

Skating on thin ice? Mental health and well-being in women's ice hockey

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ABSTRACT

Objectives First, to map the prevalence of symptoms of positive mental health, anxiety, depression and sleep difficulties, along with the coexistence of these symptoms, among players in the Swedish Women's Hockey League (SDHL). Second, to investigate relationships between these mental health symptoms and demographic variables (ie, age, injuries, dual careers), social support and psychological flexibility.

Methods Players from nine teams in SDHL (n=182; mean age 22.3±SD 4.8, range 16–35) participated in this cross-sectional study. An online survey, including validated self-assessment questionnaires, conducted data collection. The questionnaires were distributed just before the play-offs started in the 2022–2023 season. Mental health variables were presented as descriptive statistics, and associations were investigated through multivariate binary logistic regression analyses.

Results The response rate was 91%. Moderate or severe symptoms were reported among 29.7% for sleep difficulties, 20.9% for anxiety and 18.1% for depression. Nineteen per cent reported comorbidities. Sixty per cent reported flourishing mental health. Lower psychological flexibility was associated with lower odds of flourishing mental health and higher odds of symptoms of anxiety, depression and sleep difficulties. Social support was associated with higher odds of flourishing mental health and lower odds of sleep difficulties.

Conclusion 6 of every 10 players reported not reaching the ideal state of mental health (ie, flourishing mental health without mental illness). Mental health symptoms were statistically significantly associated with psychological flexibility and social support, suggesting that these factors will be beneficial to consider when preventing mental illness and promoting mental health in this population.

INTRODUCTION

Mental health (MH) problems are common among elite athletes who may have a slightly elevated risk due to exposure to a combination of generic and sport-specific factors.¹ Research on this topic has shown that female elite athletes report, in comparison to male elite athletes, higher rates of MH problems.² On this issue, recent Swedish research, for example, shows that symptoms of anxiety and depression are more common among female

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Female elite athletes are exposed to a greater risk of impaired mental health than their male counterparts. Action is needed towards a more proactive and promotive approach when working with mental health in elite athletes.

WHAT THIS STUDY ADDS

⇒ Symptoms of sleep difficulties, anxiety and depression, as well as comorbidities between these, are common among female elite ice hockey players. Psychological flexibility and social support can be considered protective and promotive factors for mental health in this population.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ By mapping the prevalence of mental health symptoms and investigating its associations with potential risk, protective factors and promotive factors, this study contributes with insights into which mental health symptoms and which preventive and promotive factors that should be addressed in work with preventing mental illness and promote mental health among female elite ice hockey players.

elite athletes than their male counterparts.^{3–5} To be a female elite athlete in a male-dominated sport, such as ice hockey, comes with conditions that expose players to factors that may influence their MH status negatively. For instance, according to a survey on salaries among elite hockey players in Sweden, only 7% of the women could play hockey for a living, while almost all men could.⁶ Thereby, it might be common among these women to have dual careers (ie, combining sports careers with education or work), which can be challenging to cope with.⁷ The potential inability to balance one's dual careers can, in turn, compromise MH.⁸ Another condition to consider within ice hockey as a contact sport is that higher levels of play increase the risk of injury.⁹ Injury is a risk factor for anxiety and depression among elite athletes.¹ Furthermore, being an elite ice hockey player also involves extensive travelling for games. In expert consensus statements on sleep in



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elite athletes, competition-related travel is a primary risk factor for sleep disturbances.¹⁰ Sleep difficulties can be understood as mental illness symptoms, while recent studies on Olympic athletes also show strong associations with anxiety and depression.¹¹

Focusing on factors that can help an individual remain healthy while facing these potential stressors that may lead to impaired MH is an important strategy for promoting MH in elite athletes, according to the International Society of Sport Psychology (ISSP).¹² Similarly, the IOC highlights the importance of addressing factors that minimise harm and maximise benefits for MH in elite athletes.¹ Both risk factors for mental ill health and facilitators for MH can be conceptualised within an ecological systems model¹³ where potential risk/protective factors are present on different levels: (1) the athlete (skills, strategies, attitudes), (2) microsystem (interpersonal relationships), (3) exosystem (individual sport) and (4) macrosystem (international/national sporting environment, media). In previous research, most attention has been focused on factors on the athlete and the microsystem level.¹⁴ Recent research, including ice hockey players, has, for example, highlighted social support as a protective factor, where athletes with higher levels of social support experience positive well-being and low levels of anxiety and depression.¹² Another such factor can be psychological flexibility (PF), which is defined as the 'ability to contact consciously the present moment and the thoughts and feelings it contains more fully and without needless defence, and based on what the situation affords, to persist or change in behaviour in the service of chosen values'¹⁵ (p 155). Previous research has shown that poor PF in elite athletes was negatively associated with psychological distress, including anxiety.¹⁶

Mapping the prevalence of MH and symptoms of mental health problems (MHP), as well as investigating associations with potential risk, protective factors and promotive factors, would be useful for gaining an understanding of how to adequately target interventions and develop strategies for promoting MH within the context and group of athletes in interest. Therefore, the first aim of this study was to map the prevalence of positive MH as well as anxiety, depression and sleep difficulties, along with comorbidities between these, among players in the Swedish Women's Hockey League (SDHL). A secondary aim was to investigate relationships between MH symptoms and demographic variables (ie, age, injury, dual careers), perceived social support (PSS) and PF.

METHODS

Population

This study adopted a purposive sampling with the eligibility criteria of playing in the SDHL. The players were recruited through their respective team managers. Forty-nine per cent (n=90) of the players had another nationality than Swedish.¹⁷ The mean age in the sample population was 22.3 years (SD 4.8 years) and ranged from

16 to 35 years. Eighty per cent (n=145) reported having dual careers and 30% (n=54) reported being injured.

Design

A cross-sectional online survey in Swedish and English was distributed to all SDHL players through their respective team managers. Of the 199 players in SDHL, 182 from all nine teams completed the survey (response rate 91%). Data were collected in February 2023 during the competitive season (before the play-offs started). Before the data collection took part all clubs in SDHL were informed about the study. After that information, a link to the survey was distributed from the researchers to the clubs with instructions to forward the link to the players in the clubs. A video was also recorded and distributed from the researchers to the population of players. In the video, information about the study and the ethical aspects, relevant for the study, were presented. Some of the clubs allocated time in connection to practice for the players, who agreed to take part, to complete the survey while other teams only distributed the link and asked the players to complete the survey in their free time. The participants gave informed consent before taking part in the study. Participation was voluntary, and participants could withdraw from the study at any time without receiving negative consequences. The study was conducted in accordance with the Declaration of Helsinki.¹⁸ The Strengthening the Reporting of Observational Studies in Epidemiology checklist was used to guide the reporting of the study.

Patient and public involvement

This study was performed in collaboration with the Swedish Ice Hockey Association, which wanted an increased understanding of MH promotion and prevention. The Ice Hockey Association were involved in designing the study and assisted during the different steps in the research process. More specifically, staff from the Ice Hockey Association were involved in the design of the study. Also, they facilitated contact with the clubs as well as with the league organisation. The study was founded by the Swedish Ice Hockey Association, but they had no access to the data and were not involved in the data analysis phase.

Measures

The survey consisted of questions on demographic variables (age, injury, dual careers). The variable age was reported as the number of ages. The variable injury was reported as having an injury or not. Dual careers refer to combining one's sports career with education or work and were reported as having dual careers. The survey also consisted of the following validated self-report questionnaires:

Generalized Anxiety Disorder-7 was used to assess the severity of anxiety symptoms.¹⁹ Respondents scored seven items on how often they, during the last 2 weeks, experienced different states. The responses were given on a

4-point scale ranging from 0 to 3, 'not at all' to 'nearly every day'. The scores were categorised into severity levels: minimal to mild (0–9 points) and moderate to severe (10–21 points) based on the clinical cut-off score of 10 points.

Patient Health Questionnaire-9 was used to assess the severity of depression symptoms.²⁰ Respondents scored nine items on how often they, during the last 2 weeks, experienced different states. The responses were given on a 4-point scale ranging from 0 to 3, 'not at all' to 'nearly every day'. The scores were categorised into severity levels: none to mild (0–9 points) and moderate to severe (10–27 points) based on the clinical cut-off score of 10 points.

The Athlete Sleep Screening Questionnaire is an athlete-specific sleep screening questionnaire.²¹ The questionnaire contains 16 questions, of which five questions assess sleep difficulties. Responses to questions on sleep difficulties were scored between 0 and 3 or 4 points, depending on the question. Total scores were categorised into severity levels: none to mild (0–7 points) and moderate to severe (8–17 points) based on the clinical cut-off score of 8 points.

The Mental Health Continuum Short Form was used to assess positive MH.²² Respondents scored 14 items on how often they, during the last 2 weeks, have experienced different states of well-being, both emotional, social (ie, 'hedonic') and psychological (ie, positive functioning). The responses were given on a 6-point scale ranging from 0 to 5, 'never' to 'every day'. If respondents scored 4 or 5 on three hedonic items and six functioning items they were categorised as 'flourishing MH', which is referred as the ideal state.¹² The remaining respondents were categorised as 'non-flourishing MH'.

The Swedish Acceptance and Action Questionnaire assessed PF.²³ Respondents scored six items on a 7-point scale ranging from 1 to 7, 'never true' to 'always true'. The sum of scores was divided by the number of items. Lower scores indicate higher PF. No cut-offs were applied for this continuous variable.

The Multidimensional Scale of Perceived Social Support was used to assess PSS.²⁴ The scale covers three dimensions of social support: family, friends and significant others. Respondents scored 12 items on a 7-point scale ranging from 1 to 7, 'very strongly disagree' to 'very strongly agree'. Higher scores indicate higher levels of PSS. The sum of scores was further divided by the number of items. No cut-offs were applied for this continuous variable.

Statistical analysis

IBM SPSS (V.28.0) was used for the statistical analysis. Descriptive statistics of the dichotomised MH variables and their coexistence were calculated and presented as numbers and percentages. Multivariate binary logistic regression analyses were conducted to investigate associations between the dichotomised MH variables (positive MH, anxiety, depression, sleep difficulties) as dependent

Table 1 Mental health problems (MHP; levels based on cut-off scores)

Variables	Respondents, n=182 n (%)
Anxiety	
Minimal to mild anxiety (below clinical cut-off)	144 (79.1)
Moderate to severe anxiety (above clinical cut-off)	38 (20.9)
Depression	
None to mild depression (below clinical cut-off)	149 (81.9)
Moderate to severe depression (above clinical cut-off)	33 (18.1)
Sleep difficulties	
None to mild sleep difficulties (below clinical cut-off)	128 (70.3)
Moderate to severe sleep difficulties (above clinical cut-off)	54 (29.7)
Any MHP	
Moderate to severe anxiety, depression or sleep difficulties	75 (41.2)

variables, and age, dual careers, injury, PSS and PF, respectively, as independent variables. Associations for each MH variable were calculated and presented separately, including ORs and a 95% CI.

RESULTS

Mental health

Among the respondents (n=182) in this study, 41.2% (n=75) reported reaching the clinical cut-off for at least one of the questionnaires (ie, anxiety, depression or sleep difficulties). More specific prevalence of symptoms of anxiety, depression and sleep difficulties is presented in [table 1](#). Moreover, 10 of the players (5.5%) reported suicidal intentions. Comorbidities (ie, reaching clinical cut-off for multiple questionnaires) were reported by 19.2% (n=35) of the respondents. More details on the prevalence of comorbidities are presented in [table 2](#).

Table 2 Comorbidities of MHP (moderate or higher)

Variables	Respondents, n=182 n (%)
Symptoms of any MHP without comorbidities	40 (22.0)
Symptoms of multiple MHP (comorbidities)	35 (19.2)
Anxiety and depression	23 (12.6)
Sleep difficulties and anxiety or depression	27 (14.8)
Sleep difficulties, anxiety and depression	15 (8.2)



Table 3 Coexistence of Mental health and Mental health problems

Variables	Respondents, n=181* n (%)
Flourishing MH without MHP symptoms (moderate or higher)	73 (40.3)
Flourishing MH with MHP symptoms (moderate or higher)	36 (19.9)
Non-flourishing MH with MHP symptoms	39 (21.5)
Non-flourishing MH without MHP symptoms	33 (18.2)

*1 respondent missing.
MH, mental health.

The results on positive MH show that, among the respondents (n=181), 60.2% (n=109) reported having flourishing MH and that 39.8% (n=72) did not reach the criteria for flourishing MH. Additionally, 40.3% (n=73) reported flourishing MH without reaching clinical cut-off levels for symptoms of sleep difficulties, depression or anxiety. The remaining respondents were either not flourishing (39.7%, n=72) or flourishing with MHP symptoms (19.9%, n=36; [table 3](#)).

Associations with potential risk, protective factors and promotive factors

The results from the logistic regression analyses showed that lower PF was associated with higher odds of symptoms of anxiety (OR=2.46, 95% CI 1.66 to 3.65), depression (OR=2.75, 95% CI 1.80 to 4.18) and sleep difficulties (OR=1.76, 95% CI 1.26 to 2.45). Lower PF was also associated with lower odds of flourishing MH (OR=0.49, 95% CI 0.34 to 0.71). Higher PSS was associated with higher levels of flourishing MH (OR=3.49, 95% CI 1.93 to 6.31) and lower sleep difficulties (OR=0.49, 95% CI 0.30 to 0.80). PSS was not statistically significantly associated with anxiety or depression. No statistically significant associations were found for age, dual careers and injury. A more detailed summary of the results from the logistic regression analysis is described in [table 4](#).

DISCUSSION Mental health

In the present study, 41.2% of the players reported moderate or higher symptoms of at least one MHP (anxiety, depression or sleep difficulties). Compared with the prevalence of comorbidities at 19.2%, this illustrates that comorbidities were represented in almost half of the cases. This can highlight the importance of acknowledging comorbidities of anxiety, depression and sleep difficulties, which are MH states with strong positive relations shown in recent research on elite athletes.¹¹ Notably, out of the 19.2% with comorbidities, 14.8% had sleep difficulties, indicating that sleep difficulties are a big part of comorbid cases and should be addressed. If not, comorbid MHP symptoms such as anxiety and depression will unlikely dissolve.¹

Symptoms of sleep difficulties were most frequently reported, with a prevalence rate of 29.7% for moderate or severe symptom levels. This is somewhat higher than the percentages from a systematic review of athletes from various sports and contexts, showing a prevalence rate of sleep disturbances at 26% among female and male athletes.²⁵ The result from the present study adds to the existing empirical evidence on the common prevalence of sleep problems in high-level athletes and the need to target them.¹⁰ Within the league it is a mix of games played between lunch time (game starts and 12:00) and the evening (19:00). There is also a mix of overnight stays versus travel back home the same night when playing away games. For the present study population, addressing sleep difficulties can be of certain interest due to the inevitable travel associated with competition, which in previous consensus statements has been presented as a primary risk factor for sleep disturbances. Additionally, it is highlighted in the consensus statements that sleep in elite athletes is an essential part of both their mental and physical health.¹⁰

For anxiety symptoms, 20.9% of the respondents in the present study reported moderate or higher levels. For symptoms of depression, 18.1% reported moderate or higher levels. The percentages from the present study correspond to a previous Swedish study, which included a similar population consisting of female players in

Table 4 Associations between MHP/MH and potential risk/protective factors/promotive factors

Variables	Sleep difficulties OR (95% CI)	Anxiety OR (95% CI)	Depression OR (95% CI)	Flourishing MH OR (95% CI)
Age	1.06 (0.99 to 1.14)	0.91 (0.84 to 1.00)	0.92 (0.84 to 4.36)	1.01 (0.94 to 1.09)
Dual careers (scored as no/yes)	1.40 (0.56 to 3.50)	0.63 (0.22 to 1.78)	0.64 (0.20 to 1.97)	0.83 (0.32 to 2.10)
Injury (scored as no/yes)	1.69 (0.79 to 3.61)	1.13 (0.47 to 2.73)	1.37 (0.53 to 3.53)	0.56 (0.26 to 1.20)
Psychological flexibility (scored from best to worst)	1.76 (1.26 to 2.45)	2.46 (1.66 to 3.65)	2.75 (1.80 to 4.18)	0.49 (0.34 to 0.71)
Perceived social support (scored from worst to best)	0.49 (0.30 to 0.80)	0.94 (0.55 to 1.59)	0.74 (0.42 to 1.24)	3.49 (1.93 to 6.31)

MH, mental health.

top leagues in soccer, handball and ice hockey. The COVID-19 pandemic was present in that study, and COVID-19-related worries were associated with anxiety and depression among the athletes.² COVID-19 restrictions were not present when the present study was conducted. Instead, it was conducted during the competitive season, which can come with different stressors that may affect MH, such as travel, external expectations and media.²⁶ Also, performance-related stressors might be of particular importance given the time of the season when the study was conducted.²⁷

Among the respondents in the present study, 60.2% reported flourishing MH, meaning experiencing a good MH with optimal functioning, including emotional, social and psychological well-being.^{12–22} The percentage in the present study is notably higher than in a Canadian study, showing 44–45%.²⁸ It should be noted that the population in the Canadian study were both male and female student-athletes from a wide variety of sports, in comparison with the present study with athletes from a specific sport without the specific university context, meaning the contextual factors differ between the populations which could influence the MH prevalence.²⁹ Even though the percentages from the present study could be interpreted as relatively high, it should be noted that the ISSP states that the ideal state is experiencing flourishing MH without symptoms of MHP (ie, symptoms of anxiety, depression or sleep problems),¹² which was reported among about 40.3% in the present study. As follows, 59.7% were not reaching the ideal state of MH, either due to not having a flourishing MH or the presence of symptoms of MHP.

Associations with risk, protective factors and promotive factors

In this study, PF was the variable with the most associations with MH and the symptoms of MHP. More specifically, higher levels of PF were associated with flourishing MH, and lower levels of PF were associated with symptoms of depression, anxiety and sleep difficulties. This indicates that PF can be suggested as a promotive and protective factor in this context. The negative association between PF and anxiety corresponds with previous research with male elite soccer players in Portugal participating in an intervention inspired by acceptance and commitment therapy programmes.¹⁶ Other research has further shown that PF enhances MH directly, both decreasing anxiety and depression, as well as enhancing social functioning,³⁰ which may explain the associations found in the present study. The findings in this study can add to recent research highlighting the relevance of working towards promoting PF in athlete populations. For instance, a randomised controlled trial study with female student-athletes has shown that participation in interventions to increase PF reduces psychological, emotional and behavioural concerns.³¹

The results of the present study also showed that higher PSS was associated with higher odds of flourishing

MH. Similarly, a recent Danish study showed that elite athletes with above-average mental well-being received higher support than athletes with low mental well-being.³² The associations presented in the present study can be understood through recent research with a German working population where it was suggested that social support facilitates the enforcement of mental well-being, even when multimorbidity is present.³³ The association between lower PSS and symptoms of sleep difficulties was a more unexpected finding. However, this correlation corresponds with recent research on Dutch elite athletes.³⁴ The association between PSS and sleep is theorised by other scholars with a suggestive explanation that 'social support may influence sleep through the meaning that people derive from their supportive social ties and how meaning promotes better mental health'³⁵ (p 153). The present study supports previous research on elite athletes presenting low social support as a risk factor and high social support as a protective factor for MH,¹⁴ as well as its positive association with mental well-being,³² suggesting that it can also be understood as a promotive factor.

In the discussion of protective factors, it is important to state that even if we, in the current study, have focused on athlete (PF) as well as interpersonal (social support) aspects, organisational as well as societal factors also influence both the risk for MHP as well as the athletes' chances of coping with potential stressors. It is, therefore, important for different stakeholders to work actively with strategies that could help the athlete to cope with the potential stressors to facilitate health and performance.

Clinical implications

This study mapped MH among players in the SDHL. The prevalence of symptoms of anxiety, depression and sleep difficulties reported in this study should be acknowledged, considering that the mapping and early identification of MHP is an important prevention strategy.¹² Likewise, the prevalence rates also indicate where further assessment and management are needed. Moreover, this study gives insight into the prevalence of a subideal MH state, indicating a promotion gap. Additionally, this study identifies PF and PSS as protective and promotive factors that could be beneficial to prevent MHP and promote MH. The findings in this study can be valuable for promoting MH in this elite athlete population, which in turn can be understood as a key resource for a healthy and prosperous sports system.²⁹ Different initiatives to facilitate MH are important to consider for stakeholders.¹³ Such initiative could, for example, be to educate stakeholders about both how to facilitate MH and how to identify signs of MHP. Also, for the organisation to screen for MHP, using, for example, the IOC Sport Mental Health Assessment Tool 1³⁶ to detect athletes who need help can be of great importance. In this process, it is also important for the organisation to have connection with psychologists to refer athletes who need treatment for MHP. This can, in turn, be valuable, considering that sport is a powerful

platform for promoting MH and gender equality, especially within high-level sports where such work can serve as a model for society at large.^{1 37}

Limitations and strengths

Considering the cross-sectional design of this study, causal relationships cannot be determined. This study only investigated the point prevalence of MH status during the competitive season. It should be noted that the prevalence could differ during the off-season. Therefore, it can be suggested that future research observing MH status and associated factors over time is needed. A strength of this study was the high response rate, contributing to higher quality and accuracy of the data, making the sample much more representative. Another strength is that both MI and MH were investigated, contributing to a fuller picture of the MH status of the studied population.

CONCLUSION

Six out of every 10 players in SDHL reported not reaching the ideal MH state (ie, flourishing MH without MHP). Statistically significant associations for the MH variables were found with PF and PSS, suggesting these factors can be beneficial to consider when promoting MH and preventing MHP in this population.

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Patient consent for publication Consent obtained directly from patient(s).

Ethics approval This study involves human participants and was approved by the Swedish Ethical Review Authority (diary number 2022-05906-01). Participants gave informed consent to participate in the study before taking part.

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Data availability statement Data are available upon reasonable request from the last author.

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