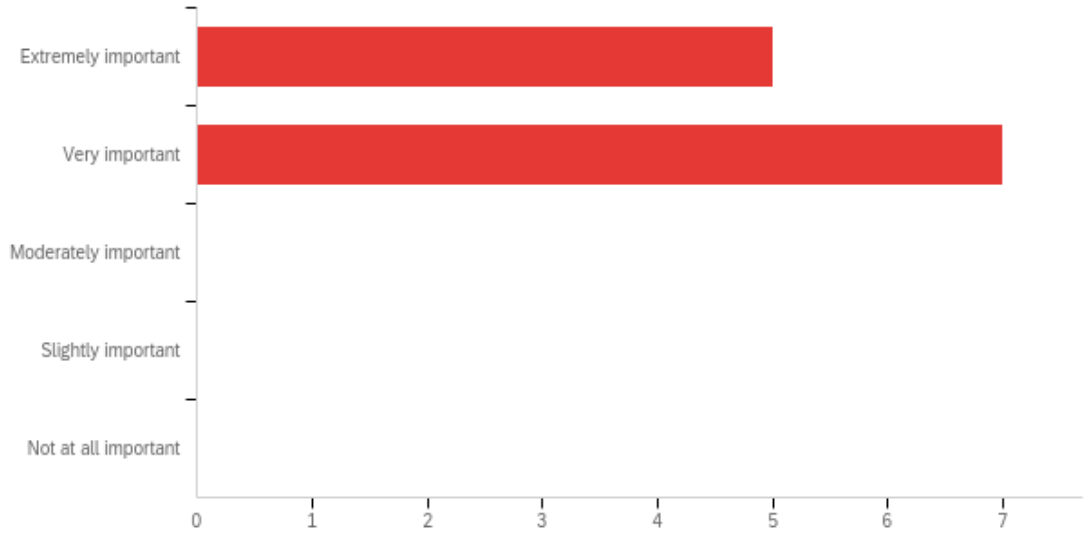
Q12 - Using the same scale once again, please indicate your professional opinion as to the importance of a health literacy environment for athletes in epitomizing Australian high-performance sport healthcare:



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Using the same scale once again, please indicate your professional opinion as to the importance of a health literacy environment for athletes in epitomizing Australian high-performance sport healthcare:	1.00	3.00	1.58	0.64	0.41	12

#	Answer	%	Count
1	Extremely important	50.00%	6
2	Very important	41.67%	5
3	Moderately important	8.33%	1
4	Slightly important	0.00%	0
5	Not at all important	0.00%	0
	Total	100%	12

Q17 - In addition, using the same scale, please indicate your professional opinion as to the importance of a health literacy environment for coaches in optimizing high-performance sport healthcare:

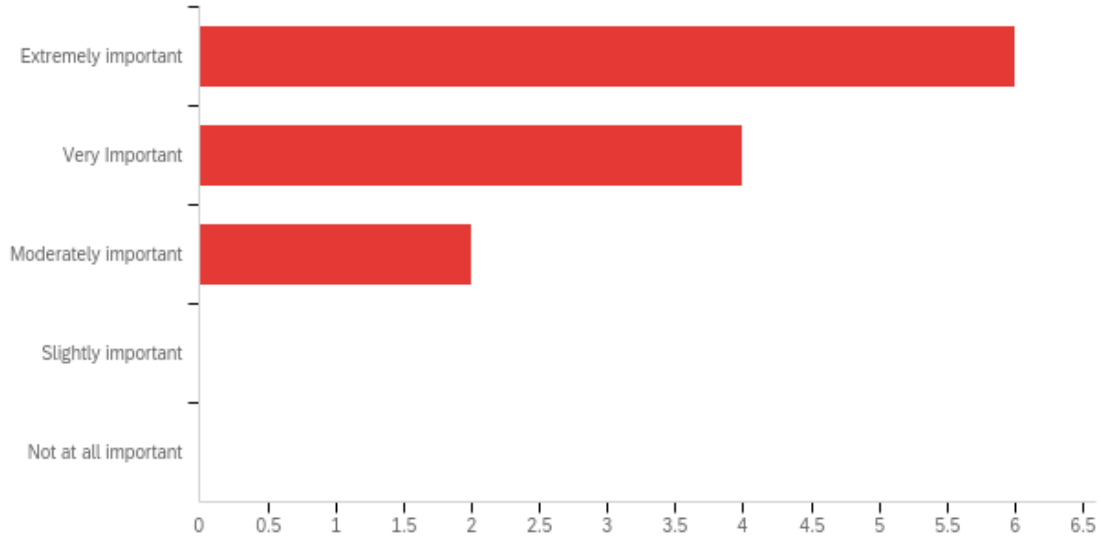


#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	In addition, using the same scale, please indicate your professional opinion as to the importance of a health literacy environment for coaches in optimizing high-performance sport healthcare:	1.00	2.00	1.58	0.49	0.24	12

#	Answer	%	Count
1	Extremely important	41.67%	5
2	Very important	58.33%	7
3	Moderately important	0.00%	0

4	Slightly important	0.00%	0
5	Not at all important	0.00%	0
	Total	100%	12

Q18 - Finally, using the same scale, please indicate your professional opinion as to the importance of a health literacy environment for sports administrators in optimizing high-performance sport healthcare:



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Finally, using the same scale, please indicate your professional opinion as to the importance of a health literacy environment for sports administrators in optimizing high-performance sport healthcare:	8.00	10.00	8.67	0.75	0.56	12

#	Answer	%	Count
8	Extremely important	50.00%	6
9	Very Important	33.33%	4
10	Moderately important	16.67%	2
11	Slightly important	0.00%	0
12	Not at all important	0.00%	0
	Total	100%	12

Q13 - Please provide a written explanation for your responses to the previous questions regarding health literacy

Please provide a written explanation for your responses to the previous questions regarding health literacy
Having the environment supporting high levels of literacy is ideal but I believe that high individual levels of literacy are probably more important because a well informed and determined athlete and coach will probably still be able to navigate the environment regardless.
This is a hard one to answer as my response would be slightly different for each group above. In principle, public health campaigns seek to raise awareness of these factors. Departments of health etc provide strategies to address these factors to raise equity of health across populations. My thoughts and responses are related to whether we need to make all these groups literate or we change the system to ensure the factors are addressed. Importantly, staff both medical and sport science in high performance environments have very poor understanding of these, and so while it's important for coaches and administrators to have this knowledge we cannot overlook the reality that medical and health staff poorly understand population health and epidemiology.
Very important because improving health literacy increases the likelihood of athletes understanding and complying with recommendations or programs that are recommended to them by their athlete support personnel. In other words, improved health literacy should improve compliance, and compliance is key to results for any program that has a self-directed or self-managed component. While the focus of health literacy education is often the end user in this case the athlete, within sport both coaches and team management / team culture are critically important to athlete attitudes and behaviours. If athletes think the coach doesn't don't think a program or recommendation is important then they are less likely to see it as important themselves and therefore less likely to comply. Many of us working in sports medicine have seen bad outcomes occur as a result of coaches with

incorrect or outdated understanding of injury/illness prevention or management either actively or unintentionally subvert the work being done to both manage and educate athletes under our care. Similarly, injury prevention or management protocols that are incorrect or outdated that are embedded within a team or organisations rules or processes represents an immediate risk to athlete wellbeing, as well as further barrier to them being able to improve their personal health literacy.

Everyone needs to be on the same page (coaches, athletes, and administrators), and have a thorough understanding of what it takes, and the strategies required, for optimal athlete health and well-being (and performance success). If administrators don't understand the needs of athletes, then this makes it challenging for budgets and programs to be catered for adequately. If a coach has a high level of health literacy this helps to direct programming and also support player well-being. Programs need to be structured to allow for different learning styles and needs for athletes to be able to build health literacy and achieve behaviours consistent with good health and performance. Health literacy is key at all levels at a sports club - and there is still significant work to be done in Australian professional sport, although I would say there have been improvements also!

health is complex so it is essential that multiple components and levels within the social ecological framework are on the same page when it comes to mental health and well-being; literacy is a critical foundation

Athlete centred management hinges on a genuine understanding of athlete and all contributing factors. Without understanding of the multidimensional experience of health and unhealth from all parties, there will not be buy in to strategies adopted to capture this. Too often the athlete, coach and management are not aligned with differing priorities which further amplifies the disconnect in finding and maintaining athlete health.

Health literacy is a critical component of professional development for athletes, coaches, and sports administrators. This education needs to be delivered by sport psychologists who can frame mental health in a positive performance perspective as opposed to Clinical Psych’s who typically have a focus on mental illness and can scare athletes into thinking that normal and natural mental health challenges are a disorder or illness.

The degree of health literacy required by various stakeholders will vary, to an extent, by the quality and accessibility of the healthcare team surrounding those stakeholders. A great healthcare team with customize their involvement to match the healthcare literacy of the stakeholder and achieve an optimal health outcome

I believe that to successfully promote health in Australian high-performance sport a systems-based support (e.g., resourcing, promotion) is required first. That step involves/weights sports administrators "firstly" among the key stakeholders.

I think that health literacy in HP sport - whether it is for athletes, coaches or administrators needs to understand the context of what is important for success,

balanced by what is important for well-being. It is often a fine line, but it needs to understand context. Applying the same issues/expectations for HP athletes as for community members is problematic and does not value the factors that contribute to HP success. This is not to suggest that all HP athletes are "unhealthy" and that it is ok for coaches, athletes, or administrators to deliberately enforce practices or an environment that are toxic. However, we need to recognize that HP success is associated with a specific training load, competition demands and other social/psychological stresses.

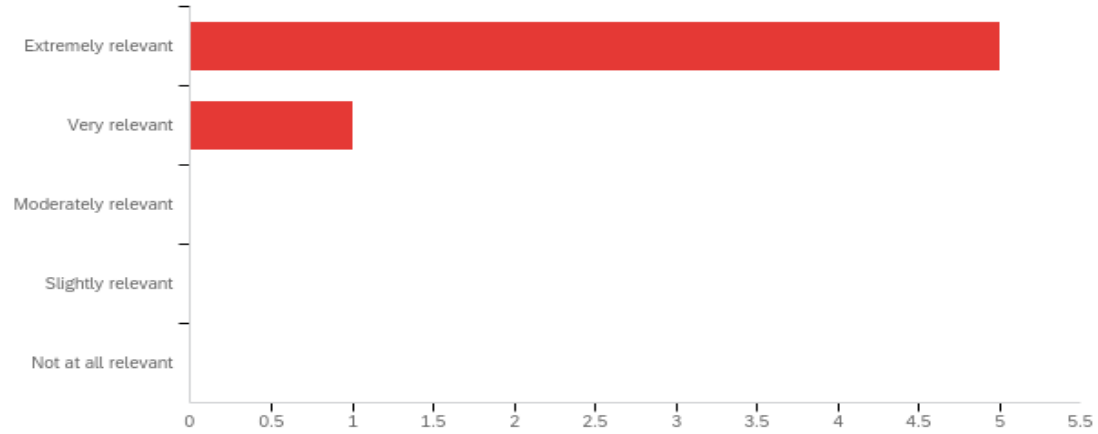
All stakeholders that work in, with and/or support high performance athletes require substantial levels of health literacy in order to create the environment, provide the appropriate services, and support athletes to perform as best they can.

Default Report
Round 2 of promoting health in Australian high-performance sport Delphi
February 7th, 2021, 5:16 pm MST

Q_RecaptchaScore

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Q_RecaptchaScore	0.90	1.00	0.95	0.05	0.00	6

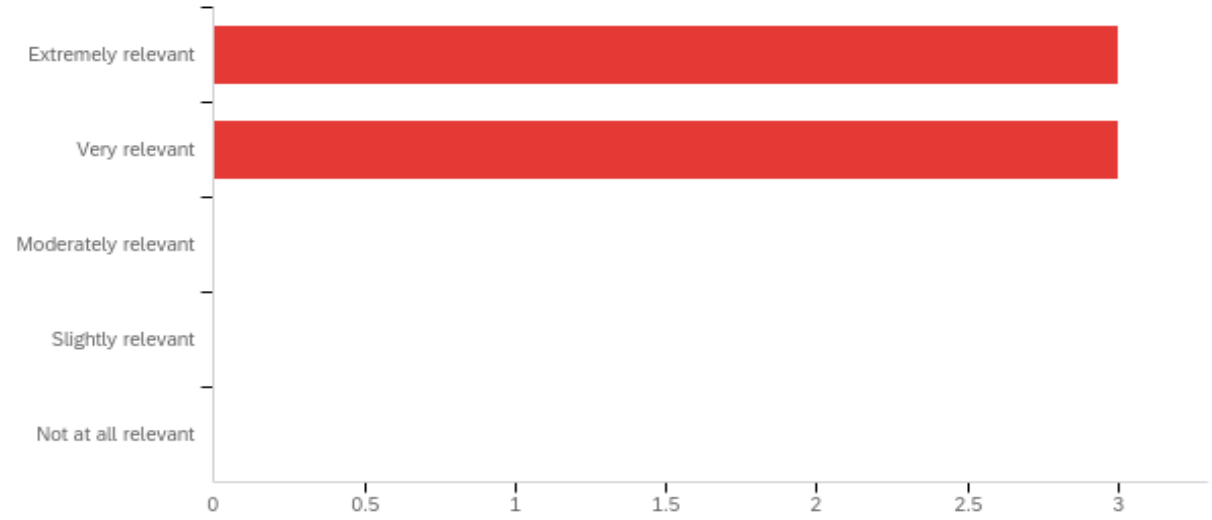
Q1 - We invite you to review your response to the following question from the first round of this s



#	Answer	%	Count
1	Extremely relevant	83.33%	5
2	Very relevant	16.67%	1
3	Moderately relevant	0.00%	0
4	Slightly relevant	0.00%	0
5	Not at all relevant	0.00%	0
	Total	100%	6

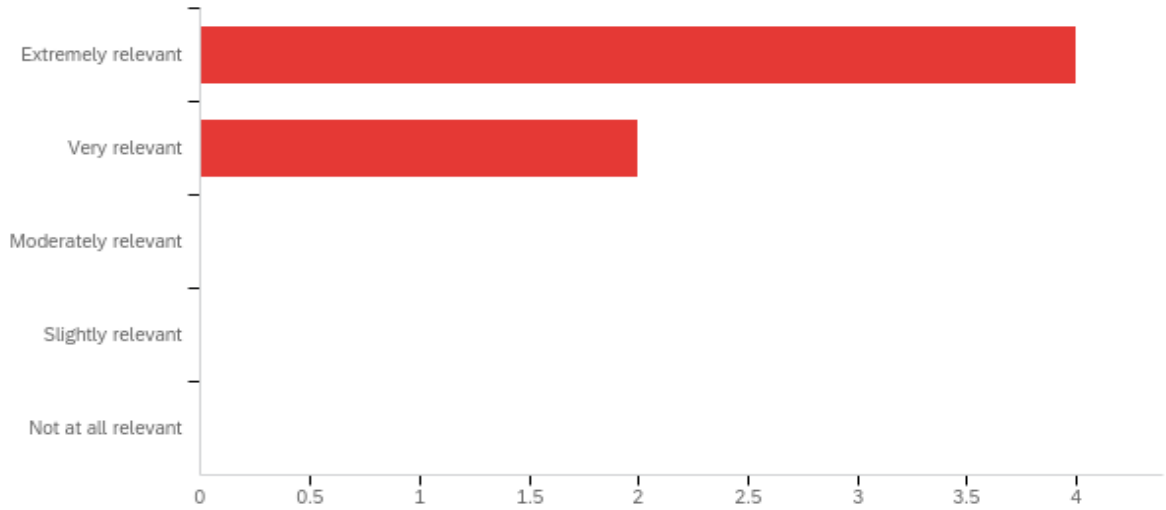
Q2 - Once again, we invite you to review your response to the following question from the first round of this survey on the basis of the results obtained. Data analysis showed that 41.67% of recorded responses identified social determinants as being extremely relevant. 41.67% also identified them as very relevant and 16.67% as

moderately relevant. Using the same scale please indicate how relevant social determinants of health are to the development and maintenance of health in Australian high-performance athletes:



#	Answer	%	Count
1	Extremely relevant	50.00%	3
2	Very relevant	50.00%	3
3	Moderately relevant	0.00%	0
4	Slightly relevant	0.00%	0
5	Not at all relevant	0.00%	0
	Total	100%	6

Q3 - Again, we invite you to review your response to the following question from the first round of this survey on the basis of the results obtained. Data analysis showed that 41.67% of recorded responses also identified biomedical risk factors as extremely relevant and another 41.67% as very relevant. Again 16.67% identified them as moderately relevant. Using the same scale once again, please indicate how relevant biomedical risk factors are to the development and maintenance of health in Australian high-performance athletes:

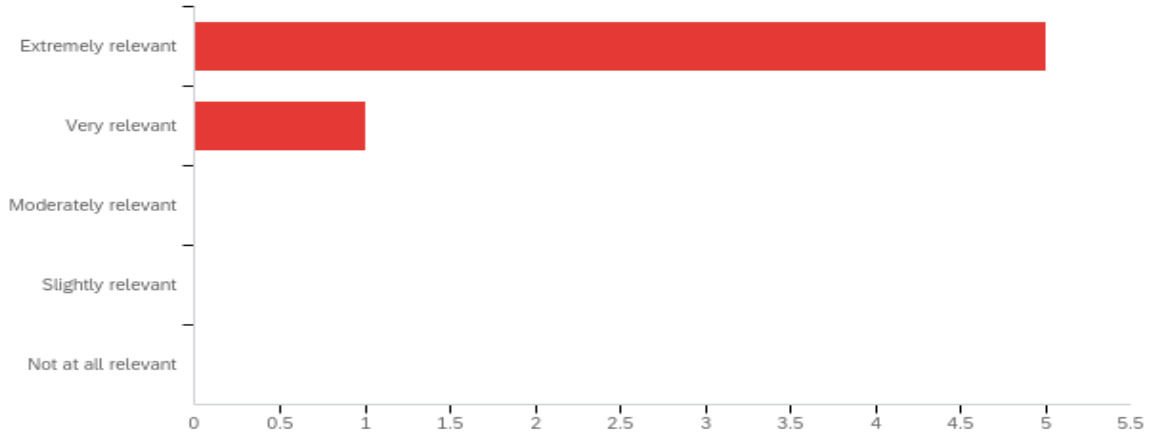


#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Again, we invite you to review your response to the following question from the first round of this survey on the basis of the results obtained. Data analysis showed that 41.67% of recorded responses also identified biomedical risk factors as extremely relevant and another 41.67% as very relevant.	1.00	2.00	1.33	0.47	0.22	6

Again 16.67% identified them as moderately relevant Using the same scale once again, please indicate how relevant biomedical risk factors are to the development and maintenance of health in Australian high-performance athletes:						

#	Answer	%	Count
1	Extremely relevant	66.67%	4
2	Very relevant	33.33%	2
3	Moderately relevant	0.00%	0
4	Slightly relevant	0.00%	0
5	Not at all relevant	0.00%	0
	Total	100%	6

Q4 - And again we invite you to review your response to the following question from the first round of this survey on the basis of the results obtained. Data analysis showed that 58.33% of recorded responses identified behavioural risk factors as extremely relevant and 25% as very relevant. 16.67% identified them as moderately relevant Using the same scale once again, please indicate how relevant behavioural risk factors are to the development and maintenance of health in Australian high-performance athletes:

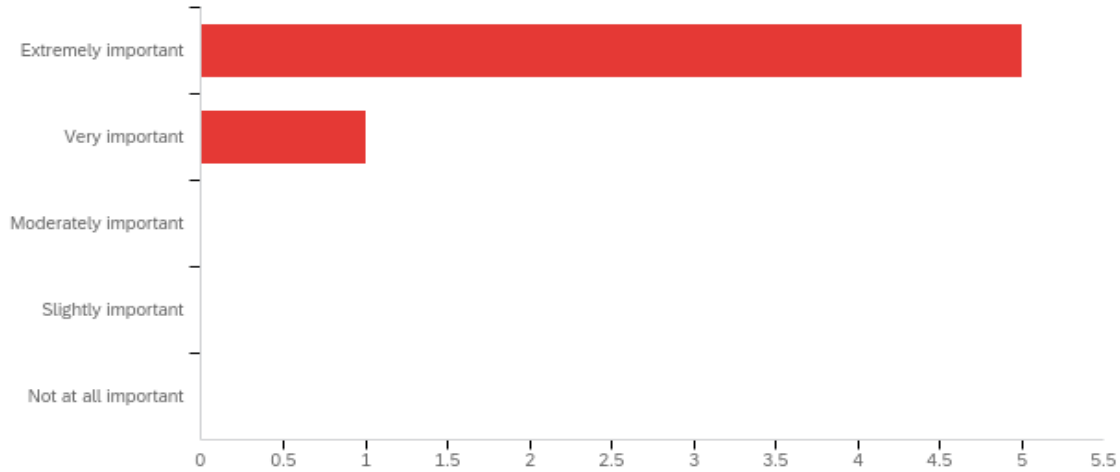


#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	And again, we invite you to review your response to the following question from the first round of this survey on the basis of the results obtained. Data analysis showed that 58.33% of recorded responses identified behavioural risk factors as extremely relevant and 25% as very relevant. 16.67% identified them as moderately relevant Using the same scale once again, please indicate how relevant behavioural risk	1.00	2.00	1.17	0.37	0.14	6

factors are to the development and maintenance of health in Australian high-performance athletes:						

#	Answer	%	Count
1	Extremely relevant	83.33%	5
2	Very relevant	16.67%	1
3	Moderately relevant	0.00%	0
4	Slightly relevant	0.00%	0
5	Not at all relevant	0.00%	0
	Total	100%	6

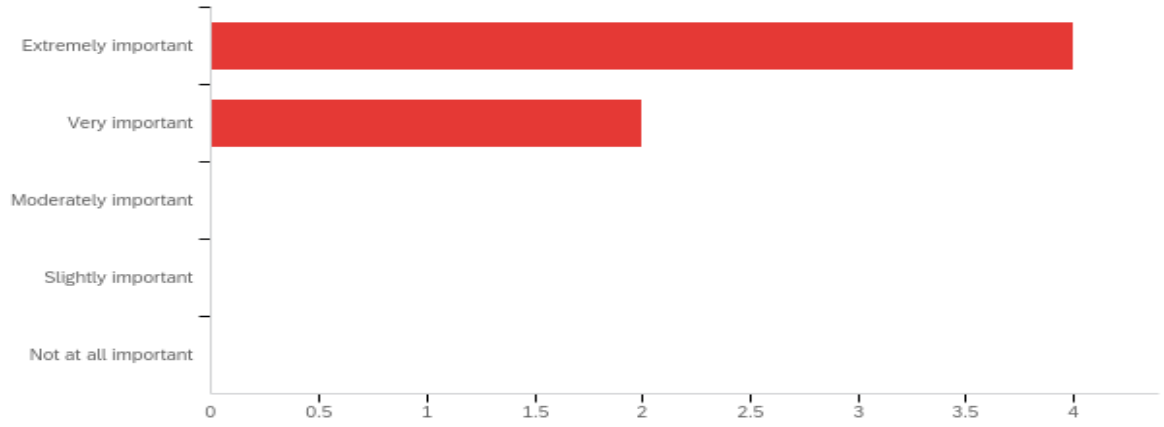
Q5 - As with the previous questions we invite you to review your response to the following question from the first round of this survey on the basis of the results obtained. Data analysis showed that 50% of recorded responses identified this as being extremely important, 41.67% as very important and 8.3% as moderately important Bearing in mind your responses to the previous questions, using the same scale, please indicate your professional opinion regarding the importance of athlete health literacy in managing Australian high-performance athlete health:



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	As with the previous questions we invite you to review your response to the following question from the first round of this survey on the basis of the results obtained. Data analysis showed that 50% of recorded responses identified this as being extremely important, 41.67% as very important and 8.3% as moderately important Bearing in mind your responses to the previous questions, using the same scale, please indicate your professional opinion regarding the importance of athlete health literacy in managing Australian high-performance athlete health:	1.00	2.00	1.17	0.37	0.14	6

#	Answer	%	Count
1	Extremely important	83.33%	5
2	Very important	16.67%	1
3	Moderately important	0.00%	0
4	Slightly important	0.00%	0
5	Not at all important	0.00%	0
	Total	100%	6

Q6 - Once again, we invite you to review your response to the following question from the first round of this survey on the basis of the results obtained. Data analysis showed that 54.55% of responses identified this as extremely important and 45.45% as very important Bearing in mind your responses to the previous questions, using the same scale, please indicate your professional opinion regarding the importance of coach health literacy in managing Australian high-performance athlete health:

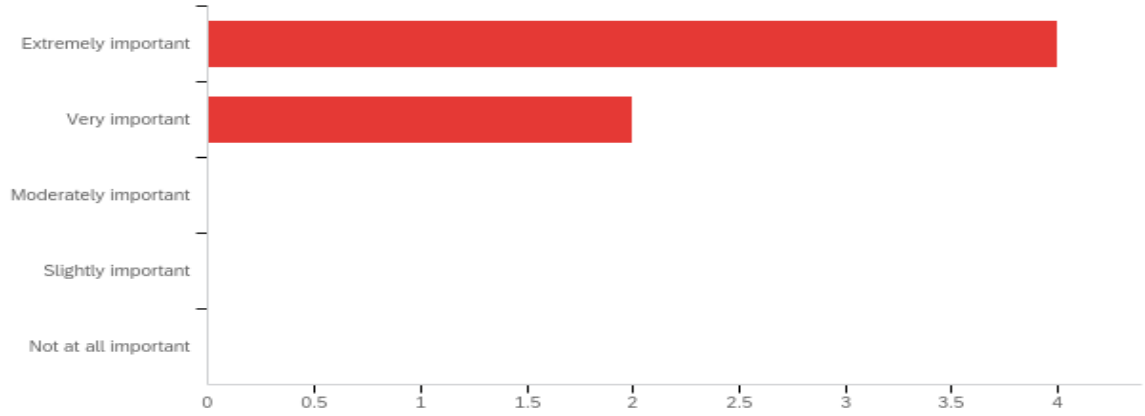


#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Once again, we invite you to review your response to the following question from the first round of this survey on the basis of the results obtained. Data analysis showed that 54.55% of responses identified this as extremely important and 45.45% as very important Bearing in mind your responses to the previous questions, using the same scale,	2.00	3.00	2.33	0.47	0.22	6

please indicate your professional opinion regarding the importance of coach health literacy in managing Australian high-performance athlete health:						

#	Answer	%	Count
2	Extremely important	66.67%	4
3	Very important	33.33%	2
4	Moderately important	0.00%	0
5	Slightly important	0.00%	0
6	Not at all important	0.00%	0
	Total	100%	6

Q7 - Again, we invite you to review your response to the following question from the first round of this survey on the basis of the results obtained and to update it if you would like. Data analysis again showed that 54.55% of recorded responses identified this as extremely important and 45.45% as very important. Bearing in mind your responses to the previous questions, using the same scale, please indicate your professional opinion regarding the importance of sports administrator health literacy in managing Australian high-performance athlete health:

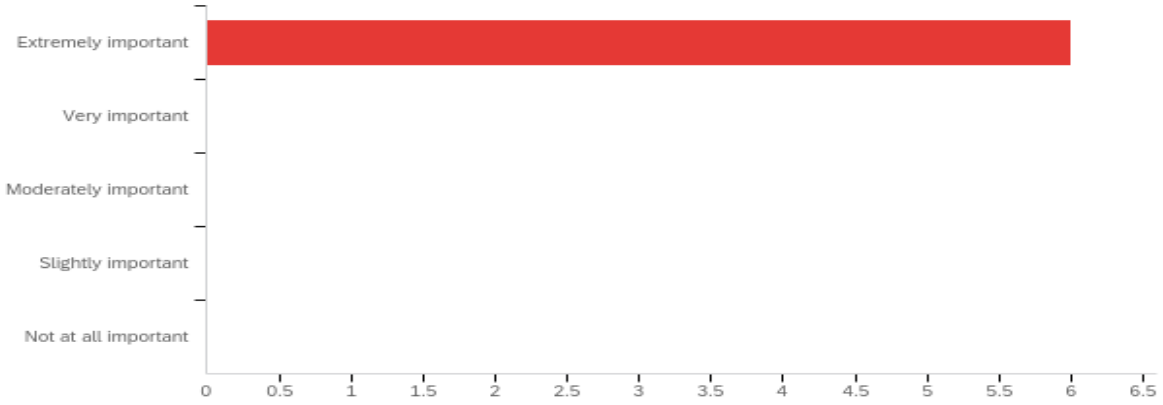


#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Again, we invite you to review your response to the following question from the first round of this survey on the basis of the results obtained and to update it if you would like. Data analysis again showed that 54.55% of recorded responses identified this as extremely important and 45.45% as very important. Bearing in mind your responses to	1.00	2.00	1.33	0.47	0.22	6

the previous questions, using the same scale, please indicate your professional opinion regarding the importance of sports administrator health literacy in managing Australian high-performance athlete health:						

#	Answer	%	Count
1	Extremely important	66.67%	4
2	Very important	33.33%	2
3	Moderately important	0.00%	0
4	Slightly important	0.00%	0
5	Not at all important	0.00%	0
	Total	100%	6

Q8 - And again, we invite you to review your response to the following question from the first round of this survey on the basis of the results obtained and to update it if you would like. Data analysis showed that 54.55% of recorded responses identified this as extremely important, 36.36% as very important and 9.09% as moderately important Using the same scale once again, please indicate your professional opinion as to the importance of a health literacy environment for athletes in epitomizing Australian high-performance sport healthcare:

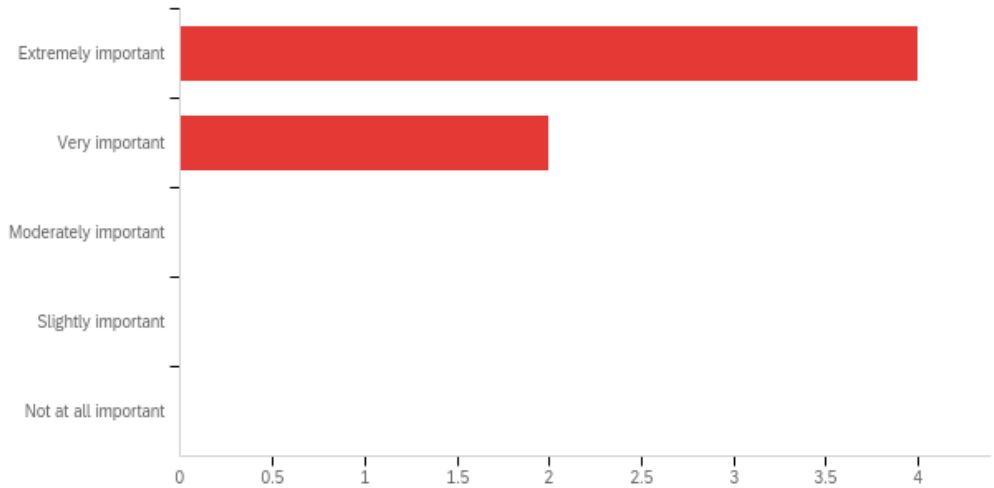


#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	And again, we invite you to review your response to the following question from the first round of this survey on the basis of the results obtained and to update it if you would like. Data analysis showed that 54.55% of recorded responses identified this as extremely important, 36.36% as very important and 9.09% as moderately important Using the same scale once again, please indicate your professional opinion as to the importance of a health literacy	1.00	1.00	1.00	0.00	0.00	6

environment for athletes in epitomizing Australian high-performance sport healthcare:						

#	Answer	%	Count
1	Extremely important	100.00%	6
2	Very important	0.00%	0
3	Moderately important	0.00%	0
4	Slightly important	0.00%	0
5	Not at all important	0.00%	0
	Total	100%	6

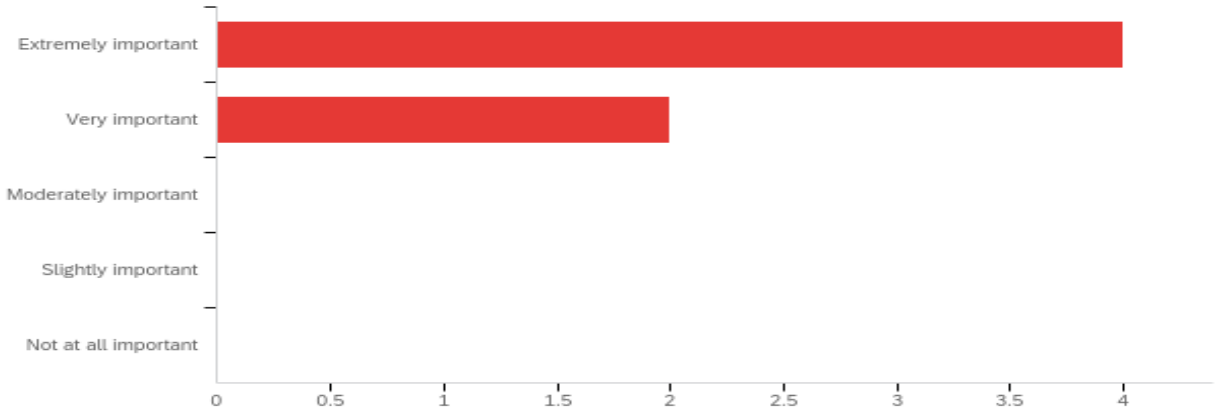
Q9 - Again we invite you to review your response to the following question from the first round of this survey based on results obtained and to update it if you would like. Data analysis showed that 45.45% of recorded responses identified this as extremely important, and 54.55% as very important. Using the same scale, please indicate your professional opinion as to the importance of a health literacy environment for coaches in optimizing high-performance sport healthcare:



#	Answer	%	Count
1	Extremely important	66.67%	4

2	Very important	33.33%	2
3	Moderately important	0.00%	0
4	Slightly important	0.00%	0
5	Not at all important	0.00%	0
	Total	100%	6

Q10 - And for the final time we invite you to review your response to the following question from the first round of this survey on the basis of results obtained and to update it if you would like. Data analysis showed that 54.55% of recorded responses identified this as extremely important, 27.27% as very important and 18.18% as moderately important. Finally, using the same scale, please indicate your professional opinion as to the importance of a health literacy environment for sports administrators in optimizing high-performance sport healthcare:



#	Answer	%	Count
1	Extremely important	66.67%	4
2	Very important	33.33%	2
3	Moderately important	0.00%	0
4	Slightly important	0.00%	0
5	Not at all important	0.00%	0
	Total	100%	6

Q11 - If you have changed any of your responses, please tell which questions you did this for and whether you felt comfortable doing so

If you have changed any of your responses, please tell which questions you did this for and whether you felt comfortable doing so
Questions 7 and 8, I increased both from very to important after reconsideration that followed seeing the consensus of responses. I was comfortable to change these upwards as I already saw these as highly important, but also rationalized that not all athletes or coaches necessarily have the capacity of achieving extremely high levels of health literacy despite the benefits this would bring. As health professionals we have the responsibility to educate and guide positive health related changes to lifestyle and health behaviours, but despite all best intentions, best efforts, and excellent strategies it cannot be guaranteed that all athletes of coaches will develop high levels of personal health literacy. But even if high levels of personal health literacy are not achieved athletes and coaches can still benefit from guidance and recommendations from health professionals. I.e., in an ideal world all would have high levels of health literacy, but this might not always be achievable.
I think the health literacy environment and mindset is very important but am vacillating in deciding which group is the most important in making it happen - is it the personal responsibility of the athlete or is the administrator who decides on the priority of use of resources and culture that is the key to implementation
Questions 5 and 6 I changed from Very important to Extremely important - although I'm not sure there is that much difference. Initially I was thinking that the health literacy aspect was perhaps not as important for the athletes and coaches as for administrators, as administrators are often those in charge of budgets and support for athlete support programs. So, if they understand things well, this allows more to happen. Coaches and athletes can have great health literacy but if administrators don't then it becomes difficult to create comprehensive athlete high-performance programs. However, health literacy is also critical for athletes and coaches to be able to embrace and engage when it comes to behaviour change programs as part of a high-performance program. Although health literacy may also be able to be developed by athletes and coaches as part of a high-performance program, but if the administrators don't have sound health literacy, then some programs may not even get to the stage where they can be funded and implemented...hence my initial response as to health literacy being of higher importance for admin vs coaches/athletes.

Appendix E

Ethics Approval

Dear DR PETER GILL,

Your ethics application has been formally reviewed and finalised.

» Application ID: HRE20-114
» Chief Investigator: DR PETER GILL
» Other Investigators: MS Mary Therese TOOMEY, MRS KARA DADSWELL, PROF WARREN PAYNE
» Application Title: Promoting Health in Australian high-performance Sport
» Form Version: 13-07

The application has been accepted and deemed to meet the requirements of the National Health and Medical Research Council (NHMRC) 'National Statement on Ethical Conduct in Human Research (2007)' by the Victoria University Human Research Ethics Committee. Approval has been granted for two (2) years from the approval date; 05/08/2020.

Continued approval of this research project by the Victoria University Human Research Ethics Committee (VUHREC) is conditional upon the provision of a report within 12 months of the above approval date or upon the completion of the project (if earlier). A report proforma may be downloaded from the Office for Research website at: http://research.vu.edu.au/hrec.php.

Appendix F

Schedule for qualitative telephone interviews.

Questions 1- 6 have been designed to explore more deeply the interviewee's insights which may inform the applicability of the socio-ecological model to any framework developed. They have been developed using health belief theory.

The Health Belief Model *can be used to guide health promotion programs.* The five key components that determine the ability of the Health Belief Model to identify key decision-making points that influence health behaviors are:

- *Gathering information by conducting a health needs assessments and other efforts to determine who is at risk and the population(s) that should be targeted. (This study)*
- *Conveying the consequences of the health issues associated with risk behaviors in a clear and unambiguous manner to understand perceived consequences of that risk.* (Aspects of this thesis)
- *Communicating to the target population the steps that are involved in taking the recommended action and highlighting the benefits to action. (Recommendations from this study/thesis)*
- *Providing assistance in identifying and reducing barriers to action. (Outcomes of this additional survey)*

Hi. If you don't mind, I'm not going to use your name in this interview to protect your confidentiality, as it is being recorded for transcription, from this point onward. Can I ask you whether you're happy to proceed on that basis?

Thanks for the opportunity to call you and discuss the thinking behind the responses you provided during the electronic survey we conducted last year. I am grateful for your input and insights

1(a - b). Can I begin by asking you to elaborate on what you understand the WHO definition of health to mean? On that basis could you also explain to me what you understand the term 'optimal health' to mean and how this understanding may apply to the health of high-performance athletes?

Thank you for that.

2(a - c) Can I ask you now to provide a further insight into your thoughts regarding what constitutes a SDOH? Can you elaborate on what impacts SDOH, as you understand them, may have on high-performance athlete health and can you tell me why that is? Are there any examples you could provide?

Thank you again. If you don't mind, I would like to move on to biomedical risk factors now.

3(a - c) Are biomedical risk factors unavoidable or manageable? Can you give me an example of a biomedical risk factor experienced by a high-performance athlete you have dealt with? In your experience, how common is this type of scenario in high-performance sport?

Thank you…and now, can we discuss behavioural risk factors and your thoughts on these and their potential impact on high-performance athlete health?

4 (a - c) Can behavioural risk factors be both organisational and individual? Is it possible to optimize individual behavioural risk factors without addressing organisational ones, if they exist? Can you identify any barriers/facilitators to achieving this?

Thank you for everything you have shared so far. All of your responses will be particularly useful in providing a deeper understanding of the survey results

However, I am particularly interested in understanding the thinking and/or experiences behind participant's responses to the questions addressing health literacy and the health literacy environment.

5 (a-e). Can we take a deeper dive into that area now? Can you explain to me why you think health literacy is important and in what ways it can have an impact on high-performance athlete health? In the survey, you were asked about the importance of health literacy for athletes, coaches, and sports administrators. In your opinion, which group is it most important for? Can you elaborate on why? With regard to the group you have identified as being most important in this context, how difficult or easy do you believe it would be to achieve positive change? Can you identify for me what the barriers/enablers to this change may be?

Thank you. I would like to continue this discussion with regard to the health literacy environment.

Can you elaborate on your understanding of what this term means and the ways in which it may impact on high-performance athlete health, for me please? Why do you believe that is important and if so, how important is it?

6. In your experience, can you tell me whether health literacy and the health literacy environment in high-performance sport are adequately understood, addressed and/or managed in the high-performance sport environment?

Questions reflecting the Application of the Theory of Planned Behaviour Framework to understanding health practitioner insights into the barriers/enablers to improving high-performance sports administrator health literacy were included in the telephone interview schedule at this point, to guide the previously planned free-ranging discussion.

7 What do you believe would be the advantages of implementing a strategy to improve high-performance sports administrator health literacy?

8 Do you believe there are any advantages or disadvantages in doing so?

3 What factors or circumstances would need to be in place to enable the implementation of such a strategy?

9 What factors or circumstances do you believe would make it difficult to implement such a strategy?

10. Is there anything else associated with your own views about the development and implementation of a strategy to improve health literacy in high-performance sports administrators that you would like to discuss at this point?

Appendix G

INFORMATION TO PARTICIPANTS INVOLVED IN RESEARCH

You are invited to participate

You are invited to participate in an additional study [a telephone interview] for the research project entitled "Understanding the determinants of health for Australian high-performance athletes"

This project is being conducted by the same student researcher, Mary Toomey, as part of a Master of Applied Research study at Victoria University under the supervision of Dr Peter Gill from the College of Health and Biomedicine.

Project explanation

We are undertaking this additional study to provide a deeper understanding of participant responses to questions asked during the electronic survey conducted in late 2020. This study will involve a once only telephone interview consisting of up to 10 open questions, which may take up to an hour. Participation is voluntary and you are free to withdraw, without consequence, at any time

What will I be asked to do?

[If you consent to participate in this additional study, you are requested to contact the student researcher at mary.toomey@live.vu.edu.au to provide a telephone number for her to contact you on, as well as nominating a suitable day and time for her to contact you to conduct the proposed interview, which will consist of 8-10 open questions and is expected to take no more than an hour

What will I gain from participating?

There are known benefits associated with participating in this study, other than the understanding of having contributed to knowledge

How will the information I give be used?

The information you provide during this interview will be used to provide a more depth understanding of participant responses to the questions posed during the electronic survey in which you previously participated

What are the potential risks of participating in this project?

The information you provide during this study will be held confidentially and used in a de-identified format to expand the knowledge gained from the previously conducted electronic survey and, hence, there are no known risks associated with participation in this project

How will this project be conducted?

As previously noted, this study will be conducted using a 1:1 telephone interview

Who is conducting the study?

Victoria University

[Dr Peter Gill Ph: +613-9919-5641; email: Peter.Gill@vu.edu.au

[Mary Toomey Ph 0418 584348; email: mary.toomey@live.vu.edu.au

Any queries about your participation in this project may be directed to the Chief Investigator listed above. If you have any queries or complaints about the way, you have been treated, you may contact the Ethics Secretary, Victoria University Human Research Ethics Committee, Office for Research, Victoria University, PO Box 14428, Melbourne, VIC, 8001, email researchethics@vu.edu.au or phone (03) 9919 4781 or 4461.

Appendix G

CONSENT FORM FOR PARTICIPANTS INVOLVED IN RESEARCH

INFORMATION TO PARTICIPANTS:

We would like to invite you to be a part of an additional study to be conducted as part of the research project titled "Understanding the determinants of health for Australian high-performance athletes…

The purpose of this additional study, which will involve a telephone interview, is to explore a deeper understanding of the reasoning behind participant responses to questions posed in the electronic survey conducted in late 2020

CERTIFICATION BY PARTICIPANT

I, "[Click here & type participant's name]"

of "[Click here & type participant's suburb]"

certify that I am at least 18 years old* and that I am voluntarily giving my consent to participate in the study:

Additional study/1:1telephone survey being conducted at Victoria University as part of the larger study "understanding the determinants of health for Australian high-performance athletes" by: Dr Peter Gill

I certify that the objectives of the study, together with any risks and safeguards associated with the procedures listed hereunder to be carried out in the research, have been fully explained to me by:

Mary Toomey

and that I freely consent to participation involving the below mentioned procedures:

- A 1:1 telephone interview to be conducted by the student researcher for the purpose listed above

I certify that I have had the opportunity to have any questions answered and that I understand that I can withdraw from this study at any time and that this withdrawal will not jeopardise me in any way.

I have been informed that the information I provide will be kept confidential.

Signed:

Date:

Any queries about your participation in this project may be directed to the researcher

Dr Peter Gill

+613-9919-5641

If you have any queries or complaints about the way you have been treated, you may contact the Ethics Secretary, Victoria University Human Research Ethics Committee, Office for Research, Victoria University, PO Box 14428, Melbourne, VIC, 8001, email Researchethics@vu.edu.au or phone (03) 9919 4781 or 4461.

Appendix H

CONSENT FORM FOR PARTICIPANTS INVOLVED IN RESEARCH

INFORMATION TO PARTICIPANTS:

We would like to invite you to be a part of an additional study to be conducted as part of the research project titled "Understanding the determinants of health for Australian high-performance athletes…

The purpose of this additional study, which will involve a telephone interview, is to explore a deeper understanding of the reasoning behind participant responses to questions posed in the electronic survey conducted in late 2020

CERTIFICATION BY PARTICIPANT

I, "[Click here & type participant's name]"

of "[Click here & type participant's suburb]"

certify that I am at least 18 years old* and that I am voluntarily giving my consent to participate in the study:

Additional study/1:1telephone survey being conducted at Victoria University as part of the larger study " understanding the determinants of health for Australian high-performance athletes" by: Dr Peter Gill

I certify that the objectives of the study, together with any risks and safeguards associated with the procedures listed hereunder to be carried out in the research, have been fully explained to me by:

Mary Toomey

and that I freely consent to participation involving the below mentioned procedures:

- A 1:1 telephone interview to be conducted by the student researcher for the purpose listed above

I certify that I have had the opportunity to have any questions answered and that I understand that I can withdraw from this study at any time and that this withdrawal will not jeopardise me in any way.

I have been informed that the information I provide will be kept confidential.

Signed:

Date:

Any queries about your participation in this project may be directed to the researcher

Dr Peter Gill

+613-9919-5641

If you have any queries or complaints about the way you have been treated, you may contact the Ethics Secretary, Victoria University Human Research Ethics Committee, Office for Research, Victoria University, PO Box 14428, Melbourne, VIC, 8001, email Researchethics@vu.edu.au or phone (03) 9919 4781 or 4461.

Appendix I

A Sample of Qualitative Interview Transcripts

Edited Transcript of interview with F

Researcher: Hi F**,** I want to start by asking you to elaborate on your understanding of the World Health Organization definition of health.

F: My understanding is the WHO definition is quite holistic. And it's all encompassing. I actually think it's a helpful definition to be operating by.

Researcher: On the basis of that, could you actually explain in some detail for me, what you understand the term optimal health to mean,

F: For me, my understanding is that ability for people to be functioning well or thriving. So optimal, physical, psychological, emotional well-being is where people are in the best kind of functional state in terms of their health and well-being as possible. I think that there's a baseline sense of optimal functioning for any human being. But obviously, when we're thinking about the context of applying it to particular high-performance situations, depending upon that sport, might require you to kind of, you know, I guess, increase, maximize, apply, you know, certain elements of that in maybe, slightly different ways.

Researcher: On the basis of what you've said then can we now discuss your thoughts on social determinants of health? If you could elaborate on what impacts, as you understand them, they may have on high performance athlete health?

F: social determinants, you know, for me, are aspects of things related to health that are connected to other people or interactions or components of how I might operate, both personally, in terms of my social support networks, how I interact and have relationships with others. In sport and in high performance settings, that can be, you

know, the social determinants or the impact of others and how I interact with others in terms of my health and well-being.

Researcher: I'm interested in the notion that social determinants that exist outside sport, can impact on the athlete in the sporting environment. If you've got anything you could add to that space?

F: So if a relationship in sport with my colleagues, like with my teammates for example, or even with my coach or key support staff, sours or becomes dysfunctional, I might become more anxious or stressed about dealing with that person or that situation where I have to interact with them so then that might have an exacerbation in terms of how it impacts upon me emotionally, psychologically, also, even, even if we're thinking from a well-being perspective, I start to change my behaviors.

Researcher: If we could move on to the next risk factor, too, which is biomedical risk. Do you think biomedical risk factors might be unavoidable? Or are they just manageable?

F: It depends. With biomedical, I think there are aspects of, again, depending upon genetically what, you know, what might be predispositions within our makeup that might be either exacerbated/assisted by the type of sport that we might be involved with. I think there are those factors that obviously you can't change those factors, but they, you might be able to, you know, potentially influence the impact of those factors. But I think, in terms of the biomedical sense, there might be components of where you can get assistance, in thinking about the interplay, in terms of how it does interact with your health and what's a range of different things that could actually assist you in dealing with those

Researcher: A really important issue, which to me, suggests that they are potentially manageable?

F: yes, I think that there are aspects that with using the appropriate science and technology at times, that they can be manageable, depending upon exactly what we're talking about and its implications or impacts but the ability to work with any challenges or certain things might enhance

Researcher: Do you think that with some with biomedical risk factors it is possible to reach the elite end of high-performance sport?

F: It depends upon what condition that somebody might have. I do think people can reach high levels of sport, whether they can actually manage that. Again, it just depends upon what that risk factor is and do they have the support team or health team around them to assist them in addressing that.

Researcher: That is important. Now, if we could move on to behavioural risk factors, and your thoughts on these, and the potential impact on high performance athlete health?

F: I think that this is actually a big one that can have an impact, because it is perfectible. Behaviour, is connected to attitude, so what attitudes might I have inherited, or role modelled, or seen or learned, that might actually be hindering type of attitudes of influence certain behaviors that might not be actually helpful to me

Researcher: Well, it's an interesting area to explore. As I read the research, it says that health interventions based on behavior change often don't work.

F: I think the interesting fact is often they're just focusing on the behavior without addressing the underlying attitudinal component of it.

Researcher: Do you think behavior risk factors are just individual, or can an organization display behavioural risk factors?

F: Absolutely. I think, those behaviors are also linked. You know it's linked to the culture of the organization. It's this large overarching attitude that kids role model. The culture itself creates particular behaviors that are then seen to be accepted, because they may be seen to be linked to results.

Researcher: Do you think there are any particular barriers or facilitators to achieving optimal outcomes with behavioural risk factors?

F: I think, Ideally, we'd be looking to consider all of these factors within, within elite or high performance.

Researcher: I've now got some additional questions. I want to explore the area of health literacy a little bit more deeply as well.

F: the reason why I think health literacy is important is that understanding that individual, not just the athletes, but outside of the kind of the performance health team or support staff is that it's critical for whether it's coaches or other components of, of support staff, as well as athletes understand about health. I think that there is a bit of a share of responsibility of keeping up to date in order to provide the most informed support and approach and service. I do think that health literacy, and particularly now even more so in the mental health and wellbeing space, you know, that's really quite critical.

Researcher: Following on from that, how difficult do you do believe it would be to effect positive change in the health literacy of all involved in high performance sport?

F: I think it's a cultural change. I see that kind of cultural change in terms of awareness of these kind of areas happening in other types of sectors in that way. For example, it might be the health and safety sector in large resource organizations or utilities… it becomes something that this is really critical, we see it as something that's critical, in order to give us and support us to reach the goals that we want. If it's

integrated into our key values. If I use it as an example, there's Mental Health First Aid training. So that's helpful in terms of general populations of people that can feel a little bit more comfortable with doing that.

Researcher: You need a strategy then that's consistent with the capacity to be flexible?

F: I think absolutely.

Researcher: From your perspective, are there any issues to be considered about the development and implementation of a strategy to improve health literacy in our high-performance sport administrators?

F: It might be like from a bandwidth perspective, as in, they've got so many other things that they might see more highly valued in terms of what the administrators have to deliver upon. It's also the competition for space and time. In light of what people have navigated through with COVID, I think people will be more receptive and open to recognizing actually, the need for this.

Edited Transcript of interview with L

Researcher: Can I ask you to elaborate on your understanding of the WHO definition of health and whether it is applicable in the high-performance sport setting for me please?

L: It does in large part, but rather than just being, well, because undertaking elite athlete activities is by its nature unhealthy. So, the definition holds, but the priority of it would change.

Researcher: That's fair. Can I expand a little bit on that and look at the determinants of health, particularly the social ones?

L: Yes. So, looking at the social determinants or the causes of causes sort of approach? I do think whatever happens to the general population still holds to elite athletes. For instance, for example, indigenous athletes would still have the same determinants of health as an any indigenous person in Australia. So, they're more likely going to have a social limitation on their health that was partly created by the Australian setting. So, from an equity perspective, the social determinants are present in athletes at an equal rate. So, they are applicable. However, in sport, I believe that there are other social determinants on top of the general societal ones that may or may not contribute to the health such as coaching motives and behaviors. funding of sports, duty of care of the organisation for their health, these are similar to wider societal ones but within themselves are somewhat context specific. Coaching behaviours, funding of sports, organisational structures.

Researcher: Do you think they might equate to social determinants that affect employees in work health settings?

L: Yes, it's directly applicable. However, whether that's acknowledged by the system or not, is debatable. I would say that the legislation would probably cover it. And that would be a body of work which should occur requiring that a board member has the fiduciary duties to make sure that everyone within that organization is safe, and well, and healthy

L: technically, athletes aren't employees, and that is the loophole at the moment. So as a scholarship holder, you are not an employee. And as someone who participates in a sport, you are not actually an employee. So, you do fall outside the legislation, as I believe that that's the loophole that should be closed. It's an important issue that needs to be addressed.

Researcher: If we could move on now to the next determinant of health, the biomedical risk factors?

L: I do believe that again, these broadly applicable you know, sports, specific example of risk effective based approaches are challenged particularly from how they are derived in the literature. So, in terms of a public health, theoretical construct of risk, it will broadly apply that as risk factors for injury and illness. Currently, the way that these are determined are not very, very applicable, but poorly utilized in that people don't understand what the risks are. And it stems from counterfactual logic that you're more likely to have the disease than not, it doesn't mean that you will get the disease and that's poorly understood.

Researcher: Can you tell me about any examples of biomedical risk factors you have to deal with in your working life?

L: I think there's many examples. I think there's a real live example would be looking at training loads and workloads as a risk factor. But truly, they're not a risk factor, they’re an exposure and exposures are different to risk factors. So as an example, they both think that running loads are a risk. Yeah, the smoking cigarettes example…. being a smoker is a risk factor. But it's the number of cigarettes that you smoke, which is tied to us getting cancer. Yep. So that dose response with exposure is the main problem. the other example with risk in sport is that there's something which is called a time to event problem, in that most risk factors are done in a very simple means. They test in preseason, and then look at the number of injuries in the season based off that test. But that's a complete repudiation of the denominator. So, if four people out of 20 get injured, you know, your denominator is 20. But in an AFL setting, you might have 300 athletic exposures of training and competition between when they get tested and when they get injured. And so, your denominator is 300

times 20. So, it's four in 6000 chance rather than four and 20 chance, and it's when those numbers are misinterpreted.

Researcher: So poor statistical analysis?

L: Yes, and biological plausibility comes into it as well as a causal thing is that how much do we believe strength testing October relates to the injury in August, probably little. So, in terms of biomedical risk factors in sport, the concept applies, the operationalization of it in sport is at best poor. It's useful when it's done well, but unfortunately, it's not always done well.

Researcher: I'm really interested in exploring your thinking around behavioural risk factors.

L: So, behaviour-based research does hold a place. And it comes to the individual susceptibility models, that you know, if looking at the epidemiological triangles of host, agent, and environment, that if you can change the behaviors to lower the environmental exposure than that, that holds. The problem with behavioural based interventions is that many of the social and medical determinants of health are beyond the individual's control…. even if you change an individual behavior, it probably won't change their susceptibility, if it's beyond the individual scope to address.

Researcher: That feeds into my next question about whether behavioural risk factors can be organizational rather than individual

L: Yes, absolutely. So, we are thinking this socio ecological model here of intrinsic problems, or factors. Those that are closely related to you know, direct contact. But you have organizational, and we have multiple organizations influence on the same individual sale either state Institute's the National Institutes, the state sports, the National Sports, and also international federations involvement. And then more broadly, you'll have the causes of causes, and you have the Australian context, and

also the regional Australia context. So as an example, hospitals and community programs, …. primary care, being GP's, is federally funded, as is vaccinations, as are a lot of other parts. So yes, they are organizational, but they're also societal and international.

Researcher: One of the really critical findings of my research at this point, has been a strong consensus on the need for better health literacy amongst High Performance Sports administrators, yes. Can you see any advantages or disadvantages of implementing a strategy to address that?

L: Yes, definitely. Obviously, the decisions you make are informed by how literate you are in an area. overwhelmingly in sport, the senior leadership don't have a health background. If you look broadly across the national sporting organization, most of them would come from non-health backgrounds. So as a broad statement, yes, and intervention to improve that would likely change outcomes. However, we need to be cautious in that the existing leadership haven't had the ability to improve their literacy. And so, it's, again, it's another cause of the causes problem that should be implemented, but with empathy and understanding of the state of the situation.

Researcher: what factors or circumstances do you think would need to be in place to manage the implementation of such a strategy?

L: There's a couple of parts to that one. So, if we break down the roles, you probably need a co-intervention here, a single intervention, mightn't work. So, at the very top of an organization since the board, the board will probably need to undergo health literacy as part of their duties as board members. So, I think, at the very top, we need to understand that the board's make the decisions. A CEO will only do what the board instructs. So, I would start with board literacy. …. CEOs probably don't need to be that literate. They should have a delegate who is literate in that area. So that may

be someone who is head of health, or a CMO. That is. organizationally appointed to be responsible to make decisions in this area. And that's not universally met in Australia. I do believe that role holders below that should be undergoing health literacy training, such as coaches, sport scientists, and athletes themselves performance managers and high-performance managers.

Researcher: with multiple different interventions depending on the level of responsibility or engagement that the athletes?

L: Yes, I believe. So, you do need to make it role specific education. The role of a health practitioner is vastly different to someone who funds the health services

Edited Transcript of interview with M

Researcher: I need to revisit that survey you did last year for a little bit to try and get some nuance and depth beyond people's initial responses. The first question I need to put to you is whether you can elaborate on your understanding of the World Health Organization definition of health

M: my understanding is, is obviously it goes well beyond the area of disease, and certainly moving into the area of, of health and, and thriving in what I call kind of resilience, I guess. So, in some ways, it's quite a proactive approach

Researcher: they also use the term ‘optimal health;’ can I ask you how you interpret that?

M: pretty broadly and loosely, I think it's going to be different for each individual. And I think that's a sense that's probably inherent in the definition is that the more we kind of define things, broadly, and one size fits all, you know, what's optimal health for, you know, for a high-level triathlete will be different from optimal health, for a high-

level softball athlete. It needs to be individually defined, hence the word optimal, I guess. It's hard to give any objective definitions of what this might look like for different athletes, I think.

Researcher: I'd like to go on and discuss the determinants of health if you don't mind. can we start with the social determinants? Can you give me your thoughts regarding what constitutes a social determinant in the life of a high-performance athlete?

M: I guess, starting with people in individual sort of understanding, and having good social support, and I can think about those kind of, sometimes those concentric rings that go out, so probably, you know, with the athlete, the coach, and the, you know, with a team, probably, for one of those really important, very narrow, concentric rings, they're so making sure that they've got good connection, they feel supported. You know, they have a place, you know, and that's something that's really important, I think, with most of the athletes that I sort of work with. They're part of a community, a sporting community and the sport and have a sense of connection.

Researcher: Can I ask you to explore some of the wider out rings you mentioned and talk about friends and family outside sport, and their impact on the health of their athletes?

M: I don't know whether they're wider rings, definitely different touch points. And obviously, the athlete's family and the people who sit outside of the sport are just as important. So, partners family, depending on age, and might be their family of origin, but it can also be their what I call their family of creation, and guardians and people like that are enormously important.

Researcher: You're leading me on to another question here regarding social determinants. I'm really interested in things like cultural and historical social determinants and their impact on elite athletes

M: I guess initially, when you talk about culture, you think about ethnicities where they have a big cultural leanings. My sense is that one of the things that I look at in indigenous culture, overrepresented is in the sporting landscape, and probably very much under supported and not really well understood. I think that's one of the areas that we can certainly do better, improve people's social health is how do we, how do we allow for culture how do we embrace that culture?

Researcher: the next one is the biomedical determinants?

M: Well, I think that's one that we kind of, we probably invested most of our time and energy and money in and the likes of things that we're, we do pretty well on that, that side of things. it suits our scientific models and our need for numbers, I think. if you're in a sport where you can measure, you know, to the, to the millimetre, you know, what their capacity is, is not a great predictor of exceptional performance.

Researcher: That's interesting, the biomedical model misses out on is things like psychological drivers?

M: In that space, predicting performance based on psychological constructs is pretty poor too.

Researcher: In that space, do you think the problem is likely to be that we try and generalize findings for an injury in an individual to a collective?

M: Yeah, I think so. So yeah, measuring human behavior is always complex.

Researcher: Which I think leads nicely into the next area, which is behavioural risk factors. And your thoughts on that space, with regard to high performance athlete

health? I have a sub question to that one. Do you think behavior risk factors can be both organizational, and individual?

M: Definitely - you have to look broader than if you're really going to improve the health of the system, you've got to look further than the individuals. And most definitely look at the organizational drivers. Often, we focus too much on the individuals and their behavior and not enough on the on the system. And to a very large extent, I think we were relatively good at on the individual level we're much poorer on the organisational. And one of the areas from a psychological perspective, but it comes up repeatedly to me is sort of that coach athlete interaction, where you can be, you can be concerned about basically risk behaviors there.

Researcher: which leads me to my next question, which is regarding health literacy

M: As I sit and watch the high-performance space, the way that we approach and deal with things like athletes, mental health and eating disorders, included in that certainly has improved our thought from where we were, we're going to continue processes. Before we begin, I would like to probably because it's quite topical, for me at the moment. I don't know what the solution is, very when you have very, very successful coaches who will occupy a big footprint in the space. Effectively, their behavior can be quite detrimental to athletes, and we're seeing it again in the genetic space, we've seen that, you know, that sort of psychosocial behavior of the other coaches towards their athletes.

Researcher: I think that's leading me to my next question. In the survey, you were asked about the importance of health literacy for athletes, coaches, and sports administrators. Which group would you consider be most important address?

M: priority is probably coaches at this stage. Administrators …essentially, they're the hirers and firers of the coaches as well. So, they're really important as well. So, there's probably a bit of a cultural work in that space.

Researcher: how difficult or easy do you think it would be to achieve positive change with both of those groups in terms of health?

M: I think it's challenging, but I don't think it's a huge ask. And I think if you lifted the performance, I think you would get the buy in from these people. And for me, that's what it's about. And in the end, I think we all have that shared, common goal of performance success.

Researcher: That leads me on to the health literacy environment, which is where I think administrators and coaches are critically important.

M: Environment is critically important for your health in high-performance sport and sports administrators create the systems and processes that drive that.

Edited transcript of Interview with R

Researcher: I've got some questions here to ask now if you don't mind. What I'm trying to do is get a deeper understanding of the responses we got from the first-round survey. To start that off, I need to ask you to elaborate on your understanding of the World Health Organization, definition of health

R: Complete physical, mental, and social well-being and not merely the absence of disease or injury (then started discussing R's current studies in epidemiology)

Researcher: It's kind of insightful, isn't it?

R: It's been an interesting year. So much of the focus is not on the specifics of performance health or athlete health. The focus is obviously much more, in a general

sense, [on] developing strategies and processes to apply those general principles into a performance health setting. That's been quite an interesting thing to be learning and extrapolating on and developing thought processes around

Researcher: I'm trying to gather the evidence required to implement some of those strategies.

R: So, the evidence that you've got so far; the stuff from the from the survey?

Researcher: The results so far suggest that there's a significant need for improved health literacy across the board.

R: doesn't surprise me. Can I say even when I started in this role, I would say I would have rated my health literacy reasonably. I wouldn't have said it would have been an expert, but I would have rated it reasonably highly. But then, it took me about three to four months to realize what little I actually knew.

Researcher: You've realized knowledge previously held is presumed not actual?

R: Yeah, correct**.** That's part of the reason why I was interested to, not the least of all been very keen, to help you out in your in your research.

Researcher: Good. I'll just go back to the definition of health question to ask how you understand the term optimal health?

R: I would say my understanding has evolved pretty much as I've just explained, having been involved in my current role. Previously, if I'm very honest, and transparent in my own thoughts, I would have said that, that my focus on health was very much on physical health and didn't even consider mental health or social well-being. There was a very strong focus for probably fairly obvious reasons in sports medicine, on physical capability, and physical capacity for performance, mental health and social wellbeing were a consideration, but always a bit of an afterthought.

Researcher: I think one of the things that is lacking in our education is an understanding of how much those things drive physical health.

R: Agreed. And the older that I get, and potentially more experienced, I become, I suppose, the more obvious to me that becomes, but the other part which resonates with me, significantly, which is really just a follow on is the whole absence of disease so that we're not it's not we're not merely just saying someone who's not sick. But someone who is actively well.

Researcher: It's really interesting, when you read the read the bulk of the literature regarding high performance athlete health, it usually talks about health from the perspective of ill-health or injury

R: Yeah. Yeah. And that's, I suppose that's where I that's where I still see a lot of our focus. the key project that I've got as part of my role is to try and shift the focus of our health care providers, from engaging with broken athletes. To engage with as many unbroken athletes as possible so that we have to deal with the least number of broken athletes in any context and in any by any definition, whether that's physical, mental, or social. So that we can decrease the number of those broken athletes because we've hopefully put in place various forms of primary, secondary, and tertiary injury prevention to minimize that risk in the first place. I would actually argue that I that the number of the number of high-performance sporting organizations that are at the point that we are at here is still well and truly in the minority. And any evidence, any evidence that can continue to evolve the way that clinicians think about athlete health in high performance sport.

Researcher: Can I just take the little step sideways? I'd like to talk to you about social determinants of health. They're a critical part of my thinking in this space. I'm think you'll be able to answer this question well now you're studying in the

epidemiology space? Can you define what constitutes a social determinant of health? And the health impacts of that?

R: Social determinants of health in a sporting context for me, social determinants of health I think about as being factors to do with, with access and availability as a fairly significant component. And that's certainly one of the one of the issues that we continue to need to address here is equal access to health care. Despite our best efforts, we've got regional athletes and, in some cases, international athletes who don't necessarily have the same access as the metro athletes that are living around the corner

Researcher: That's one of the real-world challenges.

R: Yeah, yeah, exactly. And the other real-world Challenge, we don't yet have the capacity to be able to provide private health cover for all of our scholarship holders. So, access to health care outside of our network, should we need to be extending that access into general Australian population health care model, which is obviously split between the public and private system? We don't have equal access to that within our work social network, or social setup or sociology group, either. There's a range of socio-economic backgrounds from whichever scholarship holders come.

Researcher: That's, that's leading into my next question, thinking about broader social determinants, including athletes, ethnicity and cultural background, the broader social network? Do you factor those into thinking about athlete health?

R: Well, absolutely I do. So, we've got some good examples of that at the moment with athletes from different socio-cultural backgrounds, with different beliefs around vaccination. So, you know that and that's a significant factor for us at the moment. We have to try and work out ways of translating often slightly confusing scientific jargon, scientific principles, and scientific language into meaningful pieces of

information that are digestible by a range of different people that come from a range of different ethnicities, backgrounds, socio cultural backgrounds, socioeconomic backgrounds, and in some cases, educational backgrounds. Yes, I think those things have a potentially very significant effect on health outcomes in any healthcare model.

Researcher: When you talk about high performance, athlete health, we think about where they are now (the sporting environment) rather than when they're not with us (the general community).

R: I think the other part for that too, is where they go once they leave us. And that's one of the things that there's been a very significant focus on, certainly not just with us, but across, I would say, a significant proportion of the Australian high performance sport landscape.

Researcher: It's all about building the capacity of athletes as people for life beyond sport?

R: Exactly. And so, we try and factor in where people have come from and factoring in some of those determinants that you've already described

Researcher: Can I just take a sidestep sideways to talk about biomedical risk factors?

R: For me biomedical factors are probably the things that are a little bit more the traditional clinical way of thinking about health

Researcher: I also want to talk about the other risk factor, which is behavioural

R: I think for me, the behavioural side with high performance athletes is an interesting one. (And continued to discuss this in significant detail, including citing specific athlete/team/sport examples)

Researcher: you're leading into another question I've got in this space about whether behavioural risks can be both organizational, and individual?

R: Well, I think that's the that's the constant tension, isn't it? Is what are the non-negotiable things from an organizational perspective, that rule that we require our athletes to standards to, for them to meet, let's say, from a behavioural perspective, versus what potentially suits the individual.

Researcher: I think that leads into my next series of questions, which are all about health literacy. Why do you believe health literacy is important?

R: We could talk about that for the next six hours and still not have a definitive answer. I think we exist in a mode where health literacy hasn't been prioritized. I think the truly best high-performance sports teams, and this could be in a team sport just as much as an individual sport, are best set up is when there's leaders who instil that willingness to be vulnerable and to share and to not feel as though we need to protect their turf and silo ourselves away from each other. Be prepared to share in a vulnerable way, but a way in which we know is positive and supportive across all of those disciplines.

Researcher: I think what you're talking about there was the healthy health literacy environment. That's the operational expression of health literacy.

R: So yeah

Researcher: One of the really important findings from the surveys was generally consistent opinion, there was a really significant need for improved health literacy in High Performance Sports administrators. Can you see any advantages in undertaking that as a project relative to what you discussed before?

R: For me, the answer to that would be determined by the format of the project. I'm a pretty firm believer in needing to try and customize things to suit life, not just individuals, but the circumstances. At any given time, and at any given point, and that may change in the same organization with the same person in charge. For a

different perspective, that may require two very different approaches to be taken at different points in time.