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A scoping review of factors within the higher education ecosystem influencing student-athlete mental health and wellbeing in North America: Insights and a model for mental health promotion

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The purpose of this research was to synthesize peer-reviewed literature identifying factors in the organizational ecosystem that impact student-athlete mental health in North American higher education. We adopt a holistic definition of mental health that includes both mental illness and multidimensional wellbeing (i.e., psychological, emotional, and social wellbeing). A structured scoping review method was used to search seven databases. Data from included studies (N = 57), were summarized according to the socioecological model of health and analyzed using thematic synthesis. Post-secondary sport environments that promoted mental health and wellbeing supported student-athlete psychological need satisfaction and were characterized by: (1) growth-oriented motivational climates, (2) harmony between academic and athletic roles, (3) equity and inclusion, (4) social support, (5) positive relationships, (6) ethical leadership, and (7) health-promoting organizational operations. We propose a theoretically and empirically informed conceptual model illustrating features of post-secondary sport that interact to promote student-athlete mental health and wellbeing. The model offers a foundation to guide the design, implementation, and evaluation of organizational strategies that are responsive to athletes' reported needs and adaptable across competitive levels. Applied theoretical perspectives aim to support interpretation of the model across different competitive divisions and sport levels considered in the included literature, emphasizing the importance of supportive environments amid varying demands and sociocultural climates. Overall, findings underscore the need for coordinated, system-level investment in student-athlete mental health and further organizational research across sport systems.

Broad recommendations to manage mental health and illness exist in some levels of elite sport and frameworks are being adopted for mental health promotion in colleges and universities (Canadian Standards Association [CSA] & Bureau de normalisation du Quebec [BNQ], 2013; CSA & Mental Health Commission of Canada [MHCC], 2020; Durand-Bush & Van Slingerland, 2021). However, there remains a significant gap in knowledge regarding proactive mental health promotion among different athlete groups like those at the university and college level, who are a large and valued sport community. A more comprehensive understanding is needed for mental health promotion strategies to be effectively targeted and tailored to athlete needs in unique contexts (Herrman & Jané-Llopis, 2012; WHO, 2005). The design and delivery of proactive and preventative mental health interventions can be particularly nuanced for athletes in embedded sport systems within higher education who navigate interconnected academic and athletic systems and must also manage these competing demands.

Existing guidelines for mental health promotion call for socioecological perspectives that consider diverse determinants of health and wellbeing at individual, group, institutional, community, and sociopolitical levels (Botezat et al., 2017; Durand-Bush & Van Slingerland, 2021; Herrman & Jané-Llopis, 2012; WHO, 2005). Despite this, higher-level factors stemming from sport institutions, communities, groups, and their surrounding sociocultural environments are under-researched (Kuettel & Larsen, 2019; Uphil et al., 2016; WHO, 2005). For instance, research on the mental health impacts of social and group dynamics in athletes is still nascent. Instead, social factors have been largely examined for their impact on health behaviours like substance use in collegiate athletes or participation and retention among younger recreational athletes (Arnold & Liu, 2020; Chan et al., 2019; Grossbard et al., 2009). Athlete mental health literature has also primarily focused on individual athlete risks or behaviours affecting mental health (like injury, coping skills, sleep, or personality tendencies; Kuettel & Larsen, 2019). This overlooks the importance of broader, upstream factors that influence mental health and wellbeing, such as leadership, sport climate, and organizational operations and resources (Kegelaers et al., 2022; Kuettel & Larsen, 2019; Simpson et al., 2021; Uphil et al., 2016; WHO, 2005). An incomplete understanding of how sport groups, environments, and cultures impact mental health limits approaches to support athlete wellbeing and can further inequalities by placing a disproportionate onus on individuals and overlooking systemic preventive measures (Botezat et al., 2017; Fletcher et al., 2006; Herrman et al., 2012).

Research on athlete mental health has also largely stemmed from sport psychiatry, focusing on elite athlete performance and using a "deficit-based" lens — considering mental illness pathology (e.g., the impacts of anxiety symptoms on performance; Gouttebarge et al., 2019; Kuettel & Larsen, 2019; Reardon et al., 2019; Uphill et al., 2016). The clinical treatment

perspective often used in reviews of athlete mental health has tended to explore the prevalence of common mental disorders and associated risk factors (Kaishian & Kaishian, 2021; Rice et al., 2016; 2019). However, focusing solely on athletes with clinical mental illness symptoms is largely reactive – overlooking a large portion of athletes who may not have a clinical diagnosis or symptoms but who could nonetheless benefit from wellbeing interventions. This approach may also contribute to a narrative that "others" athletes with mental illness rather than unifying the conversation around mental health (Uphil et al., 2016). Such a deficit-based, clinical lens is thus insufficient to inform comprehensive mental health promotion which calls for empowering and destigmatizing asset-based approaches that consider both predictors of health as well as illness (Galderisi et al., 2015; Herrman et al., 2005; Uphill et al., 2016).

Considering both mental illness and mental wellness aligns with recognized definitions of mental health like that of the dual-continuum model. This model of mental health suggests mental illness and mental wellness are not mutually exclusive but exist on along intersecting spectra (Keyes, 2002; WHO, 2005). This means an athlete can have a mental health condition while also maintaining aspects of positive mental health. This holistic view may contribute to alleviating mental illness stigma and supporting help-seeking, which may be a particular concern in sport, ultimately supporting mental health promotion efforts (Uphil et al., 2016).

Research on organizational stress in sport has identified extensive stressors and consequences including burnout, anxiety, and impaired performance (Arnold et al., 2016, 2018; Didymus & Fletcher, 2017; Simpson et al., 2021). However, the mechanisms through which organizational factors impact athlete mental health and may promote wellbeing are not well-understood, particularly in post-secondary settings, where complex interactions between academic and athletic institutions may be imperfectly accounted for in current organizational and management theory. Thus, we lack a comprehensive understanding of how to build organizational sport environments not only to prevent stress and ill-health, but to promote mental wellbeing. An improved understanding of factors within organizational ecosystems that impact mental health is increasingly important to support current governmental and institutional priorities for mental health promotion (CSA & Bureau de normalisation du Quebec, 2013; CSA & MHCC, 2020; Durand-Bush & Van Slingerland, 2021). Therefore, the present research seeks to build on previous literature identifying variables associated with mental health in student-athletes (Kegelaers et al., 2022) with an expanded scope and through theoretically informed analysis of factors relevant to organizational mental health promotion.

This review draws on the socioecological model of health, a multi-level framework central to mental health promotion practice, to review existing research and propose a model for the mental health

and wellbeing impacts of organizational factors in post-secondary sport (Durand-Bush & Van Slingerland, 2021; Henriksen et al., 2020; McLeroy et al., 1988). We adopt a holistic definition of mental health that includes both mental illness and multidimensional wellbeing (i.e., psychological, emotional, and social wellbeing) (Keyes, 2002; Lundqvist et al., 2011). We seek to synthesize literature according to the socioecological model and compare settings in Canada and the United States (U.S.) to better understand contextual differences in organizational impacts and how mental health promotion approaches may be tailored to different settings.

Materials and Methods

A structured scoping review method was used for the present study given the breadth of the topic, considering factors impacting both mental health and wellbeing at multiple socioecological levels. This review adhered to the five-stage framework by Arksey and O'Malley, (2007), enhanced by Levac and colleagues (2010). A systematic search strategy was developed using a Population, Exposure, Outcome (PEO) format (Table 1). Population terms covered student-athletes in higher education (hereafter simply 'student-athletes') competing in interscholastic sport. We use the term 'post-secondary' on occasion to emphasize inclusion of both colleges and universities, which in Canada are relatively distinct institutions. Students in college or university at any level (i.e., undergraduate, graduate, or professional degrees) were considered provided they were eligible participants in their corresponding competitive interscholastic sport league (e.g., the U.S. National Collegiate Athletic Association [NCAA], Canadian Collegiate Athletic Association, or U Sports; Table 2). Outcomes included indicators of mental illness and related symptoms (e.g., anxiety, depression, or broader psychological symptoms) and indicators of positive mental health and wellbeing (Table 2). Wellbeing outcomes were based on a multi-dimensional model of emotional, psychological, and social wellbeing including related terms like flourishing, thriving, eudemonia, and hedonia (Keyes, 2002; Lundqvist, 2011; Table 2). Four platforms were searched (PsycINFO, Web of Science, PubMed, and EBSCOhost) for all research published to July 2023. Further, the reference lists of 14 included articles were hand searched to ensure no relevant articles were missed.

Articles included in this review were limited to English, peer-reviewed studies that, in addition to the population and outcome criteria, included an exposure associated with the post-secondary environment (e.g., interpersonal, group, institutional factors according to the levels of the socioecological framework; McLeroy et al., 1988; Table 1). Transient emotional experiences or state-like psychological responses to sport performance, competition, or training were excluded (e.g., competition anxiety). Studies solely examining disordered eating or substance use behaviours in the absence of other mental health or wellbeing outcomes were also excluded. Though these behaviours are often linked to mental health, they were excluded if they lacked any

recorded broader indicators of pathology or wellness. Substance use and disordered eating have also been thoroughly studied elsewhere, including examining distinct interventions for the target population (Reardon et al., 2019; Rice et al., 2016). To maintain relevance for mental health promotion practice broadly, studies were excluded if their sole predictor was related to COVID-19, a physical injury, or a clinical treatment intervention. Both qualitative and quantitative study designs were eligible for inclusion.

Citations were imported, de-duplicated, and reviewed in Covidence systematic review software (Veritas Health Innovation, n.d.). Titles and abstracts were screened by two independent reviewers based on eligibility criteria defined *a priori*. Full texts were then reviewed against inclusion criteria by both reviewers in parallel using a structured form. Extracted data included publication details, population size and demographics, study aims, methodologies, theoretical frameworks, outcome measures, findings, and limitations. Data were extracted from each eligible study by the primary author, then reviewed and verified by the second reviewer. Reasons for study exclusion were recorded in Covidence. Electronic database searching retrieved a total of 4,371 references (Figure 1). After removal of duplicates, 1,659 unique articles were assessed for title and abstract relevance. The full texts of 696 articles were reviewed, resulting in a final sample of 57 articles eligible for inclusion.

To better conceptualize characteristics of post-secondary environments associated with positive mental health and well-being, we undertook a thematic synthesis of included exposure variables (Thomas & Harden, 2008). Relevant data reflecting the operationalization and measurement of exposures were extracted from study methods, results, and discussion. This included details such as conceptual frameworks, definitions of key constructs, and measurement tools used in the included studies, allowing analysis of data from both quantitative and qualitative research. These text data were coded inductively and manually in Word, assigning relevant constructs labels reflecting their meaning and use in the included research. Similarities and differences between codes across studies were explored to iteratively create and modify groupings of codes and assign them hierarchical themes. The inductively derived codes and themes were then grouped into generalizable, higher-level characteristics associated with positive mental health in post-secondary sport (Thomas & Harden, 2008). Because this was an iterative process of translating findings, many words could be used to code similar constructs, and multiple codes could be applied to the same data, no data were available to calculate inter-coder agreement. Instead, we present important contextual details for the studies from which these themes emerged to allow readers to judge for themselves whether the included contexts are relevant to their own (Thomas & Harden, 2008).

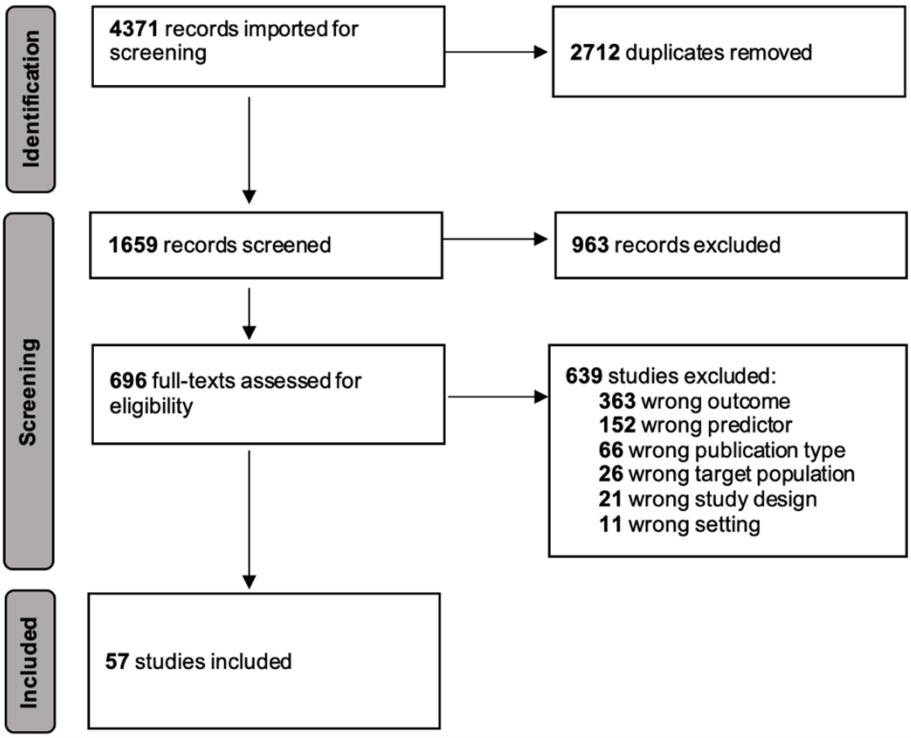
Table 1. Eligibility criteria for included research on factors impacting mental health and wellbeing in North American post-secondary student-athletes (for literature published prior to July 2023 in 5 databases)

	Inclusion Criteria	**Exclusion Criteria**
Population	Intercollegiate student-athletes Attending a North American post-secondary institution	
Exposure	Any factor in the meso- (e.g., interpersonal, group), exo- (e.g., institutional) and/or macro- (e.g., sociopolitical) system levels	Sole predictor related to COVID-19 Sole predictor is physical injury. Sole predictor is clinical treatment Exposure/intervention is theoretical or hypothesized
Outcome	Any outcome related to complete mental health and/or wellbeing including: - Mental illness diagnoses and/or related symptoms - Positive mental health or wellbeing (e.g., social, psychological, or emotional wellbeing)	Coping skills Performance- or competition-related state measures (e.g., affective states during training or competition) Physiological indicators of stress Alcohol or substance use behaviours in the absence of any other mental illness or wellbeing variable Eating disorders/disordered eating
Study type		Consensus statements/opinion papers Reviews Theses/dissertations Tool development/validation studies
Language	English	

Table 2. Search terms used to conduct a scoping review of peer-reviewed research on factors related to mental health and wellbeing in North American post-secondary student-athletes (published prior to July 2023 in 5 databases)

Inclusion Criteria	Outcome
varsity OR colleg* OR post-secondary OR "post secondary" OR intercollegiate* OR inter-university OR "inter university" OR interuniversity OR universit* OR USport* OR "U Sports" OR "U Sport" OR "CCAA" OR "OUA" OR "NCAA" OR "div I" OR "div II" OR "div iii" OR "division I" OR "division II" OR "division III" OR undergrad* AND "Student-athlete" OR "student-athletes" OR Athlet* OR jock OR sport* OR competitor* OR racer* OR finalist* OR medalist* OR champion* OR Archer* OR Baseball* OR basketball* OR badminton OR biker* OR Biking* OR backstrok* OR biathl* OR butterfl* OR breaststrok* OR bodybuild* OR "body builder" OR "body building" OR "body builders" OR boxer* OR boxing OR boulder* OR Curling OR curler* OR cheer* OR climber* OR climbing OR canoe* OR cyclist* OR cyler* OR cycling OR cricket* OR duathl* OR dragonboat* OR "dragon boat" OR "dragon boating" OR "dragon boater" OR "dragonboaters" OR ((dancer* OR dance) AND (compet*)) OR diver OR divers OR diving* OR equest* OR futsal* OR fencer* OR fencing OR football* OR floorball* OR "fast-pitch" OR "fast pitch" OR "fast pitcher" OR "fast pitchers" OR "fast-pitcher" OR "fast-pitchers" OR fastpitch* OR frisbee* OR freestyle* OR gymnast* OR golf* OR hurdl* OR heptathl* OR hockey OR handball* OR halfpipe* OR "half pipe" OR "half-pipe" OR "jiu-jitsu" OR "jiu jitsu" OR judo OR "high jump" OR "long jump" OR "triple jump" OR "high jumper" OR "high jumpers" OR "long jumper" OR "long jumpers" OR "triple jumper" OR "triple jumpers" OR javelin* OR karate OR "krav maga" OR kayak* OR lacrosse OR "martial arts" OR "martial art" OR mogul* OR "MMA" OR marathon* OR netball* OR pickleball* OR pentathl* OR "ping pong" OR "Ping-Pong" OR polo* OR powerlift* OR "power lifter" OR "power lifting" OR "power lifters" OR "power-lifting" OR "power-lifter" OR "power-lifters" OR runner* OR racquetball* OR ringette* OR raft* OR riding OR rider* OR rugby OR rower* OR rowing OR racing OR swim* OR skier* OR skiing OR ski OR snowboard* OR soccer OR skat* OR softball* OR squash OR slalom* OR synchro OR shotput* OR "shot put" OR "shot putter" OR "shot putters" OR "shot putting" OR slopestyle* OR trampolin* OR tennis OR triathl* OR throw* OR toss* OR weightlift* OR "weight-lifting" OR "weight-lifter" OR "weight-lifters" OR wrestler* OR wrestling OR volley* OR "vaulting" OR vaulter*	Anxi* OR stress OR "conduct disorder" OR "conduct disorders" OR "GAD" OR phobi* OR panic* OR obsess* OR compuls* OR "OCD" OR "post-traumatic" OR "PTSD" OR "post traumatic" OR "postratumatic" OR "moral injury" OR "moral injuries" OR "OSI" OR "OSIs" OR distress* OR worry OR overwhelm* OR Depress* OR "MDD" OR dysthymi* OR sad* OR mood OR mania OR manic OR bipolar OR unipolar OR cyclothymi* OR Psychos* OR "negative affect" OR schizo* OR paranoia OR delusion* OR catatoni* OR "BPD" OR dissociat* OR depersonaliz* OR derealiz* OR psychopath* OR "CMD" OR "ADHD" OR "attention-deficit" OR neurot* OR neuros* OR languish* OR "Eating disorder" OR "eating disorders" OR anorexi* OR bulimi* OR "BN" OR dysmorph* OR Suicid* OR "self-harm" OR "self harm" OR "self-injury" OR "self injury" OR "self injurious" OR "Well-being" OR "well being" OR "wellbeing" OR hedoni* OR eudaemon* OR eudemon* OR eudamon* OR generativity OR flourish* OR wellness OR welfare OR thriv* OR drinkers OR "drinking" OR "alcoholism" OR addict* OR alcoholic* OR (psych* OR mental* OR emotion* OR personalit* OR antisocial* OR behaviour* OR behavior*) AND (Symptom* OR disorder* OR ill* OR dysregul* OR disease* OR patho* OR challeng* OR concern* OR struggl* OR health OR coping OR adjust* OR adapt*)

Figure 1. Results of scoping review retrieval and screening process



Results

Characteristics of Included Studies

Summary characteristics of included studies can be found in Tables 3 and 4 and additional details of the included studies in the Supplementary Material. Most included studies were cross-sectional in design (n = 46). Forty were quantitative and 18 were qualitative (including one longitudinal and one pre-post intervention study). Only ten were based on research conducted in Canada. The most common theoretical or conceptual frameworks used were Self-Determination Theory (n=6), the Keyes' Dual-Continuum Model of Mental Health (n = 4), and the Transactional Model of Stress and Coping (n=3).

Quantitative studies (n = 40) had sample sizes ranging from 37 to 20,589 participants (median = 157) and primarily examined student-athletes from more than one sport (n = 30) including a mix of team and individual sports. Five of these studies examined athletes from a single sport and five did not specify the participants' sport type. Just under half of the quantitative studies (n = 19) sampled athletes from one post-secondary institution, with the remaining 21 studies sampling multiple schools, spanning local to national geographies. All quantitative studies collected data through self-report questionnaires. Most (n = 16) looked at the highest competitive level of U.S. athletics – Division I (DI) of the National Collegiate Athletic Association (NCAA). Four studies examined Canadian inter-university sport, three looked at student-athletes across all divisions of the NCAA, and six others did not specify the competitive level.

Qualitative studies (n = 17) ranged in sample size from five to 47 participants (median = 14) also primarily considering student-athletes from more than one sport (n = 12), two examined athletes from a single sport, and three did not specify sport type. Interpretive research paradigms (e.g., inductive thematic analysis) were the most common approaches to qualitative inquiry (n = 6). Twelve qualitative studies collected data primarily through individual interviews. Three others used a combination of focus groups and interviews, with one additionally surveying key informants and observing participants. Interviews and focus groups lasted from 13 minutes to two hours, and all but three studies described interview or focus groups guides used to maintain consistency throughout data collection, however, only three noted pilot testing the question sets.

Mental Health and Wellbeing Outcomes

Twenty-three studies looked at outcomes related to illness and associated symptoms, while 19 measured wellbeing or positive mental health, and 15 examined a combination of the two (Table 3). Stress and anxiety were the most common outcomes examined related to poor mental health, examined in 11 studies using nine different measurement scales (e.g., The Perceived Stress Scale n = 4, the State-Trait Anxiety Inventory n = 2; See Supplementary Material). Mood disorder and depressive symptoms were the second most common indicator of mental ill-health (n = 10), measured using three different scales, primarily the Center for Epidemiologic Studies Depression Scale (CES-D) (n = 7). Nine studies measured general psychopathology or mental illness symptomatology, using scales such as the Patient Health Questionnaire (PHQ) (n = 2) and the Symptom Checklist (SCL) (n = 2). Three individual studies separately examined suicidality and self-harm, and stress in minority communities.

Most studies considering positive mental health examined multiple components of wellbeing (n = 20) or used global indicators (n = 6). Five others specifically examined psychological wellbeing, two considered subjective wellbeing, and one social wellbeing. Most often, wellbeing outcomes were assessed qualitatively (n = 12). Otherwise, common measurement tools included the Satisfaction with Life Scale (SWLS) (n = 5) and The Mental Health Continuum Short-Form (MHC-SF) or its subscales (n = 5).

Factors Related to Mental Health and Wellbeing

Exposures in the post-secondary environment explored in included studies were categorized according to levels of the socioecological model — See Figure 2 for a summary of examined factors related to athlete mental health and wellbeing. Interpersonal factors were examined in 40 studies. Social support was the most common; quantitatively explored by 18 research teams using 10 different scales in nine cross-sectional studies and one longitudinal study.

Table 3. Summary of characteristics of included North American studies examining factors related to mental health and wellbeing in post-secondary student-athletes (n = 57; published in 5 databases prior to July 2023)

Inclusion Criteria		Number of Included Studies
Study Type		
Quantitative		**40**
	Cross-sectional	35
	Longitudinal	5
Qualitative		**17**
	Cross-sectional	13
	Longitudinal	1
	Pre-post evaluation	1
Location/Schools		
United States		**47**
	A single school	*22*
	More than one school	*20*
	Not specified	*5*
Canada		**10**
	A single school	*5*
	More than one school	*5*
Sport Type		
Team (interactive) sports only		**8**
	One sport	*6*
	Multiple	*2*
Individual (coactive) sports only		**1**
Interactive and coactive sports		**29**
Not specified		**20**
Outcomes		
Mental illness/symptoms		**23**
	Stress/anxiety	*11*
	Mood disorders/depressive symptoms	*10*
	General psychopathology	*9*
	Other	*3*
Wellbeing/positive mental health		**19**
	Psychological wellbeing	*5*
	Subjective wellbeing	*2*
	Social wellbeing	*1*
	Multiple indicators	*20*
	Global indicators	*6*
Combination of ill health & wellbeing		**15**

Table 4. Details of 57 included studies and variables examined in relation to post-secondary student-athlete mental health and wellbeing

Study	Aim	Population	Method	Variables Associated with SA Mental Health
[1]	To evaluate if SAs and NAs differ in non-suicidal self-injury (NSSI), suicidal ideation, suicide attempt, or help-seeking and their predictors.	U.S. national sample of 165, 210 undergraduates from 426 four-year schools (20,589 SAs – sport type and level n.s.)	Regression analysis of secondary cross-sectional data	Interpersonal - Relationship difficulties more strongly predicted suicide attempts in SAs (OR = 2.51 vs OR = 1.86; $p < 0.01$). Sociopolitical - Race was a significant predictor for NSSI only in non-athletes (OR = 0.42; $p < 0.01$).
[2]	To explore SA experiences of team cohesion and its impacts.	U.S. 21 NCAA SAs (17 DI, 4 DII) from 8 sports (2 co-active) and "a range of colleges geographically"	Retrospective individual semi-structured interviews (30-90 min)	Group/Organizational - Flexible team environments permitted engagement outside sport, an outlet for stress, and diverse sources of social support to boost mood and satisfaction. - Restrictive team environments (e.g., mandated bonding, limits on activities, over-identification) reduced SA autonomy, strained relations, and created exhaustion and isolation from campus.
[3]	To compare SAs and NAs social connectedness, self-esteem, and depression and assess their interactions.	U.S. 227 undergraduate students from 1 small private southern liberal arts college (104 SAs)	Analysis of variance of cross-sectional data	Interpersonal - Social connectedness had a strong inverse correlation with depression ($r = -0.619$; $p < 0.01$) and predicted depression in regression modelling ($\beta = -0.539$; $p < 0.001$). - SAs had greater social connectedness ($p < 0.001$), self-esteem ($p < 0.01$), and less depression ($p < 0.05$) than non-athletes.
[4]	To examine factors that influence the transition process: athletic identity, career maturity, and subjective wellbeing.	U.S. 93 male undergraduate football SAs from 2 NCAA schools (1 DI - 46 SAs - and 1 DIII)	Analysis of variance of cross-sectional data	Group/Organizational - Sport level and school were associated with mood, life satisfaction, and anxiety. - DI SAs had lower mood than DIII and were higher on five of six subscales including anxiety ($p = 0.004$), depression ($p = 0.034$), anger ($p = 0.098$), and fatigue ($p = 0.005$). - Among SAs who were high in athletic identity (AI), those at the DI school had lower life satisfaction ($p = 0.106$, $\eta p2$ partial eta squared effect size = 0.064). SAs with low AI did not differ in wellbeing between institutions.
[5]	To understand newcomer SA acculturation in Canada by exploring transition and settlement experiences.	7 newcomer varsity SAs (arrived in Can. Between 2013 and '18) attending colleges and universities in Manitoba	Interpretive qualitative analysis of individual semi-structured interviews, participant reflection, and field notes.	Interpersonal - Racism, prejudice, and other social difficulties excluded newcomer SAs. - Acculturation stress could lead to depressive symptoms and suicide risk via loneliness and isolation. - Tangible and informational support from coaches and teammates were helpful, particularly to help overcome language barriers. Organizational - Academic administrative challenges were stressors Community - Financial strain and poor healthcare access were also stressors

β = Regression coefficient; D = Competitive division; NA = Non-athlete; NCAA = National Collegiate Athletic Association (United States); n.s. = Not stated; OR = Odds ratio; r = Correlation coefficient; SA = Student-athlete

Study	Aim	Population	Method	Variables Associated with SA Mental Health
[6]	To determine gender and parent involvement differences in psychology of freshmen SAs.	U.S. 155 first-year undergraduate NCAA SAs (schools n.s., DI and DIII) from 8 sports (7 co-active)	Analysis of variance using cross-sectional data	Interpersonal - Parental involvement did not impact psychological wellbeing (but greater father involvement was linked to more (conscientious) perfectionism in univariable analyses – p value < 0.01).
[7]	To examine if support is associated with SA psychological well-being.	U.S. 235 SAs from 24 schools (8 DI, 7 DII, 6 DIII, 4 NAIA)	Regression analysis using cross-sectional data	Interpersonal - Support satisfaction was significantly associated with greater self-determined motivation (SDM) (β = 0.31) and less overall burnout (β = -0.27) (p values < 0.001). - Perceived availability of support predicted increased SDM (β = 0.32; p < 0.001) and less burnout (β = -0.24; p < 0.01) above the impact of satisfaction. - Support received was not associated with SDM or burnout above satisfaction. - Gender did not moderate the relationships. Group/Organizational - Only emotional/physical exhaustion varied at the team level (ICC = 0.17; p < 0.05), neither global burnout nor motivation varied by team.
[8]	To examine social support and interactions as moderators of the stress-burnout and burnout-well-being relationships.	U.S. 465 SAs from at 20 schools (9 DI, 2 DII, 7 DIII, 2 NAIA)	Regression analysis of longitudinal data from surveys at 4 times over a competitive season	Interpersonal - Support satisfaction (β = 0.22) and negative interactions (β = -0.12) were significantly associated with wellbeing over time, when accounting for SA dispositional negative affect, motivation, and stress (all p values < 0.001). - Neither satisfaction nor interactions moderated the time-burnout-wellbeing relationship
[9]	To examine associations among SA emotional intelligence, social interactions, burnout, and well-being.	U.S. 86 SAs (sport, school, and level n.s.)	Regression analysis of cross-sectional data	Interpersonal - Positive (β = -0.22; p < 0.05) and negative (β = 0.41; p < 0.001) interactions were associated with burnout and these relationships were significantly moderated by SA emotional intelligence (where high emotional intelligence reduced burnout). - Social interactions did not significantly impact SA wellbeing.
[10]	To explore if SA happiness and satisfaction are influenced more by external or internal factors.	U.S. 140 SAs from 1 large west coast private university in 5 interactive sports	Hierarchical regression analysis of cross-sectional data	Group/Organizational - Neither playing time nor scholarship status significantly predicted happiness, nor life satisfaction in modelling. - Age/grade (β = -0.16; p < 0.03) significantly predicted happiness

β = Regression coefficient; D = Competitive division; ICC = Intraclass correlation coefficient; NAIA: National Association of Intercollegiate Athletics (United States); NCAA = National Collegiate Athletic Association (United States); n.s. = Not stated; SA = Student-athlete

Study	Aim	Population	Method	Variables Associated with SA Mental Health
[11]	To examine severity of psychiatric symptoms in undergraduate recreational and competitive SAs.	U.S. 72 NCAA SAs and 64 recreational SAs from 1 southwest university	Analysis of variance of cross-sectional data.	Group/Organizational - Competitive level was not associated with psychiatric function: NCAA and recreational athletes did not differ in psychiatric function for men or women ($p > 0.05$). - Sport participation was associated with fewer symptoms: SAs (both NCAA and recreational) had fewer psychiatric symptoms than non-athletes ($p < 0.005$).
[12]	To understand the experience of coming out as a gay male in sport.	U.S. 6 NCAA SAs from schools n.s. (4 DI, 1 DIII) from 6 sports (3 co-active)	Qualitative existential phenomenological study using individual semi-structured interviews (20-60 min)	Interpersonal - Uncertainty about acceptance upon coming out (by teammates and family) and fear of rejection led to anxiety. - Constant effort to "mask" resulted in stress and depressive symptoms. - Acceptance and support from teammates and others predicted SA wellbeing. Sociopolitical - A culture of hegemonic masculinity and heteronormativity led to (1) decreased competence, (2) conformity, (3) exclusion/isolation, and (4) discrimination (slurs, violence etc.) towards gay athletes.
[13]	To explore sources of stress and coping strategies for SAs.	U.S. 5 first year female SAs from 1 large NCAA DI school	Qualitative study using 2 focus groups and a semi-structured interview for each SA	Interpersonal - Stresses included challenging relationships (particularly coaches) and performance demands from others. - Socially-based coping was used from (1) teammates (emotional - venting, humour, connection; or informational – older SA advice) and (2) parents (emotional and informational) to relieve stress, and promote wellbeing (satisfaction, happiness). Community - Being away from home in a new community was a stress
[14]	To understand SA social-psychological processes and outcomes during a head coach change.	U.S. 47 undergraduate NCAA DI SAs from 11 sports (2 co-active) and 20 schools	Qualitative study using individual semi-structured interviews.	Group/Organizational - Coaching change could greatly impact SA mental health. It could be a stress or an opportunity depending on context and management. - Increased mental health risk if (1) SAs chose school for the coach, and (2) communication was poor. - Some SAs (n = 8) had decreased confidence (n = 4), higher stress (n = 2), feelings of being devalued, or alienated from the team (n = 4), a lack of support (n = 1), and burnout (n = 1). - Some SAs had increased confidence (n = 7) and motivation (n=3).
[15]	To explore the mental health of Canadian SAs so universities can better meet their needs.	CAN 113 undergraduate and graduate SAs from 1 large university and 25 sports	Descriptive statistics of cross-sectional data	Interpersonal - Stressors for poor mental health included: coach and teammate pressure and social isolation Group/Organizational - Competing demands were a source of stress.

D = Competitive division; NCAA = National Collegiate Athletic Association (United States); n.s. = Not stated; SA = Student-Athlete

Study	Aim	Population	Method	Variables Associated with SA Mental Health
[16]	To examine the relationships between social support and mental health in SAs	U.S. 204 NCAA DI and DIII SAs from south-central and southwest schools representing 15 sports (5 co-active)	Correlational analysis of cross-sectional data	Interpersonal - Giving ($r = -0.29$) and receiving ($r = -0.38$) social support to and from teammates were both significantly negatively correlated with depression in female but not male athletes. - Male and female athletes did not differ in terms of amount of support.
[17]	To examine factors that facilitate SA positive development, considering PYD models.	CAN 198 undergraduate SAs from "1 of the country's largest universities" representing 10 sports (2 co-active)	Regression modelling of cross-sectional data	Interpersonal - Social and personal skill development activities in sport predicted greater positive development (competence, confidence, connections, compassion, and character) $\beta = 0.39$; $p < 0.01$) - The coach-athlete relationship was not statistically significant. Group/Organizational - Restricted roles outside school and sport ($\beta = -0.16$; $p = 0.03$), predicted greater positive development (i.e., competence, confidence, connections, compassion, and character).
[18]	To examine sport-specific family relationship problems and SA mental health.	U.S. 85 SAs from 1 southwest school (26 intramural, 12 club, and 47 NCAA DI)	Regression modelling of cross-sectional data	Interpersonal - General pressure from family significantly predicted SA symptoms of depression ($\beta = 0.47$; $p < 0.05$) and anxiety ($\beta = 0.39$; $p < 0.001$) and was the strongest predictor of overall distress ($\beta = 0.40$; $p < 0.05$) (significant after controlling for gender and competition level). - Pressure to quit or play unsafely was also significantly associated with general psychopathology ($\beta = 0.21$) and depression ($\beta = 0.24$) (both p values < 0.05). Group/Organizational - Varsity (NCAA) SAs had better mental health than club SAs (all p values < 0.05).
[19]	To explore the relationships among SA personal characteristics, social contexts, and stress.	U.S. 19,967 undergraduate and graduate SAs from 60% of NCAA schools (36% DI, 28% DII, 36% DIII) from 15 sports (5 co-active).	Data mining secondary analysis of cross-sectional data	Interpersonal - SAs with the least stress, had lower academic anxiety and much less abusive coaching. Group/Organizational - Team climate moderated the relationship between academic anxiety and stress. - Lower stress was linked to a more inclusive team climate.
[20]	To explore SA's experiences with bullying victimisation.	CAN 11 female undergraduate SAs from 1 urban university in Ontario	Qualitative constructivist analysis of individual semi-structured interviews (25-60 min)	Interpersonal - Older SAs were hard on younger SAs to the detriment of their emotional health. This was perceived to be "convention". - Bullying from senior SAs resulted in (a) decreased happiness (e.g., via worry and overwhelm from physical and verbal violence); (b) isolation, insecure relationships, low self-esteem, and low belonging (e.g., via exclusion); and (c) global negative emotions and prolonged stress and sadness (for victims and witnesses), sometimes leading to seeking help, complicated by stigma.

β = Regression coefficient; D = Competitive division; NCAA = National Collegiate Athletic Association (United States); PYD = Positive Youth Development; r = Pearson correlation coefficient; SA = Student-athlete

Study	Aim	Population	Method	Variables Associated with SA Mental Health
[21]	To examine how academic psychological capital (PsyCap) and SA engagement relate to satisfaction and psychological well-being.	U.S. 248 undergraduate NCAA DI SAs from 8 sports (1 co-active) from 9 DI schools	Structural equation modelling using cross-sectional data.	Group/Organizational - SA engagement (with faculty, other non-athlete students, school, and academic activities) fully mediated the relationship between academic PsyCap and wellbeing. - Wellbeing was significantly correlated with engagement ($r = 0.70$, $p < 0.001$)
[22]	To examine SA's sport stress using Self-Determination Theory.	U.S. 14 undergraduate SAs from 1 Midwest DI school representing 9 sports	Qualitative secondary analysis of interpretive data from semi-structured interviews (40-80 min)	Interpersonal - Controlling coaches and a lack of support worsened SA wellbeing - Social support in and outside sport helped SAs cope via connection, identity, and companionship. Group/Organizational - Sport environments that supported freedom of choice, growth opportunities, intrinsic motivation, and strengths/positivity supported SA wellbeing. - If sport created role conflict, stress resulted. - SAs who relied on sport scholarships described less self-determination, less intrinsic motivation, and greater sport stress. Sociopolitical - Social inequality and gender stereotypes contributed to greater sport stress and undermined SA autonomy and competence
[23]	To examine coach stigma, SA coping, and SA help-seeking.	U.S. 644 undergraduate SAs from 4 schools and 18 sports	Correlation and regression analyses of cross-sectional data	Interpersonal - Coach stigma significantly correlated with SA depressive symptoms ($r = -0.24$, $p < 0.001$). Group/Organizational - School was significantly associated with help-seeking attitudes.
[24]	To assess SA parental involvement and its impact on SA academic self-efficacy, athletic satisfaction, well-being, individuation.	U.S. 455 undergraduate SAs from 3 NCAA schools (1 large DI – 30%, 1 medium DII – 37%, 1 small DIII – 33%)	Hierarchical regression analysis and analysis of variance using cross-sectional data.	Interpersonal - Parental support ($r = -0.14$; $p < 0.01$), contact ($r = -0.14$; $p < 0.01$), academic (r -0.18; $p < 0.01$), and athletic engagement ($r = -0.28$; $p < 0.001$) correlated with depression, but only athletic engagement predicted depression in modeling ($\beta = -0.24$; $p < 0.001$). Group/Organizational - Competitive division was not related to parental involvement nor depression. - Division, gender, race, and class were not significant predictors of depression. - DIII SAs had better psychosocial development: reporting greater emotional and functional independence than DII or DI SAs (all p values < 0.001, small effect sizes).
[25]	To assess the prevalence of stress and specific stressors experienced by SAs in the U.S.	U.S. 523 undergraduate SAs from NCAA and NAIA schools, mainly east coast (all D)	Cross-sectional survey	Interpersonal - Coaches were a source of stress - lack of guidance, negative feedback, pressure - Leaving friends and family to being post-secondary - Social injury-related stress (e.g., feeling unable to help team, looking "weak", lack of help). Community - Transition to school stressors worsened wellbeing (socially: mistrust; emotionally: frustration, isolation; and psychologically: doubt)

β = Regression coefficient; D = Competitive division; NAIA = National Association of Intercollegiate Athletics (United States); NCAA = National Collegiate Athletic Association (United States); r = Correlation coefficient; SA = Student-athlete.

Study	Aim	Population	Method	Variables Associated with SA Mental Health
[26]	To assess SA experiences of a female empowerment intervention.	U.S. 8 undergraduate female SAs from 1 DI major conference school and 6 sports (4 co-active)	Consensual qualitative research with single semi-structured interviews (~60 min)	Interpersonal and Group/Organizational - The intervention improved SA interpersonal relationships, supported wellbeing, and decreased stress. - Increased sense of responsibility supported role modeling value-driven behaviour and promoting growth of others. - Improved cohesion/connection led to better communication, respect, fewer cliques, better friendships, less peer pressure, more positive perceptions of others, greater support, less isolation.
[27]	To explore SAs' experiences of cliques from a group dynamics perspective.	U.S. 18 undergraduate SAs from 1 school and 5 sports (1 co-active)	Qualitative study with single semi-structured interviews (15-45 min)	Interpersonal and Group/Organizational - Negatively, cliques harmed emotional wellbeing - via isolation, exclusion, lack of friendships, dampened collective team mood, reduced cohesion, undermined trust, and decreased efficacy. - Positively, some cliques were an outlet for social and emotional support, belonging, and fun and modelled positive behaviours which could increase team motivation and social wellbeing.
[28]	To use authentic leadership theory to test impacts on SA psychological resources and engagement.	U.S. 119 NCAA DI basketball SAs from 9 DI conference schools	Structural equation modelling with cross-sectional data.	Interpersonal - Authentic leadership significantly predicted PsyCap after controlling for gender and team tenure ($\beta = 0.34$; $p < 0.01$). Group/Organizational - Authentic leadership predicted engagement only through positive team climate. - There was a significant indirect effect of authentic leadership on PsyCap through positive team climate ($\beta = 0.18$; $p < 0.05$).
[29]	To examine associations among the coach-athlete relationship and SA psychological outcomes.	U.S. 37 NCAA DI female undergraduate rowers from 1 large south-east school	Multilevel regression analysis using longitudinal data from surveys at 4 time points over competitive season.	Interpersonal - Coach-athlete emotional closeness significantly predicted global burnout ($\beta = -0.33$; $p = 0.005$) and engagement ($\beta = 0.21$; $p = 0.048$) over time. These were not significant after controlling for stress and motivation. - Coach-athlete co-operative behaviours significantly predicted engagement ($\beta = 0.13$; $p = 0.050$) and emotional/physical exhaustion when controlling for stress and motivation ($p = 0.017$) but not on its own.
[30]	To examine the subjective wellbeing of SAs.	U.S. 109 NCAA DI undergraduate SAs from 1 medium school and 10 sports (3 co-active)	Descriptive cross-sectional survey	Group/Organizational - There were no statistically significant differences in subjective happiness by gender, or individual vs team sport. - In-season SAs reported significantly higher levels of subjective happiness than SAs out-of-season ($p < 0.05$).

β = Regression coefficient; D = Competitive division; NCAA = National Collegiate Athletic Association (United States); r = Correlation coefficient; SA = Student-athlete

Study	Aim	Population	Method	Variables Associated with SA Mental Health
[31]	To explore experiences of Black SAs at a PWI.	U.S. 6 Black male undergraduate NCAA DI football SAs from 1 large private, PWI	Qualitative grounded theory study with individual semi-structured interviews, observation, and KI survey.	Interpersonal - SAs reported feeling judged, stigmatized, and stereotyped as Black athletes by classmates, teammates, coaches, and community members - leading to mistrust, depression, isolation, poor self-concept, and resentment (e.g., sacrificing their culture to please coaches). - Efforts to include Black SAs often felt too "forced" by coaches. This led to some support, but relationships remained a source of stress, conflict, and judgment. SAs suggested integration would be more effective if left to the SAs. Group/Organizational - SAs felt double standards, value conflict, and unfair coaching that was poorly communicated and favoured White SAs, creating frustration and animosity. - Firing the only Black coach harmed SA wellbeing, showing organizational value conflict.
[32]	To examine connections among dimensions of wellness of female SAs.	U.S. 20 female undergraduate SAs from 1 southeast Power Five DI school. All sports.	Qualitative study with single semi-structured interviews (25 – 60 min)	Interpersonal - Coaches harmed wellbeing (in 60% of SAs) – via harsh communication (e.g., cursing/shouting) which was sometimes seen as manipulative and demeaning. - Performance pressure (from coaches, friends, and family) harmed wellbeing, via self-criticism and feelings of inadequacy. - ATs offered support and mentorship. Sport psychologists could be helpful, but stigma and "fit" were barriers. Group/Organizational - The transition from high school to university was difficult for 80% of SAs – reporting decreased confidence, trust, and support, greater isolation, and unstable team dynamics.
[33]	To investigate factors in flourishing SAs over the season.	CAN 6 female SAs from 2 schools who met criteria for flourishing on MHC-SF. 3 sports (2 co-active)	Qualitative IPA analysis of pre- and post-season semi-structured interviews and SA diaries.	Interpersonal - (1) Pre-Season: "Building a foundation of flourishing" – Planning schedules; positive connections with family, friends, and significant others. - (2) In-Season: "Maintenance of flourishing" – Managing demands, with a reliance on coaches. Positively – coaches provided practical assistance and supportive relationships, celebrated SA success, encouraged, and empowered them to overcome setbacks, and promoted autonomy. In contrast, a lack of coach support, conflict, or non-constructive communication harmed wellbeing. - (3) Post-Season: "Reinvesting in flourishing" – Reflection; taking a break from sport.
[34]	To investigate how coaches and SAs can flourish together in sport.	CAN 10 SAs, 6 coaches, 2 administrators, 1 AT, and 1 sport psychologist from 8 schools.	Qualitative pragmatic study using single semi structured interviews	Interpersonal - Co-creating meaningful goals with coaches supported flourishing – via goal-oriented growth, competence, confidence, purpose, and engagement. Goal conflict hurt flourishing. - Coach-athlete relationships with trust, respect, celebration of successes, and feeling cared for/valued helped flourishing. - Coaches and staff were important for resources for SA flourishing, as were positive views of the resources. - Teammates helped each other learn and pursue goals and supported social wellbeing (e.g., integration/lack of cliques) Group/Organizational - Positive relationships between athletic staff (e.g., coaches and admin) that were transparent, respectful, and trusting supported SA wellbeing as each were better able to be supportive. - Prioritizing SAs in organizational decision-making supported flourishing.

AT = Athletic Trainer; D = Competitive division; IPA = Interpretive phenomenological analysis; KI = Key informant; MHC-SF = Mental Health Continuum Short-Form; NCAA = National Collegiate Athletic Association (United States); PWI = Primarily White Institution; SA = Student-athlete

Study	Aim	Population	Method	Variables Associated with SA Mental Health
[35]	To compare SAs, students who were Greek members, and NAs on social connectedness health.	U.S. 1,075 total sample, 59 NCAA SAs (34% DI, 66% DIII) from 4 schools.	Analysis of variance of cross-sectional data.	Group/Organizational - SAs had significantly fewer days of poor mental health and anxiety, and greater quality of life than fraternity/sorority (Greek) students and general students (all p values < 0.05) (small effect sizes: η^2 = 0.007, 0.016, and 0.012, respectively). - SAs and Greek students both had greater social connectedness than other students (all p values < 0.005; small effect: η^2 = 0.012). - DI SAs had significantly more days of poor mental health (Cohen's d = 0.429; p = 0.040), and more anxiety (d = 0.539; p = 0.003), than DIII SAs (Cohen's d suggest moderate effect sizes). - Team SAs had significantly greater anxiety (d = 0.113; p = 0.032; small effect) than coactive sport SAs. - Revenue sport SAs reported greater health-related quality of life and non-revenue sport SAs (d = 0.414; p = 0.034; small effect).
[36]	To explore SA experiences of a constellation mentoring program.	CAN 30 undergraduate soccer SAs from 1 school.	Instrumental qualitative case study using critical realism and 6 post-intervention focus groups	Interpersonal - Mentoring supported wellbeing (mood, less stress, confidence, trust, enjoyment, and growth) via instrumental and psychosocial support as well as belonging, inclusion, and cohesion (especially for 1st years). - Mentors grew through leadership roles. - Groups were felt to be safe spaces for emotional comfort, stress relief, and problem solving, with less fear of asking for help. - Diverse perspectives of role models (mentors) were helpful. Group/Organizational - Mentorship supported wellbeing via organizational belonging, inclusion, and cohesion (especially for 1st years).
[37]	To investigate if coach–athlete relationships could predict SA mental health beyond gender and personality.	U.S. 79 undergraduate NCAA DI SAs from 1 mid-west public school and 16 sports.	Regression analysis of cross-sectional data.	Interpersonal - Coach-athlete relationship was the only significant predictor of depression and quality of life when controlling for personality and gender. A stronger coach-athlete relationship associated with lower depression scores (β = -0.43; p = 0.001) and higher quality of life (β = -0.38; p = 0.003). - Coach-athlete relationships did not significantly predict anxiety.
[38]	To investigate SA need satisfaction and wellbeing using SDT.	U.S. 180 undergraduate NCAA SAs from 9 schools (South- and north-east), 8 sports (3 co-active). 50% DI, 26% DII, 24% DIII.	Cluster analysis of longitudinal data from 2 surveys at start and end of school year.	Interpersonal - Relatedness was significantly associated with wellbeing at time 1 (T1) (r = 0.39) and T2 (r = 0.45) (p values < 0.001). No differences by sex. Group/Organizational - Competitive level had no effect at either time. - Need satisfaction differed by school year at T1, but not T2. - Co- vs interactive sport did not impact the relatedness/wellbeing relationship

β = Regression coefficient; η^2: partial eta squared; AT = Athletic trainer; D = Competitive division; NA = Non-athlete; NCAA = National Collegiate Athletic Association (United States); r = Correlation coefficient; SA = Student-athlete; SDT = Self-Determination Theory

Study	Aim	Population	Method	Variables Associated with SA Mental Health
[39]	To assess coach and teammate influence on SA psychological need satisfaction, outcomes, and the influence of sport type.	U.S. 362 NCAA DI undergraduate SAs (schools n.s.) (113 in co-active sport)	Analysis of variance using cross-sectional data	Interpersonal - Teammates had a significantly greater positive influence on need satisfaction than coaches — competence (small effect size: d = 0.17), autonomy (large effect size: d = 0.97), and relatedness (medium effect: d = 0.5) (all p values < 0.001) Group/Organizational - Need satisfaction and wellbeing varied by sport type. - Team sport SAs felt teammates had a greater positive impact on their relatedness than SAs in co-active sports (d = 0.22; p < 0.05; small effect). No differences for competence or autonomy. - SAs in co-active sports felt coaches had greater positive impact on their competence (d = 0.54; p < 0.001; medium effect), autonomy (d = 0.58; p < 0.001; medium effect), and relatedness (d = 0.29; p < 0.05; small effect) compared to SAs in team sports.
[40]	To examine the sociocultural and mental health adjustment of Black SAs based on social support, campus racial climate, team cohesion, and life events.	U.S. 98 Black undergraduate SAs (62% DI-A, PWI; 8% DI-AA PWI; 18% DI-AA HBCU; 11% DII HBCU)	Latent profile analysis using cross-sectional data	Interpersonal, Group/Organizational, and Sociopolitical - Minority stress, social support, and social cohesion impacted SA wellbeing. - 3 groups were found: Two with low and one with high minority stress. - The first (14% SAs) had low minority stress but also low social cohesion, and low social support. The third (49%) had low minority stress but high social cohesion and social support. The second group (37%) had moderate levels of social cohesion and support but high levels of minority stress. Group 2 was less common at HBCUs (p < 0.05). - Comparing SAs with low minority stress, those who had low cohesion and support (being in Group 1 vs 3) were more likely to report anxiety (p < 0.05), 2x more likely to report depression (p < 0.05), and more likely to have interpersonal (p < 0.1) or family problems (p < 0.1) - Despite moderate support and cohesion, SAs with higher levels of minority stress (being in Group 2 versus 3) were more likely to report depression (p < 0.05), interpersonal problems (p < 0.1), and lower self-esteem (p < 0.05)
[41]	To examine the epidemiology of mental health in incoming SAs.	U.S. 1,118 incoming NCAA SAs from 1 major DI school (40% co-active, 38% contact sport)	Retrospective cross-sectional study using secondary data	Group/Organizational - Prevalence of mental illness was significantly higher among co-active SAs (17.2%) than inter-active SAs (11.8%; p = 0.010) but not for contact sports (16.4%) compared to non-contact sports (12.5%).
[42]	To examine how team climate relates to well-being in SAs after a workshop.	U.S. 109 undergraduate sport club SAs from 1 mid-west school	Correlation analysis of cross-sectional data.	Group/Organizational - Task-Involved (TI) climate positively correlated with hope (r = 0.25; p < 0.01), happiness (r = 0.18; p < 0.05) and self-kindness (r = 0.22; p < 0.05). - A caring climate positively correlated with hope (0.21, p < 0.05). - Ego-oriented climate was not related to wellbeing. - Canonical correlations revealed a moderate caring climate and high TI climate were positively related to wellbeing (hope happiness, and self-kindness) with canonical loadings of 0.82, 0.53, and 0.71 respectively (p < 0.05).

d = Cohen's d for effect size; D = Competitive division; HBCU = Historically Black College/University; NCAA = National Collegiate Athletic Association (United States); n.s = Not stated; PWI = Primarily White Institution; r = Correlation coefficient; SA = Student-athlete

Study	Aim	Population	Method	Variables Associated with SA Mental Health
[43]	To explore how coach turnover influences SA psychosocial states and team dynamics.	U.S. 21 NCAA DI SAs from 1 mid-west school.	Qualitative interpretive phenomenological analysis using SA focus groups and key informant interviews (coaches, staff)	Interpersonal - Coach turnover was a reduced risk for mental health if coaches (1) supported team cohesion (e.g., helped set up fun social activities); (2) used strength-based encouragement; (3) made meaningful relationships with SAs; and (4) were community-involved – encouraging SAs to develop roles. Group/Organizational - Coach turnover was an increased risk for poor mental health if (1) SAs chose school for the coach; (2) new coaches made fast changes; (3) new coaching styles were very different; (4) there was a lack of SA leaders during transition; and (5) coach communication was passive. - Turnover was a chance to (1) improve team cohesion – if navigation of transition was cooperative; (2) develop SA leaders (if they were recognized and supported by new coach); and (3) modify team culture.
[44]	To understand the relationships between coach-athlete relationships, social support, psychological well-being and sport type.	U.S. 153 undergraduate NCAA DI SAs from 11 sports (3 co-active)	Correlation analysis and analysis of variance using cross-sectional data	Interpersonal - The coach-athlete relationship significantly positively correlated with wellbeing (Spearman rank correlation coefficient: $r = 0.55$, $p < 0.01$). - Social support significantly positively correlated with wellbeing. The correlation between total support and esteem support and psychological wellbeing were strongest ($r = 0.36$, p values < 0.01). Group/Organizational - Co-active versus team sports did not differ in wellbeing, coach-athlete relationships, or support.
[45]	To measure the levels of psychological distress in CAN SAs.	CAN 284 undergraduate SAs from schools in 8 provinces and 11+ sports (3 co-active)	Regression modelling and analysis of variance using cross-sectional data	Group/Organizational - Starting status (non-starters scoring higher; $\beta = 1.56$; $p < 0.05$) and scholarship status (non-scholarship SAs scored higher; $\beta = 1.18$; $p < 0.05$) significantly predicted psychological distress. - There was a significant effect of sport on psychological distress ($p < 0.05$) for only hockey SAs (mean = 6.13 ± SD = 4.48) who scored lower than track SAs (mean = 9.51 ± SD = 4.29). - Mental health was not impacted by time in the season, or year of study. Community - Mental health was not impacted by location of residence.
[46]	To examine depressive symptoms in SAs and how they relate to different types and sources of social support.	U.S. 218 first- and second-year undergraduate NCAA DI SAs from 1 mid-size mid-west school. 15 sport teams	Regression analysis of cross-sectional data	Interpersonal - All types of social support correlated negatively with depression, with weak sizes (Pearson correlations ranging from $r = -0.32$, for personal emotional, to $r = -0.38$, for sport tangible support, p values < 0.01). - In regression analysis, sport tangible support was the strongest predictor of depression ($\beta = -0.30$) accounting for 15.1% of variance. Need for support was the second strongest ($\beta = 0.23$; 4.3% variance), followed by personal tangible support ($\beta = -0.22$; 3.5% variance) (all p values < 0.001) - SAs wanted more support from coaches ($n = 72$) and teammates ($n = 29$). - 20 SAs said teammates could be the most beneficial while $n = 19$ said non-athletic support (e.g., counselling) was best.

β = Regression coefficient; D = Competitive division; NCAA = National Collegiate Athletic Association (United States); SA = Student-athlete; SD = Standard deviation

Study	Aim	Population	Method	Variables Associated with SA Mental Health
[47]	To explore SAs' experiences of emotions as social phenomena.	CAN 14 undergraduate SAs from 1 school and 6 sports (2 co-active)	Qualitative constructivist study with 2 individual semi-structured interviews (29-93 min)	Interpersonal - Shared stressors included: performance pressures from others and interpersonal conflict (teammates or coaches) - Teammate relationships, leadership and coaching impacted stress response. - Generally, experiencing emotions and coping as a group supported wellbeing (pride, happiness, belonging, empowerment, connectedness, competence, and trust) - If group emotions were "imposed" (e.g., "you shouldn't be happy after a loss") or if communal coping was not used, SAs felt disconnected/isolated and the team mood and motivation could be low. Group/Organizational - Travel was a common shared organizational stressor as were coaching changes and changes in team lineup (such as due to injury) - Social norms impacted stress response.
[48]	To examine the role of trait anxiety and gender on mood state in SAs.	U.S. 159 NCAA DI swimming SAs from 1 large mid-west school.	Longitudinal between-subject survey over 10-years and analysis of variance.	Group/Organizational - Depression, anxiety, and anger varied over the competitive season and by gender. - At baseline, female SAs had significantly higher trait anxiety ($d = 0.55$) and anxiety ($d = 0.63$) (p values < 0.005) than males. - From baseline to peak training, mood worsened. SAs with low trait anxiety showed significant increases in depression ($p < 0.001$), anger ($p < 0.001$), anxiety (men) ($p < 0.005$), and overall mood scores ($p < 0.001$) while SAs with high trait anxiety showed significant increases in anger ($p < 0.05$) and overall mood scores ($p < 0.001$). - From peak training to taper, vigor increased ($d = 1.23$; $p < 0.01$), anxiety increased for women ($p < 0.01$), and depression, anger, and overall mood scores decreased for both high and low anxious groups ($p < 0.05$). - At taper, low trait anxious SAs had increased anger ($p < 0.05$) and anxiety ($p < 0.05$), while high trait anxious SAs had greater depression ($p < 0.05$) and women had higher anxiety ($d = 0.71$; $p < 0.001$).
[49]	To examine stressors (i.e., discrimination and stereotypes) and buffers relevant to Asian SA mental health.	U.S. 517 Asian-identified SAs from a national sample of schools	Hierarchical regression analysis of secondary cross-sectional data	Interpersonal - Discrimination correlated with depression ($r = 0.41$; $p < 0.001$), anxiety ($r = 0.39$; $p < 0.001$), and less positive mental health ($r = -0.21$; $p < 0.01$). - GPA interacted with discrimination to predict suicidality and mental health but not depression or anxiety among SAs. Among SAs with A-grades, but not SAs with Bs or lower, discrimination predicted worse mental health ($\beta = -0.38$; $p < 0.001$). Among SAs with B grades or lower, discrimination significantly positively predicted suicidality ($\beta = 0.59$; 95% CI: 1.05, 3.07; $p < 0.05$). - Exercise level protectively moderated the relationship between discrimination and mental health (except suicidality.) - SAs with below-average exercise had a stronger positive relationship between discrimination and anxiety than SAs with above-average exercise. Discrimination predicted depression and worse mental health in all NAs and SAs with low exercise ($\beta = 0.86$, and $\beta = -0.91$, p values < 0.001) but not SAs with high exercise.
[50]	To examine mental health of CAN SAs.	CAN undergraduate and graduate SAs from 30 schools. Time 1 (T1) N = 388; T2 N = 110	Analysis of variance with longitudinal data from 2 surveys (start and end of academic year)	There were no effects of gender, alcohol use, living situation, year of study, or sport type on mental health functioning over time.

β = Regression coefficient; CI = Confidence interval; D = Competitive division; d = Cohen's d for effect size; NA = Non-athlete; NCAA = National Collegiate Athletic Association (United States); r = Correlation coefficient; SA = Student-athlete.

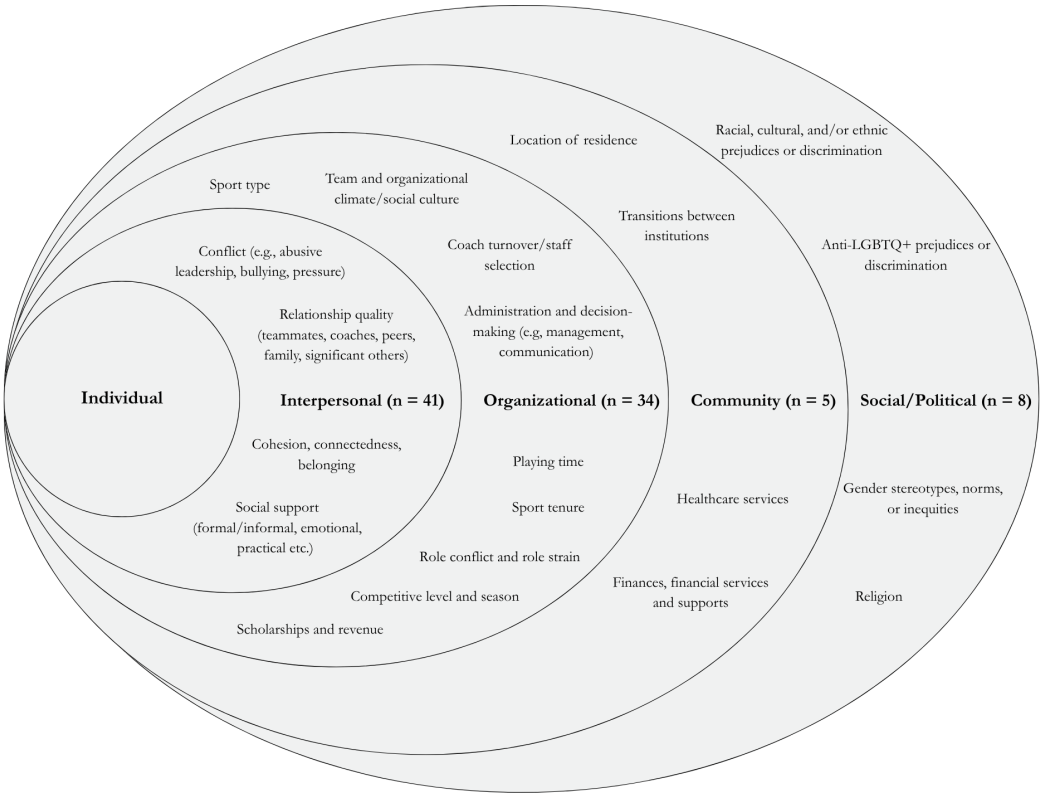
Study	Aim	Population	Method	Variables Associated with SA Mental Health
[51]	To examine SA quality of life.	U.S. 159 SAs from schools in the Phoenix and San Diego areas. (26% NCAA DI, 24% NCAA DII; 20% NJCAA; 23% Club). 21 sports.	Cross-sectional survey	- Groups did not significantly differ in social relationships. Group/Organizational - Level of sport influenced SA quality of life. - NJCAA SAs had significantly lower physical, mental, and environmental health overall, lower monetary means than DII SAs ($p < 0.001$), and lower mental health (alongside club SAs, $\eta^2 = 0.08$) than DI ($p < 0.01$) and DII ($p = 0.02$) SAs, and lower environmental health than DI and DII SAs ($\eta^2 = 0.07$; $p = 0.005$). - DI SAs scored 9 points higher for mental health than DII and club SAs and 13 higher than NJCAA SAs. - DI had higher total quality of life scores ($\eta^2 = 0.07$) than NJCAA ($p < 0.001$) and DII and club SAs ($p < 0.05$). - DII SAs reported more feelings of low mood, despair, depression, and anxiety than DI, NJCAA, and club SAs ($\eta^2 = 0.22$; $p < 0.001$).
[52]	To explore links between masculine norm conformity, athletic identity, life satisfaction, and well-being.	U.S. 110 male football SAs SAs (26% NCAA DI, 4% NCAA DII, 64% NCAA DIII, 5% NAIA)	Correlational analysis and analysis of variance using cross-sectional data	Group/Organizational - Subjective wellbeing was significantly positively correlated with age ($r = 0.25$) and total years of participation in sport ($r = 0.26$) (p values < 0.01). - Outcomes did not differ by scholarship status. Sociopolitical - Wellbeing was significantly negatively correlated with masculine 'playboy' norms regarding sexual relationships ($r = -0.23$; $p < 0.05$).
[53]	To examine SA connectedness, motivational climate, and well-being.	U.S. 206 NCAA DIII SAs (10 sports, 1 co-active) from 2 small north-east liberal arts schools	Structural equation modelling using cross-sectional data	Group/Organizational - Motivational climate influenced wellbeing. Ego motivation ($\beta = -0.24$; $p < 0.05$) and task motivation ($\beta = 0.21$; $p < 0.05$) directly predicted wellbeing. The model accounted for 13% variance - small effect size. - Social connectedness mediated the relationship between goal orientation and wellbeing. There was a significant indirect effect of task motivation ($\beta = 0.27$, $p < 0.01$) and ego motivation ($\beta = -0.20$; $p < 0.01$) on wellbeing through social connectedness. This model accounted for 30% of variance, suggesting an intermediate effect size.
[54]	To examine links between SA chronotype, depression, and social support.	U.S. 189 NCAA DI SAs from 1 school.	Regression and mediation analysis using cross-sectional data.	Interpersonal - Social support moderated the relationship between sleep-wake patterns and depression. Among SAs with low social support from friends ($\beta = 1.41$; 95% CI: 0.01, 2.81; $p = 0.048$) and teammates ($\beta = 1.65$; 95% CI: 0.31, 2.99; $p = 0.017$), and among SAs with greater support from a significant other ($p < 0.0005$) a later chronotype was linked to greater depression. - No impact of global nor family support.

β = Regression coefficient; η^2 = eta squared effect size; D = Competitive division; NAIA: National Association of Intercollegiate Athletics; NCAA = National Collegiate Athletic Association (United States); NJCAA = National Junior College Athletic Association (United States); r = Pearson correlation coefficient; SA =. Student-athlete

Study	Aim	Population	Method	Variables Associated with SA Mental Health
[55]	To explore stressors among SAs (compared to NAs)	U.S. N = 362 (52 NCAA DI SAs, 210 NAs) from 1 private mid-west school.	Exploratory analysis of cross-sectional data	Interpersonal - SAs reported more stress related to conflicts with a significant other's family ($p < 0.05$) than NAs. - SAs reported less stress over social isolation ($p < 0.01$), being ignored ($p < 0.05$), or conflicts with a friend or roommate about smoking ($p < 0.05$) than NAs. . Group/Organizational - SAs reported more role conflict: many responsibilities ($p < 0.05$), lacking time for sleep ($p < 0.05$), and heavy extracurricular demands ($p < 0.001$). - SAs reported less stress related to transportation difficulties ($p < 0.05$), making important educational decisions ($p < 0.05$), or financial burdens ($p < 0.001$).
[56]	To describe the prevalence and correlates of depression and anxiety symptoms among SAs.	U.S. 257 undergraduate NCAA DI SAs from 1 Big Ten school	Analysis of variance and regression modelling of cross-sectional data	- Anxiety did not differ by gender, race, history of injury, or collegiate class. - In modelling, after adjusting for other covariates (age, race, residence, injury, illness diagnoses) SAs who were female (OR = 1.32; 95% CI 1.01, 1.73), freshmen (OR 3.27; 95% CI 1.63, 6.59), or who had pain in the past week (OR 1.21; 95% CI 1.09, 1.33), had significantly increased odds of depressive symptoms (all p values < 0.05). - No impact of residence, race, nor history of injury on odds of depression.
[57]	To explore SA mental health and resources.	U.S. 23 undergraduate NCAA DI SAs from 7 sports (3 co-active) at 1 school.	Consensual qualitative research using single semi-structured interviews (15-20 min)	Interpersonal - Coaches, athletic trainers, school advisors, dietitians, sport psychologists, family, friends, and psychology services were all important for SA wellbeing support. - A lack of support from others or encouragement from coaches was detrimental to wellbeing. Group/Organizational - Role conflict was a source of stress to manage demands and meet high expectations. - The SA dual-role was sometimes said to provide helpful coping structure. - Some SAs said outdated "sport-first" attitudes from coaches and teammates harmed wellbeing by dismissal, discouraging discussion, and creating stigma, fear of judgment, and discomfort with vulnerability. Some coaches encouraged discussion, while others were felt to lack understanding of SA challenges – creating mistrust.

CI = Confidence interval; D = Competitive division; NA = Non-Athlete; NCAA = National Collegiate Athletic Association (United States); SA = Student-athlete

Figure 2. Socioecological model of factors impacting mental health and wellbeing among post-secondary student-athletes in North America (based on 57 eligible studies published until July 2023)



Studies tended to explore multiple types and sources of social support both inside and outside sport, with teammate support examined most frequently (n = 10). Quality and characteristics of interpersonal relationships were examined for their impact on mental health and wellbeing in 15 studies, most commonly considering the coach-athlete relationship (n = 12). Interpersonal conflict was examined in ten studies, most often with coaches (n = 6). Fourteen studies explored social cohesion or isolation and its impacts on mental health and wellbeing. Of note, we categorized factors like support and cohesion as 'interpersonal' constructs to reflect their relational and contextual nature despite them often being assessed at the individual level with self-report measures in the included studies.

Thirty-four studies examined the impact of group and organizational factors on mental health and wellbeing. Studies looked at variables such as team climate and culture (n = 11), academic and athletic role conflict (n = 10), coaching changes (n = 5), competitive level (n = 7), seasonality (n = 3), playing time (n = 4), scholarship and revenue status (n = 5), year of study/tenure in sport (n = 6), navigating transitions between institutions (n = 3), decision-making (n = 1), and type of sport (n = 9). Five studies examined factors at the community level, encompassing finances (n = 2), healthcare services (n = 1), location of residence (n = 3), and transitions

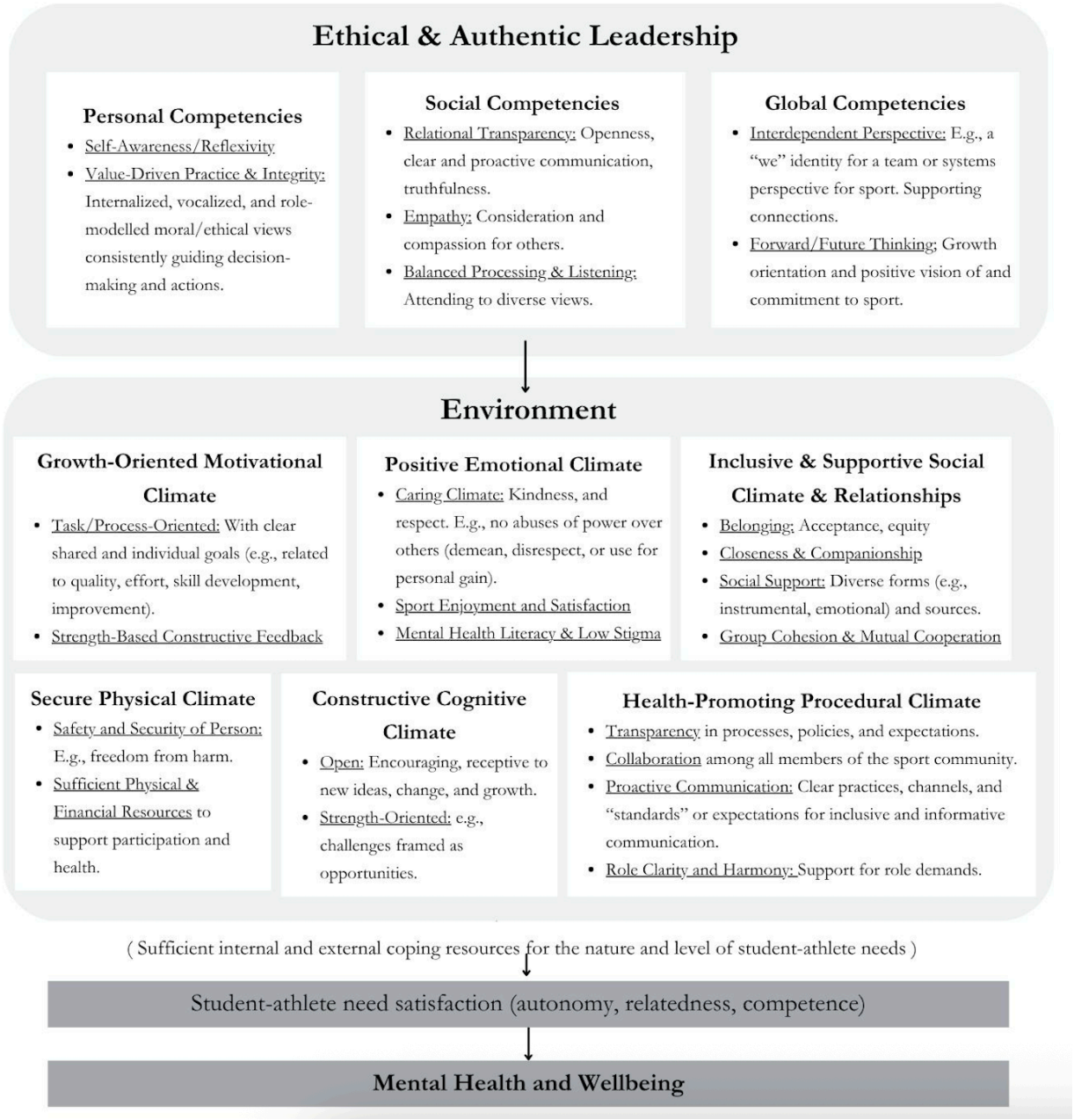
between institutions (n = 3). Eight studies looked at the social-political level considering things like religion (n = 1), masculine norms (n = 3), homophobic discrimination (n = 1), and racial, cultural, and ethnic prejudices or discrimination (n=5).

Thematic synthesis of exposure variables allowed us to compare similar factors impacting mental health across studies and contexts, providing a summary of key factors such as leadership behaviours, social inclusion and cohesion, and effective program management, while remaining close to the original findings of included research (Thomas & Harden, 2008). Based on this synthesis, we identified the following characteristics of competitive sport environments in higher education that promote mental health and wellbeing: 1) growth-oriented motivational climates, (2) harmony between academic and athletic roles, (3) equity and inclusion, (4) social support, (5) positive relationships, (6) ethical leadership, and (7) health-promoting organizational operations. Subsequently, to address the overarching aim of the present review, i.e., to understand how higher education institutions can create mental health-promoting sport environments, descriptive themes were abstracted to higher-level analytic themes (Thomas & Harden, 2008). In line with a socioecological perspective that recognizes the interconnectedness of diverse health determinants, a thematic mapping process was used to answer *how* the seven descriptive factors may be achieved given the findings of included literature (Figure 3). Ethical or "authentic" leadership behaviours were indicated by core personal, social, and global competencies. In turn, leadership influenced the motivational, emotional, social, physical, procedural, and cognitive climates of post-secondary sport. These environmental characteristics are described according to common, recurring characteristics extracted from the literature (Figure 3).

Theoretical Orientations for Continued Research

Our conceptual model (Figure 3) draws on Self-Determination Theory, commonly used in the reviewed research, to theoretically describe how environmental factors impact mental health and wellbeing through their satisfaction (or thwarting) of innate human needs for autonomy, competence, and relatedness (Ryan & Deci, 2000). Tracing the impact of an environmental stressor on psychological needs, and ultimately mental health, can further be understood using the complementary lens of the Transactional Model of Stress and Coping, describing the process of interpreting and responding to an external stressor (Fletcher et al., 2006). The transactional approach was also used several times in included literature. In the transactional view, 'stress' is the result of a dynamic interaction between a student-athlete and their environment when they appraise a stressor to exceed their resources to cope, endangering their wellbeing (Lazarus & Folkman, 1984; Simpson et al., 2021). Leveraging these theories can help us understand how stress and coping result in specific mental health outcomes through the impact of an institutional resource or stressor on needs for autonomy, competence, and relatedness (Deci et al., 2017; Ntoumanis et al., 2009; Ryan & Deci, 2000).

Figure 3. Conceptual model summarizing key factors in the post-secondary ecosystem associated with student-athlete mental health and wellbeing (based on thematic synthesis of 57 included studies published prior to July 2023)



Growth-Oriented Motivational Climates

One over-arching protective factor identified in this review was the presence of growth-oriented motivational-climates within athletic environments. These climates prioritized mastery over ego and emphasized student-athlete development. Included evidence suggests that such environments, characterized by constructive, strength-based feedback, and goal-directed growth opportunities, contributed to reduced stress, fewer depressive symptoms, and enhanced wellbeing (Harris et al., 2018; Raabe et al., 2022; Scott et al., 2021; Shipherd et al., 2019; Wayment & Walters, 2017). Conversely, environments marked by conventional "sport-first" attitudes that prioritized performance above all and minimized or ignored considerations of wellbeing, were associated with greater stress (Kimball & Freysinger, 2010; Neeley et al., 2021; Young et al., 2022), restricted help-seeking, and decreased wellbeing (Neeley et al., 2021; Young et al., 2022). While these environments were often measured at the team level, evidence suggests endorsement of a growth-oriented vision for sport by organizational leaders additionally supported student-athlete mental health and wellbeing by culture-setting across the institution (Shipherd et al., 2019; Wayment & Walters, 2017).

Role Conflict and Role Strain

This review identified the impact of role conflict and role strain on student-athlete mental health, highlighting the need to go beyond factors in the immediate sport environment to consider the interacting, often competing, demands of student-athletes' multiple roles and responsibilities. Academic-athletic role conflict, balancing competing demands, and striving for high standards both in sport and school often posed challenges for student-athlete mental health both in Canada and the U.S., particularly when one domain was felt to come at the expense of the other (Anderson & Dixon, 2019; Kim et al., 2020; Kimball & Freysinger, 2010; Pankow et al., 2021; Wilson & Pritchard, 2005). For example, student-athletes who had activities restricted outside sport reported reduced feelings of autonomy, relatedness, and competence that isolated them from the rest of the institution and limited their social support networks to cope with stress (Anderson & Dixon, 2019; Kim et al., 2020; Kimball & Freysinger, 2010; Pankow et al., 2021; Wilson & Pritchard, 2005). Additionally, in U.S. literature, adherence to conventional sport or masculine social norms associated with the athlete role, such as emotional stoicism, independence, and control were found to contribute to role strain and negatively impact mental health (Anderson & Dixon, 2019; Fenwick & Simpson, 2017; Kim et al., 2020; Kimball & Freysinger, 2010; Neeley et al., 2021; Walsh et al., 2021; Young et al., 2022). These restrictive norms appear to inherently undermine psychological safety (Vella et al., 2022) by creating fear of exclusion, rejection, or other psychological harm, the consequences of which were amplified when restrictive beliefs were strongly and uncritically endorsed, particularly by leaders in the sport environment. Indeed, deviations from these social expectations could result in stress

or prejudiced treatment, and decreased feelings of autonomy, competence, and relatedness, ultimately worsening mental health (DeLenardo & Lennox Terrion, 2014; Fenwick & Simpson, 2017; Kimball & Freysinger, 2010; Melendez, 2008; Tran, 2021; Walsh et al., 2021).

Equity and Inclusion

Student-athletes who were Black, had diverse sexualities, and were newcomers to the country, described stress from unwelcoming environments and behaviours that were overtly prejudiced, discriminatory, and in one case - physically violent (Fenwick & Simpson, 2017; Melendez, 2008; Neeley et al., 2021; Sadberry & Mobley, 2013). Included studies, both in Canadian and American literature, suggest social role strain could be amplified for student-athletes with multiple intersecting identities (particularly when this included marginalized identities), reiterating the importance of equity and inclusion for mental health promotion. Stigmatization of mental health and mental illness was also linked to worse mental health outcomes in some U.S. studies (Kroshus, 2017; Young et al., 2022) and decreased help-seeking (Kroshus, 2017; Neeley et al., 2021).

Social Support and Positive Relationships

Positive, socially supportive relationships were a significant factor influencing student-athlete mental health, primarily from coaches and teammates, but occasionally also from athletic staff or others outside sport like significant others, family, medical professionals, and faculty. Coaches and teammates could both support athlete coping and a sense of belonging.

Coaches were often a source of interpersonal conflict for athletes in Canada and the U.S., impacting wellbeing by undermining autonomy and competence (Giacobbi et al., 2004; Giovannetti et al., 2019; Hwang & Choi, 2016; Kimball & Freysinger, 2010; Madrigal & Robbins, 2020; Neeley et al., 2021; Powers et al., 2020; Shipherd et al., 2019; Tamminen et al., 2016; Young et al., 2022). Harmful coach behaviours included excessive pressure, negative feedback, or manipulative actions to control athletes. In contrast, positive coach-athlete relationships characterized by trust, mutual respect, goal alignment, and transparent communication were linked to lower stress, fewer depressive symptoms, and greater wellbeing (Madrigal & Robbins, 2020; McDowell et al., 2018; McGee & DeFreese, 2019; Neeley et al., 2021; Pankow et al., 2022; Shipherd et al., 2019; Simons & Bird, 2022; Young et al., 2022). Coaches also protected student-athlete mental health by providing social support (Brown & Strachan, 2022; Giacobbi et al., 2004; Neeley et al., 2021; Pankow et al., 2022; Sullivan et al., 2020). Coaches were most often cited as sources of tangible or informational assistance, yet some athletes expressed a need for greater emotional support and encouragement (Simons & Bird, 2022; Sullivan et al., 2020; Young et al., 2022).

Relationships with teammates were also an important factor for student-athlete wellbeing through belonging and social support. Teammate connectedness

was linked to fewer depressive symptoms, reduced stress, and greater psychological, subjective, and global wellbeing. This was described to inherently promote positive mental health in Canada and the U.S., and across competitive levels, through relatedness and belonging, positive emotions, competence, motivation, and growth (Armstrong & Oomen-Early, 2009; Fenwick & Simpson, 2017; Giacobbi et al., 2004; Giovannetti et al., 2019; Hagiwara et al., 2017; Malnati & Fisher, 2015; Martin et al., 2015; Pankow et al., 2021, 2022; Petersen et al., 2023; Raabe et al., 2022; Raabe & Zakrajsek, 2017; Sadberry & Mobley, 2013; Tamminen et al., 2016; Wayment & Walters, 2017; Wilson & Pritchard, 2005). Resulting social cohesion may explain lower feelings of isolation or loneliness among athletes compared to their non-athlete peers (Wilson & Pritchard, 2005). Further, peer-based social support was commonly cited for emotional comfort and coping, characterized to be less formal than that received from coaches (Brown & Strachan, 2022; Fenwick & Simpson, 2017; Giacobbi et al., 2004; Gilson et al., 2013; Kimball & Freysinger, 2010; Pankow et al., 2022; Petersen et al., 2023; Young et al., 2022).

Ethical Leadership

The findings of this review expand on the importance of formal and informal leaders in building environments that support student-athlete mental health, particularly by proactively creating safe and ethical sport cultures in both Canada and the U.S. (Anderson & Dixon, 2019; Kimball & Freysinger, 2010; Kroshus, 2017; McDowell et al., 2018; Neeley et al., 2021; Pankow et al., 2022; Young et al., 2022). These behaviours align with Self-Determination Theory by fostering student-athlete needs for autonomy, relatedness, and competence through (1) compassionate actions, (2) value-driven practices, and (3) supporting positive connections with others (or an interdependent, "we" identity). Further, ethical leadership qualities like (4) trustworthiness, (5) proactive communication, and (6) a positive future-orientation may support better appraisals of stressful demands and reframe challenges as manageable, shared obstacles while bolstering student-athlete confidence in line with Transactional models of stress and coping. While these behaviours were often discussed for coaches, findings suggest their applicability to other leadership roles as well, including senior student-athletes and program leaders (Pankow et al., 2022).

Organizational Structure and Decision-Making

Included evidence underscored the importance of organizational decision-making in promoting student-athlete mental health. Organizational changes, like coaching staff turnover, were found to significantly impact student-athlete wellbeing both in Canada and the U.S, impacting feelings of isolation, competence, connectedness, and confidence (Gilson et al., 2013; Melendez, 2008; Petersen et al., 2023; Shipherd et al., 2019; Tamminen et al., 2016). Given that organizational changes were found to impact connectedness, confidence, and competence, these stressors may operate on

mental health through their impact on student-athlete needs for relatedness, autonomy, and competence. However, successful management of these transitions, with proactive communication, leadership from staff and athletes, and prioritizing student-athlete needs were described to mitigate the negative effects (Gilson et al., 2013; Melendez, 2018; Petersen et al., 2023; Shipherd et al., 2019; Tamminen et al., 2016).

Discussion

This study aimed to synthesize research on factors in the higher education ecosystem that impact student-athlete mental health and wellbeing to inform organizational mental health promotion. The seven protective factors identified herein — such as growth-oriented climates, role and interpersonal harmony, and ethical leadership — highlight the importance of considering multi-level socioecological factors impacting student-athlete mental health and wellbeing in higher education (Figure 2). Drawing on Self-Determination Theory and the Transactional Model of Stress, we propose a conceptual model illustrating features of leadership, team and organizational environments, and institutional operations that interact to promote student-athlete mental health and wellbeing through psychological need satisfaction (Figure 3). Transactional models have been widely used to conceptualize stress in sport environments (Simpson et al., 2021) and when considered together with needs from Self-Determination Theory, the resulting Motivational Theory of Coping (Ntoumanis et al., 2009) has been useful for understanding mental health in university and college students and student-athletes alike (Poole 2019; Raabe et al., 2022). Through thematic synthesis across included studies, we aimed to present a generalizable model of factors protective of student-athlete mental health in higher education. The applied theoretical perspectives aim to support interpretation of the model across different competitive divisions and sport levels considered in the included literature. In line with multidimensional health promotion practice, we propose leveraging the present theoretically and empirically informed conceptual model to understand, implement, and assess organizational management strategies to promote student-athlete mental health with nuance across sport settings.

National Post-Secondary Sport Context

We anticipated, and retrieved, a relative paucity of literature specific to the Canadian context in this review. Yet, exploring the mental health impacts of organizational factors raises the question of how these may differ between Canadian and American sporting contexts and across competitive divisions, which can differ considerably in levels of commercialization, funding, and accessibility (Geiger, 2013). This emphasizes the need to consider these nuances for effective mental health promotion, including the unique organizational context in which an athlete is situated.

Sport in North American higher education was originally established as part of physical education programming. Howev-

er, there is no doubt that some levels of competition are very high, if not elite, despite maintenance of amateur status for various reasons (Geiger, 2013). Included literature on the mental health impacts of competitive level and sport type, however, were inconsistent. Transactional models of stress prompt us to consider student-athlete mental health depends not just on the presence of stressors, but the availability of the resources they are afforded via affiliation with an athletic institution. Thus, mental health promotion practice may benefit from assessing how institutional resource allocation to athletics influences student-athlete processes of stress and coping amid varying athletic and academic demands. These demands and resources are likely to vary between Canada and the U.S., between sport associations (e.g., NCAA, National Association of Intercollegiate Athletics), and across competitive divisions, such as within the NCAA (Moore, 2016). However, more research is needed to understand and better tailor mental health promotion efforts to the needs of athletes within these respective environments. For example, participating in other organized college or university social groups was found to confer similar social connectedness benefits to sport, yet resource allocation to athletics (especially in U.S. revenue-generating sports) may explain better mental health and quality of life seen among athletes compared to their non-athlete peers (Peacock, 2021). Further, more commercialized sport may see greater access to health resources, while higher levels of competition may simultaneously confer greater levels of organizational stress (Arnold et al., 2016; Simpson et al., 2021). This delicate balance may partly explain why, in some included studies, athletes competing at the highest and most commercialized level of the U.S. NCAA (e.g., Division I football) were found to have worse mental health than their counterparts in Division III (Berger et al., 2021; Peacock, 2021), implying that despite revenue-generation, investments in mental health promotion among these athletes may still be insufficient to combat demands. Nevertheless, other researchers found environments that support student-athlete psychological need satisfaction can ensure comparably high levels of mental health regardless of competitive level (Raabe et al., 2022). Extant literature has also highlighted differences in perceived accessibility of psychosocial support resources across NCAA divisions and between athletic directors and athletes themselves (Moore, 2016). Thus, investments in mental health should match the needs student-athletes report directly and further comparative research should continue to explore the impacts of competitive division and how supportive environments can be cultivated across competitive levels considering other environmental demands and even sociocultural climates.

Integrating Mental Health Priorities in Higher Education Institutions

Included evidence suggests comprehensively addressing student-athlete mental health must consider the impacts of

factors outside the immediate sports team to include broader social-political factors and their manifestation in post-secondary sport. The salience of organizational change management (e.g., hiring decisions and staff turnover) for student-athlete mental health in both Canada and the U.S. for example, highlights the importance of decision-making that prioritizes student-athlete mental health and wellbeing. Not only is it important to mitigate stress through change management, but the selection of athletic staff is an opportunity to ensure members of an athlete's entourage are supportive of mental health and wellbeing (Durand-Bush & Van Slingerland, 2021). According to included evidence, selection of sport staff should consider their athletic success as well as factors that support student-athlete wellbeing such as their community-involvement, ability to role-model openness about mental health, use of strengths-based approaches, and encouragement of meaningful and cooperative relationships. The coach's role as an encouraging facilitator or supportive guide highlights a dynamic that may differ from other sport contexts and suggests coach socioemotional literacy is important to promote student-athlete wellbeing in higher education. However, despite efforts to improve mental health literacy among sport leaders (Bissett et al., 2020) the prevalence of harmful coach-athlete relationships suggests more needs to be done. Reviewed literature from both Canada and the U.S. also highlights that coach-athlete relationships influence, and are influenced by, larger organizational factors. Supportive coaching behaviour can be facilitated by cooperative, ethical, and inclusive relationships across the broader higher education institution, reflecting the need for system-level interventions (Gilson et al., 2013; Melendez, 2008; Pankow et al., 2022; Shipherd et al., 2019). These findings suggest potential for leadership development programs focusing on psychologically safe leadership strategies and ways to create ethical and value-aligned sport programs (Copeland & Potwarka, 2016). These approaches could draw on organizational literature on the impact of leadership through role modelling, setting and communicating clear expectations that prioritize wellbeing, and reflexive, collaborative decision-making (Copeland & Potwarka, 2016; Edmondson, 2004; Van Tuyl et al., 2024). Future research could explore how mental health promoting leader selection and training can be integrated across different sport levels.

In addition to staff selection and training, Mental Health in All Policy (MHiAP), approaches may offer useful frameworks for aligning athletic activities with mental health priorities across the broader higher education institution (Botezat et al., 2017). MHiAP offers a systematic approach to decision-making that integrates mental health considerations into processes across all areas of an institution, ensuring wellbeing is a shared responsibility. Collaborating with student-athletes, campus health services, academics, and athletics could support student-athlete wellbeing, for example, through tailored scheduling, facility design, and delivery of wellness programs. Regardless of context, targeting and tailoring mental health promo-

tion interventions to student-athletes' expressed needs should leverage the athlete voice through their direct participation (Jowett et al, 2022; Van Tuyl et al., 2024). More research is needed, however, to understand barriers and facilitators to such collaborative approaches in organizational contexts with competing priorities that may vary by a program's relative level of development, competition, or commercialization.

Further reflecting the embedded sport environment, we propose harmony between student-athletes' responsibilities and social roles is a unique consideration in higher education that is not adequately accounted for in current North American literature. This role conflict and strain were found to impact student-athlete needs for autonomy, competence, and relatedness, crucial for mental health in Canada and the U.S. alike. Such role considerations have been identified in broader organizational stress literature and holistic ecological models of student-athlete development in Europe (Henriksen et al., 2020; Kegelaers et al., 2022; Wylleman & Rosier, 2016). Conflicting demands may be, to some degree, inherent to competitive post-secondary sport, yet management approaches may still be able to mitigate negative impacts by ensuring availability of effective social support, academic resources, and compassionate leadership, highlighting the importance of sufficient environmental resources to balance stress and coping in line with transactional perspectives (Hwang & Choi, 2016; Pankow et al., 2021; Young et al., 2022). Further exploration of strategies to support student-athlete success in multiple life domains is warranted, perhaps critically evaluating the applicability of the relative wealth of European 'dual-career' insights (Stambulova & Wyllemen, 2019).

Evidence further suggests mental health promotion efforts should address the sociocultural environment, such as by combatting stereotypes, stigma, and discrimination, to align with growing institutional equity, diversity, and inclusion efforts. Social norms could be leveraged for sport mental health promotion in higher education because of the importance of developing one's identity and independence as well as the salience of peer identification at this age (Heath & Keptner, 2023; Thomas & Welters, 2017). Positively, social norms seem to be amenable to intervention, particularly by leveraging this same peer influence (Malnati & Fisher, 2015; Petersen et al., 2023). Some studies showed student-athletes later in their post-secondary careers or with higher career maturity reported better mental health and fewer constraint from social norms, particularly in the U.S. (Berger et al., 2021; Denny et al., 2009; Walsh et al., 2021). Having gone through the transition to higher education themselves and developed their own support networks and skills, mentorship from older teammates may be useful to support more junior student-athletes (Kim et al., 2020; Malnati & Fisher, 2015; Petersen et al., 2023).

The present findings cohere with extant literature suggesting sport climates that emphasize mastery (i.e., skill development and effort) are linked to positive mental health by supporting autonomy, competence, and relatedness in line with Self-Determination Theory. Our findings

suggest that growth and development orientation, or a lack of ego-orientation, also align with fundamental tenets of psychological safety — where risk-taking is supported and athletes can learn without fear of harm or negative consequences (Vella et al., 2022). While psychological safety and growth-orientation have been more commonly examined in younger youth sport, the present findings suggest they are relevant for athlete mental health in higher education as well, across sport systems and levels, which is consistent with some other research in elite sport (Sheehan et al., 2018). For example, researchers suggest psychological safety may be yet another avenue through which environments impact mental health by supporting athlete vulnerability, reducing stigma, and encouraging help-seeking (Walton et al., 2023). The extent to which this applies across sport contexts and levels warrants further study.

Study Strengths and Limitations

This scoping review used a structured, peer-reviewed process to systematically search and synthesize research on factors impacting student-athlete mental health and wellbeing in North American higher education. We consider both influences on mental illness and lesser-studied wellbeing outcomes. We propose a conceptual model illustrating the impacts of sport environments in higher education, exploring factors across levels of the socioecological model and sport levels. While efforts were taken to ensure comprehensive data collection, no grey literature or dissertations were included in the present review. Further, though limited to peer-reviewed evidence, as a scoping review we did not conduct a robust review of the quality of included literature. We, therefore, cannot rule out the potential impact of publication bias or methodological limitations on synthesized findings. Factors deemed necessary for sport mental health promotion in higher education may have been overrepresented in published research, so universal application of findings is cautioned without critical examination of contextual nuances. Under-representation of Canadian research highlights a need for further exploration of organizational risk and protective factors for mental health in Canadian interscholastic sport. Comparative inquiry might also inform considerations of how the identified protective environments can be created considering nuances across sport contexts by country, governing body, and level of development or competition.

Conclusion

This review extends the socioecological model by synthesizing evidence on how institutional factors, such as leadership, social inclusion and cohesion, and effective program management, operate within sport in higher education to impact student-athlete mental health. While existing research emphasizes individual and interpersonal levels, this review highlights the need to address broader structural and organizational contexts for health promotion. This research provides a unique theoretically and empirically informed conceptual model of how interacting in-

stitutional factors affect student-athlete needs for autonomy, relatedness, and competence, as framed by Self-Determination Theory, for a more integrated perspective on embedded mental health promotion. Further, leveraging transactional theories from organizational stress research, offers a framework for understanding how institutional dynamics influence student-athlete wellbeing through appraisal and coping.

Briefly touched on in this review, further research can continue exploring how context shapes strategies for mental health promotion between countries and across sport levels, noting the relative gaps in Canadian literature. The present work may set the stage for inquiry into relationships between factors in the higher education ecosystem and student-athlete mental health by more deeply exploring athlete need satisfaction in relation to demands that may vary by sport type, institution, or level. Testing and integrating sport-specific variables into existing frameworks could further refine these theories and frameworks, perhaps using longitudinal research on causal impacts of policies, management practices, or leadership training on mental health through need satisfaction, appraisal, and coping. Leveraging the conceptual evidence herein can offer valuable insights to support mental health and wellbeing of athletes across sport systems or competitive levels.

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