



The Mental Health of Swiss Elite Athletes

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RESEARCH

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ABSTRACT

Mental health is an important topic in competitive sports, but there is only limited data from Switzerland. Although mental health is a prominent topic, it is difficult to estimate the efforts of Swiss sports federations to promote mental health. A representative sample of Swiss athletes ($N = 1003$, $M_{age} = 21.69$, $SD_{age} = 7.09$, 54% women, 37% team sports, 10% injured) answered questions about symptoms of mental health problems and their well-being. We also asked about the extent of basic need satisfaction and perceived organizational support. Overall, the numbers on symptoms of mental health problems (17% depression, 10% anxiety, 22% eating disorders, 18% sleep disorders) and well-being are comparable to other elite sport samples and the general Swiss population. However, we found large group differences. For example, 52% of women athletes were affected by at least one mental disorder symptom, compared with 30% of men athletes. Injured athletes were most affected in terms of depressive symptoms. The study also shows that need satisfaction and frustration in conjunction with demographic factors is related to well-being and symptoms of mental health problems. Furthermore, the more support athletes perceive from their federations, the better their mental health. We conclude that a substantial proportion of athletes are affected by symptoms of mental disorders and more measures are needed to improve this situation, for example through supporting need satisfaction in the sport setting.

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INTRODUCTION

As mental health depends on the absence of psychiatric disorders and on positive mental functioning (WHO, 2014), mental health parameters encompass both mental health problems and well-being (Uphill et al., 2016). In recent years, world-renowned athletes, including Simone Biles, Michael Phelps, and Naomi Osaka, have directed public attention to the issue of mental health in elite sport by talking openly about their own problems in this regard (Bachynski, 2021; Bleinder, 2021; Longman, 2021). In addition, several national sports federations and international professional associations have issued position statements calling for a greater emphasis on athletes' mental health in practice and research (see Vella et al., 2021 for a review). Within the field of sport psychology, there is broad consensus that sports systems should protect and promote mental health both during and after the athlete's career (Henriksen et al., 2019; Moesch et al., 2018). To ensure the appropriateness of any such measures, it is important to learn more about athletes' well-being and mental health problems.

As sports systems are organized nationally, it makes sense to address these issues on a country-by-country basis; accordingly, the present paper focuses on the Swiss sports system. Empirical data on levels of well-being and the extent of common mental disorders among current Swiss elite athletes is limited, as previous studies were based on small samples and confined to certain age groups, sports, and/or a single disorder and did not include well-being (Benson et al., 1990; Birrer et al., 2015; Gerber et al., 2018; Gerber et al., 2022; Junge & Feddermann-Demont, 2016). Taking into account these data, it seems warranted that science should pay more attention to this area and try to learn more about levels of well-being and symptoms of common mental disorders across a large and diverse sample of current Swiss elite athletes.

Depression and anxiety are among the most common mental health problems in the general population (e.g., Steel et al., 2014). Among elite athletes, the prevalence of depressive symptoms ranges from 4% to 68% (Hammond et al., 2013; Schaal et al., 2011) and generalized anxiety disorder ranges from 6% to 15% (Du Preez et al., 2017; Schaal et al., 2011). For athletes, eating and sleep disorders are also especially relevant, as these are key factors in the recovery process (Thomas et al., 2016; Vitale et al., 2019). Prevalence of eating disorders and/or disordered eating among elite athletes range from 0% to 45% (Bratland-Sanda & Sundgot-Borgen, 2013). Studies of sleep quality suggest that 50–78% of elite athletes suffer from a sleep disorder, and 22–26% experience severely disturbed sleep (Gupta et al., 2017; Samuels, 2008; Swinbourne et al., 2016). These wide-ranging estimates indicate a high degree of uncertainty that may in part reflect inconsistent measures of mental

health problems and sample differences in terms of sport, gender distribution, or other parameters. To augment existing knowledge, the present study was based on a larger sample covering all of Switzerland's most popular sports.

To learn more about the whole spectrum of athletes' mental health, it also seemed important to investigate their well-being, which to our knowledge remains a neglected topic in Switzerland. Well-being includes both hedonic and eudaimonic well-being (Ryan & Deci, 2001). Hedonic well-being—also known as emotional or subjective well-being—refers to the presence of positive feelings and satisfaction with life (Keyes, 2009). Eudaimonic well-being encompasses social and psychological well-being, including positive community involvement (e.g., social integration, social contribution) and individual functioning (e.g., self-acceptance, personal growth, Keyes, 2002).

In addition to examining the extent of athletes' mental health problems and well-being, more knowledge about associated factors would help identify potential risks and opportunities for protecting and promoting mental health. These factors include 1) group differences such as between genders, 2) psychological constructs such as need satisfaction and frustration, and 3) environmental factors such as organizational support.

GROUP DIFFERENCES

With respect to group differences, demographic factors of interest include gender and type of sport. For example, depression, anxiety, eating disorders, and sleep problems affect female athletes more than males (Gorczynski et al., 2017; Joy et al., 2016; Reardon et al., 2019; Schaal et al., 2011). There is also evidence that athletes who compete in leanness sports (e.g., synchronized swimming) are more likely to be affected by eating disorders (Mancine et al., 2020), and participants in individual sports report more depression and anxiety than those who play team sports (Nixdorf et al., 2016; Pluhar et al., 2019). Injury is also a factor in competitive sports, as they occur frequently (e.g., Clarsen et al., 2015) and athletes also report poorer mental health (in the form of depressive symptoms) in the period immediately following an injury (Appaneal et al., 2009).

NEED SATISFACTION AND NEED FRUSTRATION

Apart from group differences, theories that explain an individual's level of mental health can also help to identify underlying mechanisms and possible interventions. For example, the basic psychological needs theory (Ryan & Deci, 2002)—a sub-theory of self-determination theory (Deci & Ryan, 2000)—specifies three basic psychological needs: autonomy (feeling that one can choose how to behave); competence (feeling that one can control an outcome and experience mastery); and relatedness (feeling accepted within one's social milieu). The theory

proposes that a social environment that enables one to satisfy these needs is associated with better mental health; in contrast, a social environment that frustrates these basic needs is associated with poorer mental health (Ryan & Deci, 2002). The evidence suggests that the frustration of basic psychological needs differs from the mere absence of need satisfaction (Vansteenkiste & Ryan, 2013). This is supported by data from a heterogeneous sample of athletes, which show that mental health problems are mainly associated with more frequent frustration of needs while well-being is associated with both the satisfaction and non-frustration of basic psychological needs (Heissel et al., 2018).

ORGANIZATIONAL SUPPORT

For athletes, a social environment that satisfies basic psychological needs at the micro level (e.g., coaches, parents) is associated with better mental health in terms of well-being (Adie et al., 2008; Blanchard et al., 2009; Gagne, 2003; Reinboth et al., 2004). This support from people close to the athlete can be consolidated by organizational support from macro-level entities like clubs and federations. There are some recommendations (including tool-kits) for organizations (Poucher et al., 2021; Walton et al., 2021) and studies showing that one federations' mental health literacy intervention lead to improvements in mental health awareness but not well-being (Breslin et al., 2018). To date, however, the efforts of Swiss clubs and federations to support or promote athletes' mental health have not been investigated or evaluated.

CURRENT STUDY

One aim of the present study was to assess the prevalence of symptoms of common mental disorders (depression, anxiety, eating disorders, sleep disorders) and well-being in a large sample of current Swiss elite athletes. As there is evidence that athletes sometimes have multiple mental disorders at the same time (Gouttebarger et al., 2017), we also investigated comorbidities. A second aim of the study was to explore the relationship between potential moderating factors and selected measures of mental health outcomes. We hypothesized that our findings would align with the current evidence that female athletes exhibit more symptoms of depression, anxiety, and eating and sleep disorders. We also anticipated more eating disorders among athletes participating in leanness sports and more mental health problems among those participating in individual sports than those playing team sports. We further anticipated that injury and frustration of basic psychological needs would be associated with poorer mental health and that greater fulfillment of those needs would be associated with better mental health. As a third aim, we also explored the efforts of Swiss clubs and federations to provide organizational support from the athlete's perspective. As *organizational support* is a broad

term, we looked closely at three elements: mental health support (e.g., support with mental health problems, lending a sympathetic ear); basic need support (e.g., valuing performance and development); and additional support (e.g., organizational and financial assistance). Specifically, we investigated whether there was a positive relationship between perceived organizational support and mental health and whether perceptions of organizational support differed across groups.

METHOD

The study design was cross-sectional, with a single measurement time point. All questionnaires were delivered and completed online. The first part of the analysis focused on prevalence and moderators; the second part was more explorative, looking at athletes' perceptions of organizational support.

PARTICIPANTS AND PROCEDURE

In Switzerland, an athlete's status is determined by performance criteria specified by the national umbrella organization of sports federations (Swiss Olympic). This status in turn determines the available financial supports, which fall into two main categories, one for national squad members at elite level and for those at junior level. The individuals who receive these supports are, by definition, Switzerland's best athletes in their respective sports.

For the purposes of our study, we contacted all Swiss athletes aged 16 years or older who fell into one of these two national support categories and invited them to participate in an online survey ($N = 4872$, $M_{\text{age}} = 22.42$, $SD_{\text{age}} = 7.24$). Of these, 47% were junior-level athletes; 41% were women, and 44% played team sports. Each participant received a personal code and a link to an online survey. The first page of the online questionnaire informed participants about the purpose of the study and their rights. Each participant was required to give informed consent before commencing the online survey in their chosen language (German or French). The survey was completed by 79% of the participants in German and by 21% in French. The study was approved by the cantonal ethics committee (Project ID 2021-02282). Candidates who did not respond received two e-mail reminders (after two and four weeks).

In total, 1003 athletes (21% of those contacted) completed the survey and were included in the analysis (539 women, 462 men, 2 diverse; $M_{\text{age}} = 21.69$, $SD_{\text{age}} = 7.09$, $M_{\text{weekly training hours}} = 14.85$, $SD_{\text{weekly training hours}} = 6.54$). Of these, 52% were junior-level athletes, and 37% played team sports. At the time of the survey, about ten percent ($n = 101$) reported being injured and unable to train for at least two further weeks. Participants from 88 different sports completed the survey, the most common being

soccer (6%), athletics (6%), ice hockey (6%), alpine skiing (6%), floorball (4%), rowing (3%), volleyball (3%) and orienteering (2%). As compared to all those contacted, the athletes who completed the study were more likely to be female ($t = 9.43, p < .001, d = 0.33$) and less likely to play a team sport ($t = 5.00, p < .001, d = 0.18$). Participants were also more likely to fall into the junior-level category ($t = 3.53, p < .001, d = 0.12$) and were accordingly slightly younger than the overall sample ($t = 3.61, p < .001, d = 0.13$).

MEASURES MAIN ANALYSIS

Depression

The 9-item Patient Health Questionnaire (PHQ-9, Kroenke et al., 2001) was used to assess depressive symptoms in the two preceding weeks. The PHQ-9 has been validated in several languages, including German (Gräfe et al., 2004) and French (Carballeira et al., 2007), exhibiting good reliability and validity. The PHQ-9 asks participants to self-assess nine problems (e.g., “I had little interest or pleasure in doing things”) on a 4-point scale ranging from *not at all* (0) to *nearly every day* (3). Cut-off points of 5, 10, and 15 are classified as *mild*, *moderate*, and *severe* depression, respectively. One meta-analysis reported that combined sensitivity (i.e., true positive rate for major depression) and specificity (i.e., true negative rate) was maximized at a cut-off score of 10 (Levis et al., 2019), where the values for sensitivity were at 0.88 and for specificity at 0.85 (Levis et al., 2019). For present purposes, we implemented the previously reported diagnostic threshold of ≥ 10 , which is used in most studies (Kroenke et al., 2001). For our sample, the instrument achieved an internal consistency of $\alpha = .84$.

Anxiety

The 7-item General Anxiety Disorder (GAD-7, Spitzer et al., 2006; Spitzer et al., 1999) was used to assess anxiety symptoms in the two preceding weeks. The GAD-7 has been validated in several languages, including German (Hinz et al., 2017; Löwe et al., 2008) and French (Micoulaud-Franchi et al., 2016), exhibiting good reliability and validity. The GAD-7 asks participants to self-assess seven core symptoms of generalized anxiety disorder (e.g., “I had not been able to stop or control worrying”) on a 4-point scale ranging from *not at all* (0) to *nearly every day* (3). Cut-off points of 5, 10, and 15 are classified as *mild*, *moderate*, and *severe* anxiety, respectively. For present purposes, we implemented the previously reported diagnostic threshold of 10, which is used in most studies (Löwe et al., 2008). For the cutoff value of 10, a meta-analysis reported a sensitivity of 0.74 and a specificity of 0.83 (Plummer et al., 2016). The sensitivity in the original validation sample was higher (i.e., 0.89, Spitzer et al., 2006). For our sample, the instrument achieved an internal consistency of $\alpha = .85$.

Disordered Eating

The 5-item Screening Tool for Eating Disorders (SCOFF, Hill et al., 2010; Morgan et al., 1999, 2000) was used to assess disordered eating. The SCOFF has been validated in several languages, including German (Richter et al., 2017) and French (Garcia et al., 2010), exhibiting good reliability and validity. The SCOFF asks participants to report intentional vomiting, loss of control over food, weight loss, body dissatisfaction, and intrusive thoughts about food on a dichotomous scale (yes versus *no*). Every yes answer scores one point; a score of ≥ 2 indicates risk for an eating disorder (Morgan et al., 1999). For this score a meta-analysis reported a sensitivity of 0.86 and a specificity of 0.83 (Kutz et al., 2020).

Sleep disturbance

We used the 5-item sleep difficulty score (SDS) from the Athlete Sleep Screening Questionnaire, (ASSQ, Bender et al., 2018; Samuels et al., 2016) to assess sleep disturbances. The ASSQ has been validated in athletes and exhibits good reliability and validity (Bender et al., 2018). The items (i.e.,: 1. “During the recent past, how many hours of actual sleep did you get at night?” 2. “How satisfied/dissatisfied are you with the quality of your sleep?” 3. “During the recent past, how long has it usually taken you to fall asleep each night?” 4. “How often do you have trouble staying asleep?” 5. “During the recent past, how often have you taken medicine to help you sleep (prescribed or over-the-counter?)”) are rated on 4-point Likert scale (0–3, items 3–5) or a 5-point Likert scale (0–4, items 1 and 2). A total score ranging (ranging from 0 to 17) is obtained by summing the scores on all five items; a score of ≥ 8 indicates moderate sleep disturbance. This score exhibits a sensitivity of 0.81 and a specificity of 0.93 (Bender et al., 2018). For our sample, the SDS achieved an internal consistency of $\alpha = .50$.

Well-being

To assess well-being, we used the 14-item Mental Health Continuum Short Form (MHC-SF, Lamers et al., 2011). Both the German version (Žemojtel-Piotrowska et al., 2018) and the French version (Doré et al., 2017) of the MHC-SF exhibit good reliability and validity. The MHC-SF comprises three subscales: *emotional well-being* (three items; e.g., “During the past month, how often did you feel satisfied with life?”); *social well-being* (five items; e.g., “During the past month, how often did you feel that you had something important to contribute to society?”); and *psychological well-being* (six items; e.g., “During the past month, how often did you feel that you had experiences that challenged you to grow and become a better person?”). Items are rated on a 6-point scale ranging from *never* (1) to *every day* (6), and mean scores are calculated for the three subscales and the overall scale. For our sample, the MHC-SF achieved the

following internal consistency values: *emotional well-being*: $\alpha = .86$; *social well-being* $\alpha = .80$; *psychological well-being* $\alpha = .84$.

Need frustration/satisfaction

We used the Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS, [Chen et al., 2015](#)) to assess satisfaction and frustration of the basic psychological needs in sporting contexts. The BPNSFS has been validated in German ([Heissel et al., 2018](#)) and French ([Chevrier & Lannegrand, 2021](#)), exhibiting good reliability and validity. Following others ([Heissel et al., 2020](#)), we used the 12-item version of the BPNSFS, which comprises two 6-item subscales. The first subscale assesses *need satisfaction* (autonomy, relatedness, and competence), and the second subscale assesses *need frustration*. Participants were asked to report the extent to which they agreed with six statements related to *need satisfaction* (e.g., “When doing sports, I do the things I do because I really want to do them”) and six related to *need frustration* (e.g., “When doing sports, I feel forced to do many things that I actually do not want to do”) on a 5-point scale ranging from *not at all true* (1) to *completely true* (5). The *need satisfaction* subscale achieved an internal consistency of $\alpha = .68$, and the *need frustration* subscale achieved $\alpha = .76$.

EXPLORATIVE ANALYSIS MEASURE: PERCEIVED ORGANIZATIONAL SUPPORT

To measure perceived organizational support, we newly framed items that addressed three areas: *mental health support* (five items; e.g., “In my club/federation, signs of poor mental health are well responded to”); b) *basic need support* (three items; e.g., “In my club/federation, good performance and development are valued”); and *additional support* (four items; e.g., “My club/federation offers legal and financial advice to athletes”). We randomly selected 300 individuals from the German-speaking sample and conducted an exploratory factor analysis (oblique, promax). The result was a three-factor solution (i.e., mental health support, basic need support and additional support). All but one item loaded on the expected factor. The corresponding item was deleted, leaving the *additional support* scale with three items. A confirmatory factor analysis (maximum likelihood) with the remaining participants showed good fit with the three-factor solution (CFI = .97, RMSEA = .06, SRMR = .04) for the German version (n = 498) and an acceptable fit (CFI = .94, RMSEA = .08, SRMR = .06) for the French version (n = 205), based on Kline’s (2015) criteria: CFI > .90, RMSEA < 0.08, SRMR < .08. All items were rated on a 6-point scale (ranging from 1 = *does not apply at all* to 6 = *strongly applies*). As an added option, we included *don’t know/ can’t judge*. As these items did not distinguish between club and federation, we added two further questions about their respective levels of

commitment to mental health promotion (e.g., “How much does your club do to promote mental health?”). Responses ranged from *not at all* (1) to *very strongly* (5), along with the additional option *don’t know/can’t judge*. See Appendix for a complete list of items. All three measures exhibited good internal consistency (*mental health support*: $\alpha = .92$; *basic need support*: $\alpha = .75$; *additional support*: $\alpha = .79$).

STATISTICAL ANALYSES

We used post-stratification weights ([Valliant et al., 2013](#)) to take account of sample bias. To estimate the prevalence of symptoms of mental disorders (depression, anxiety, eating disorders, sleep disturbance) and comorbidities, we used the Wald method for 95% confidence intervals ([Woodward, 2013](#)). Prevalence was calculated as the proportion of participants (expressed as a percentage) who reached a certain cutoff point for symptoms of mental disorders ([Woodward, 2013](#)). The cut-off values were 10 (for the PHQ-9 and GAD-7), 2 (for the SCOFF) and 8 (for the ASSQ).

Comorbidity was defined as the simultaneous presence of 2, 3, or 4 symptoms of mental disorders that reached the respective cutoffs, calculated as a proportion of all participants and expressed as a percentage. We also calculated PHQ-2 and GAD-2 scores, consisting of the sums of the first two items of PHQ-9 and GAD-7, respectively, to compare our scores with other samples ([Kroenke et al., 2009](#)). PHQ-2 and GAD-2 sum scores of 3 and 5 or more, respectively, are indicative of moderate and severe symptoms, respectively ([Löwe et al., 2010](#)). We used t-tests for independent samples to assess differences in well-being and symptoms of mental disorders between men and women, individual and team sports, leanness and non-leanness sports, and injured and non-injured athletes. The distinction between leanness and non-leanness sports was based on previous research ([Martinsen et al., 2010](#)).

To estimate the impact of need satisfaction and need frustration on mental health problems and well-being, we used multiple linear regression. As a first step, we entered the variables gender, age, team/individual sport, leanness/non-leanness sport and injured/not injured. In a second step, we entered need satisfaction and need frustration. We calculated one multiple regression model for each assessed mental disorder (i.e., symptoms of depression, anxiety, eating disorder, sleep disorder) and for each well-being subscale (i.e., emotional, social, psychological). We calculated Pearson correlations to examine the relationship between organizational support and all mental health parameters and t-tests to determine whether specific groups (i.e., men/women, team sport/individual sport, leanness sport/non leanness sport, injured/non injured athletes) differed in terms of perceived levels of organizational support. For all group differences, we

calculate Cohens' *d* as the effect size (< 0.5 small, < .0.8 medium, ≥ 0.8 large effect, Cohen, 1988). Calculations were done using JASP (JASP-Team, 2019).

RESULTS

PRELIMINARY ANALYSIS

To correct for sample bias, we created post-stratification weights based on Royal's (2019) guidelines. The weights were set to ensure that our sample matched the total sample in terms of gender (male/female), type of sport (individual/team), and support category (elite/junior). The inclusion of the support category variable when calculating the weights also enabled adjustment for age of the total sample. More specifically, to ensure that this weighted sample was representative of the total sample, we calculated weights for eight groups (the three variables gender, type of sport, and support category, with two expressions each resulting in $2 \times 2 \times 2 = 8$ groups). Weighted means were used to calculate symptom prevalence and group differences. Because unweighted regression models perform better than weighted models (Avery et al., 2019), correlations and multiple regressions were based on unweighted data. In fact, the conclusions would have remained unchanged if we had used weighted regression models, because the calculated correlation and regression parameters changed only very slightly.

PRIMARY ANALYSIS

Descriptive variables and Prevalence

Table 1 shows means and standard deviations for all constructs and the correlations between them. All correlations exhibit the expected direction; all symptoms

of mental health problems correlate positively, with the strongest correlation between symptoms of depression and anxiety. The well-being subscales also correlate positively with each other and negatively with symptoms of mental health problems; the negative correlations between well-being and symptoms of depression and anxiety are stronger than those between well-being and symptoms of eating and sleep disorders.

Table 2 shows the data for prevalence of mental health problems and comorbidity for the total sample and (separately) for men and women, team and individual athletes, non-leanness and leanness athletes, and injured and non-injured athletes. The analysis shows that the prevalence of individual disorders differs by up to 16 percentage points, depending on the group. There were no differences in the prevalence of mental disorder symptoms between participants who completed the survey in German and those who completed it in French (all *t*s < 1.20, all *p*s > .23, all *d*s < 0.09). The PHQ-2 (*M* = 1.48, *SD* = 1.29, 16% moderate symptoms of depression, 3% severe) strongly correlates positively with the PHQ-9 (*r* = .80, *p* < .001). The GAD-2 (*M* = 1.49, *SD* = 1.32, 17% moderate symptoms of anxiety, 3% severe) strongly correlates positively with the GAD-7 (*r* = .87, *p* < .001). The mean value for the MHC-SF total scale was 4.46 (*SD* = 0.79, 95% CI = 4.41–4.51).

Group differences

As compared to men athletes, women athletes reported more symptoms of depression (*t* = 7.37, *p* < .001, *d* = 0.47), anxiety (*t* = 8.34, *p* < .001, *d* = 0.54), eating disorders (*t* = 7.74, *p* < .001, *d* = 0.50), and sleep disorders (*t* = 3.06, *p* < .01, *d* = 0.20), as well as lower emotional well-being (*t* = 4.06, *p* < .001, *d* = 0.26), social well-being (*t* = 2.80, *p* < .01, *d* = 0.18), and psychological well-being

VARIABLE	M (SD)	depr	anxiety	eat	sleep	emowb	socwb	psywb	nsatis	nfrust
1. depr	6.01 (4.37)	—								
2. anxiety	5.70 (3.67)	.77	—							
3. eat	0.87 (0.96)	.43	.37	—						
4. sleep	5.43 (2.50)	.50	.43	.21	—					
5. emowb	4.81 (0.88)	-.64	-.55	-.28	-.35	—				
6. socwb	4.00 (0.99)	-.46	-.41	-.23	-.22	.56	—			
7. psywb	4.67 (0.85)	-.57	-.51	-.27	-.32	.70	.65	—		
8. nsatis	3.34 (0.47)	-.43	-.40	-.21	-.23	.44	.45	.53	—	
9. nfrust	1.72 (0.56)	.56	.52	.37	.32	-.52	-.42	-.49	-.57	—

Table 1 Descriptives and Pearson's Correlations between study variables.

Note: *N* = 1003, all *p*s < .001, depr = depressive symptoms, anxiety = anxiety symptoms, eat = eating disorder symptoms, sleep = sleep disorder symptoms, emowb = emotional well-being, socwb = social well-being, psywb = psychological well-being, nsatis = need satisfaction, nfrust = need frustration, large effect sizes (i.e., correlations > .5) are written in bold, all other correlations are moderate or small.

($t = 4.33$, $p < .001$, $d = 0.28$). Compared to team sport athletes, individual sport athletes reported more symptoms of depression ($t = 2.47$, $p < .01$, $d = 0.16$) and eating disorders ($t = 2.85$, $p < .01$, $d = 0.18$), but there were no differences in well-being or other symptoms of mental disorders (all t s < 0.79 , all p s $> .05$, all d s < 0.05). A similar pattern was observed for leanness sport athletes, who reported more symptoms of depression ($t = 3.04$, $p < .01$, $d = 0.22$) and eating disorders ($t = 2.78$, $p < .01$, $d = 0.20$) than non-leanness sport athletes; there were no differences in well-being or symptoms of other mental disorders (all t s < 1.50 , all p s > 0.5 , all d s < 0.11). As compared to the non-injured, injured athletes reported more symptoms of depression ($t = 4.15$, $p < .001$, $d = 0.44$), anxiety ($t = 3.35$, $p < .001$, $d = 0.36$), and eating disorders ($t = 1.76$, $p < 0.5$, $d = 0.19$), as well as lower emotional well-being ($t = 3.67$, $p < .001$, $d = 0.39$)

and social well-being ($t = 1.66$, $p < .05$, $d = 0.18$). There were no observed differences in symptoms of sleeping disorder or psychological well-being (both t s < 1.46 , both p s $> .05$, both d s < 0.16).

Need satisfaction and need frustration

Table 3 shows the standardized coefficients of the regression analyses. The model improves substantially for all dependent variables when need satisfaction and need frustration are included (R^2 change of .10–.31). Need frustration is the best predictor of all symptoms of mental health disorders; other factors are of little or no predictive value. Both need frustration and need satisfaction predict all aspects of well-being; need satisfaction is the best predictor of social and psychological well-being. Again, other factors are of little or no predictive value.

VARIABLE	PREV (95%CI)	PREV M/W	PREV T/I	PREV L/NL	PREV I/NI	RANGE
depr	17% (15–19%)	13/24%	14/20%	24/14%	28/16%	13–28%
anxiety	10% (8–12%)	6/17%	10/11%	13/9%	18/10%	6–18%
eat	22% (19–25%)	12/36%	17/26%	27/19%	28/21%	12–36%
sleep	18% (16–20%)	16/22%	18/18%	19/18%	23/18%	16–23%
No MD	61%	70/48%	67/56%	53/65%	44/63%	44–70%
1 MD	22%	19/27%	18/25%	26/20%	33/21%	19–33%
2 MD	9%	7/11%	9/9%	9/8%	11/9%	7–11%
3 MD	6%	3/9%	4/7%	7/5%	6/6%	3–9%
4 MD	3%	1/6%	2/3%	4/2%	7/2%	1–7%

Table 2 Prevalence and Comorbidity.

Note: $n = 1003$, depr = depressive symptoms, anxiety = anxiety disorder symptoms, eat = eating disorder symptoms, sleep = sleep disorder symptoms, MD = number of cutoffs reached for any mental disorder symptom, M/W = men/women, T/I = team sport/individual sport, L/NL = leanness/non-leanness sport, I/NI = injured/non-injured athletes.

DEPENDENT VARIABLE →	depression		anxiety		eat		sleep	
	STEP 1	STEP 2	STEP 1	STEP 2	STEP 1	STEP 2	STEP 1	STEP 2
Control variables								
Gender (m 0, f 1)	.23***	.13***	.25***	.16***	.24***	.18***	.11***	.05
Age	-.09**	-.05	-.09**	-.05	-.15***	-.12***	.10**	.13***
Team (0) Individual (1)	.01	-.03	.01	-.04	.07	-.04	.01	-.03
Non-lean (0) lean (1)	.10**	.11***	.06	.07*	.06	.07	.02	.02
Not-injured (0) injured (1)	.12***	.09***	.11***	.08**	.08*	.05	.03	.01
R^2	.08***		.09***		.10***		.02***	
Independent variables								
nsatis		-.14***		-.13***		.02		-.05
nfrust		.45***		.42***		.35***		.29***
R^2		.37***		.34***		.20***		.12***
R^2 change		.29***		.25***		.10***		.10***

(contd.)

DEPENDENT VARIABLE →	emowb		socwb		psywb	
	STEP 1	STEP 2	STEP 1	STEP 2	STEP 1	STEP 2
Control variables						
Gender (m 0, f 1)	-.13***	-.04	-.11**	-.03	-.14***	-.05
Age	.09**	.05	.07*	.03	.09**	.04
Team (0) Individual (1)	.02	.05	.02	.05	.01	.03
Non-lean (0) lean (1)	-.07	-.08*	-.02	-.04	-.05	-.06
Not-injured (0) injured (1)	-.10**	-.07**	-.04	-.01	-.02	.01
R ²	.04***		.02***		.08***	
Independent variables						
nsatis		.20***		.30***		.37***
nfrust		-.40***		-.25***		-.27***
R ²		.32***		.24***		.34***
R ² change		.28***		.22***		.31***

Table 3 Multiple Hierarchical Regression Analysis.

Note: Figures shown are standard coefficients (i.e., beta values); depression = depressive symptoms, anxiety = anxiety disorder symptoms, eat = eating disorder symptoms, sleep = sleep disorder symptoms, emowb = emotional well-being, socwb = social well-being, psywb = psychological well-being, nsatis = need satisfaction, nfrust = need frustration, $n = 1003$, * $p < .05$, ** $p < .01$, *** $p < .001$.

EXPLORATIVE ANALYSIS: ORGANIZATIONAL SUPPORT

Table 4 shows means and standard deviations for all forms of perceived organizational support and correlations between perceived organizational support and other variables. Basic need support was rated highest, followed by mental health support and additional support. All three facets of organizational support for mental health correlated negatively with all symptoms of mental disorders and positively with all forms of well-being. All three facets of organizational support also correlated positively with need satisfaction and negatively with need frustration.

Overall, any intergroup differences in perceived organizational support were small at most (i.e., small effects); as compared to man athletes, woman athletes reported less mental health support ($t = 3.20$, $p < .001$, $d = 0.21$) and basic need support ($t = 2.05$, $p < .05$, $d = 0.13$). There was no gender difference in perceived additional support ($t = 1.20$, $p > .05$, $d = 0.08$). There was no difference in ratings of mental health support, basic need support and additional support between team sports and individual sports athletes (all $t_s < 1.92$, all $p_s > 0.05$, all $d_s < 0.13$). Leanness sport athletes reported less basic need support ($t = 1.96$, $p < .05$, $d = 0.14$) than those competing in non-leanness sports, but there was no reported difference in the other two forms of organizational support (both $t_s < 1.19$, both $p_s > 0.05$, all $d_s < 0.09$). Injured and non-injured athletes reported no differences in any of the three forms of organizational support (all $t_s < 1.61$, all $p_s > .05$, all d_s

	mhsup	bnsup	addsup
Descriptive			
M	3.85	4.57	2.75
SD	1.27	1.00	1.31
bnsup	.66	—	—
addsup	.57	.39	—
Variable			
depr	-.28	-.17	-.16
anxiety	-.30	-.22	-.16
eat	-.16	-.11	-.12
sleep	-.15	-.14	-.07 [†]
emowb	.27	.23	.14
socwb	.26	.20	.20
psywb	.31	.25	.12
nsatis	.28	.28	.12
nfrust	-.30	-.29	-.14

Table 4 Organizational Support: Descriptives and Pearson Correlations.

Note. $n = 954-973$, [†] $p < .05$, all other $p_s < .001$, mhsup = mental health support, bnsup = basic need support, addsup = additional support, depr = depressive symptoms, anxiety = anxiety symptoms, eat = eating disorder symptoms, sleep = sleep disorder symptoms, emowb = emotional well-being, socwb = social well-being, psywb = psychological well-being, nsatis = need satisfaction, nfrust = need frustration.

< 0.18). Participants rated federation support ($M = 2.78$, $SD = 1.26$) slightly higher than support from their club ($M = 2.58$, $SD = 1.20$, $t = 3.16$, $p < .001$, $d = 0.16$).

DISCUSSION

The present study surveyed a representative sample of Swiss elite athletes about their mental health and found that about one in six athletes had moderate to severe symptoms of depression in the past two weeks (17%). Comparing our results with broadly equivalent samples in other countries (based on a 95% confidence interval), symptom point prevalence is similar in Germany (19%, Nixdorf et al., 2013) and in Sweden (15%, Åkesdotter et al., 2020) and higher in Denmark (21%, Küttel et al., 2021), New Zealand (21%, Beable et al., 2017) and Australia (27%, Gulliver et al., 2015). About 10% of the athletes in our study reported moderate to severe symptoms of anxiety—a lower percentage than in Denmark (14%, Küttel et al., 2021) or Sweden (17%, Åkesdotter et al., 2020). Because of the somewhat low sensitivity of the GAD-7 (Plummer et al., 2016), the prevalence may be rather underestimated in all studies. The athletes in our sample reported severe symptoms of depression (3%) and anxiety (3%) at levels similar to a representative sample of the general Swiss population in the same age range for the same time period (Höglinger et al., 2022). Overall, our study participants reported levels of symptoms of depression and anxiety similar to or lower than elite athletes from other countries and were similar to the Swiss general population in the same age group.

In our sample, 22% of athletes exhibited symptoms of disordered eating. Surveys using the same questionnaire returned similar results for elite athletes in Germany (22%, Giel et al., 2016) and Australia (23%, Gulliver et al., 2015). Based on these data, prevalence is almost twice as high among elite athletes as in the general population (again using the same questionnaire, e.g., Richter et al., 2017). This finding aligns with earlier evidence that athletes are at greater risk of eating disorders than the general population (Sundgot-Borgen & Torstveit, 2004), conflicting with studies that found no such difference (Chapman & Woodman, 2016). One possible reason for this higher prevalence among athletes is the wording of one SCOFF item that asks “Would you say that food dominates your life?” This item attracted a yes response from 48% of our sample, which is about three times higher than the equivalent figure in the German validation study (Richter et al., 2017). For athletes, nutrition is crucial for regeneration and performance, and responses to this item may reflect different professional approaches to nutrition, as well as disordered eating. Overall, however, the prevalence of symptoms of eating disorders in our

study seems broadly similar to other elite sport samples and higher than in the normal population. To ensure that questionnaires provide valid and reliable results in athlete populations, it would be useful to validate measures of eating disorders for athletes, adjusting cut-off values where necessary.

In our sample, 18% of the participants exceeded the cut-off for moderate sleep problems. The percentage is higher among athletes from Canada (25%, Bender et al., 2018) and the USA (25%, Rabin et al., 2020) and lower among athletes from China (14%, Zhang et al., 2022). All of these studies employed the same instrument, which was validated in athletes (i.e., the ASSQ, Samuels et al., 2016). Studies using sleep screening tools that do not use athlete-specific cut-off values typically report a higher prevalence of sleep problems in athletes (approximately 50%, e.g., Randell et al., 2021). As noted earlier, this serves as a reminder that prevalence depends in part on the instrument used. Improving sleep quality would be important because sleep disturbances in athletes adversely impact athletic performance and injury risk (Charest & Grandner, 2020).

The survey also captured data on athletes' well-being. Comparing our results to other studies based on the same questionnaire, higher well-being scores have been reported in Italian athletes (Bertollo et al., 2021), and lower scores have been reported in Canadian athletes (Van Slingerland et al., 2018). For the same age group, the general population in Denmark reports the same level of well-being as our sample, and the Canadian general population well-being is higher (Santini et al., 2020). No MHC-SF data are currently available for the general population in Switzerland; however, our data would make such comparisons possible.

GROUP DIFFERENCES

Among the athletes in our sample, 61% fell short of the cut-off values for symptoms of mental disorders while the remaining 39% exceeded at least one cut-off. However, these numbers varied greatly from group to group. For example, 70% of men athletes fell short of the cut-off score for all mental disorder symptoms as compared to only 48% of women. Similar differences were observed for individual disorders. Compared with men athletes, women athletes were two to three times more likely to report symptoms of depression, anxiety, and eating disorders. This is consistent with findings from other studies with athlete populations and the general population (e.g., Reardon et al., 2019; Salk et al., 2017). Individual athletes reported slightly more symptoms of depression and eating disorders than team athletes, but not more anxiety symptoms, as was the case in previous studies (Nixdorf et al., 2016; Pluhar et al., 2019). We saw the same pattern among those competing in leanness sports. Individual and leanness sport athletes reported

thus more symptoms of mental health problems than other athletes, although the difference was small. Notably, injured athletes reported substantially more symptoms of depression and anxiety (and, to a lesser extent, of eating disorders) than non-injured athletes. Overall, injured athletes reported symptoms of depression more frequently (28%) than any other group of athletes. This finding aligns with earlier studies (Appaneal et al., 2009) and confirms that injury is likely to have a detrimental impact on athletes' mental health. Overall, it seems to play a major role for the size of mental health disorder prevalence which group of athletes is examined (e.g., whether one surveys men or women athletes).

NEED SATISFACTION AND NEED FRUSTRATION

The present study also investigated the extent to which psychological need satisfaction and need frustration contribute to athletes' mental health. We found that need satisfaction and frustration, in conjunction with factors that include gender, age, type of sport, and injury status, help to account for reported well-being and symptoms of mental health problems. For mental health problems, frustration of needs was the deciding factor. The more need frustration the athletes reported, the more they reported symptoms of mental health problems. In all aspects of well-being, as hypothesized, both need frustration and need satisfaction played a major role. Less need frustration and greater need satisfaction were associated with increased well-being. In the case of eudaimonic wellbeing (i.e., social and psychological well-being), need satisfaction was the most important factor. These results confirm our expectations and align with previous findings regarding athletes' mental health (Heissel et al., 2018). It is notable that basic psychological needs are a stronger predictor of mental health than demographic factors such as gender, age, or type of sport. In short, to understand athletes' mental health, perceived satisfaction and frustration of psychological needs seem more relevant than demographics.

ORGANIZATIONAL SUPPORT

We also asked participants about their perceptions of the support they receive from their club and their federation. Overall, any intergroup differences in perceived organizational support were small. As compared to men and non-leanness athletes, women and leanness athletes reported slightly lower levels of support. In general, athletes also felt that they received slightly more support from their federation than from their club. The more organizational support an athlete reported, the better their mental health (i.e., fewer symptoms of mental health disorders and more well-being). It is important to note that perceived organizational support does not necessarily correspond to the actual actions of federations and clubs; for example, some existing organizational supports may not be well known

to athletes. Overall, the data confirm the potential importance of organizational support for athletes' mental health, but this study is only a first exploratory step, and more research is needed.

PRACTICAL IMPLICATIONS

Our results show that, as in the general Swiss population, a substantial percentage of Swiss competitive athletes are affected by mental health problems, and this finding has some practical implications. In light of the associated suffering and other costs (Maercker et al., 2013), the introduction of national prevention programs to improve mental health (*Gesundheitsförderung Schweiz*, 2018) is a welcome initiative that may also be of help to athletes. In addition, the mental health of athletes should be promoted and protected specifically. This is because society expects these young people to perform at a very high level and there is a concomitant responsibility to protect their mental health and personal development (Gojanovic et al., 2021). Furthermore, our results show that athletes' mental health seems to be at particular risk at certain points in time (e.g., post-injury) and for certain groups (e.g., women competitors in leanness sports). Mental health can be promoted more efficiently through the system in which people live and work each day. In the case of athletes, this would entail integrating all persons and organizations who are involved in the day-to-day training and competition process into mental health promotion. Our results indicate that promoting and protecting basic psychological needs offers a useful starting point, along with regular screening to identify mental disorders quickly. When screening for eating and sleep disorders, it seems especially important to use athlete-specific questionnaires or cut-off values. This is because athletes may have a different relationship to food and therefore assess questionnaire items differently, or because late training times and time zone changes after travel, for example, may affect their sleep. Questionnaires that do not take such points into account could lead to an increased number of false positives. Our results suggest that clubs and federations may help to protect athletes' mental health by implementing these measures, ideally through programs whose content is based on a theory of behavior change (Breslin et al., 2022). In order to coordinate all possible measures to promote Swiss athletes' mental health, it would be useful to develop a national mental health strategy in competitive sports, similar to countries such as Canada (Durand-Bush & Van Slingerland, 2021).

LIMITATIONS AND FUTURE RESEARCH

The present study has a number of strengths. By studying a large representative sample, we were able to draw meaningful general conclusions about the current mental health of Swiss elite athletes. We also

took a broad view of mental health rather than focusing exclusively on deficits. Nevertheless, the present study has some limitations that indicate directions for future research. First, the correlational nature of our data means that we were unable to make causal inferences; for example, we cannot rule out the reverse possibility that mental health problems contribute to perceptions of need frustration. Second, the study addressed only a limited number of disorders, and we have no data on other mental health issues (e.g., addiction). Third, we did not conduct a detailed assessment of basic psychological needs beyond general measures of need satisfaction and need frustration. Finally, although we captured athletes' perceptions of organizational support, we cannot say what supports sports clubs and federations actually provide.

To address these issues, future research should employ experimental study designs to investigate whether and how, for example, variations in need satisfaction affect mental health. Longitudinal study designs would also be important to track change in mental health disorder symptoms and well-being (Poucher et al., 2022). It also seems important to investigate other mental disorders among Swiss athletes in order to gain a more complete picture. This applies not only to other disorders but also to other samples such as Swiss para-athletes (Olive et al., 2021). In future prevalence studies, in addition to German and French survey versions, Italian versions should also be offered to better represent the linguistic landscape of Switzerland. Further research is also needed to clarify differences and commonalities in the basic psychological needs of autonomy, relatedness, and competence. Finally, it would be useful to run an interview study or to engage directly with sports federations to inquire about their provisions for mental health promotion.

CONCLUSION

A substantial proportion of Swiss elite athletes are affected by symptoms of mental disorders. Sport-specific events like injuries could have a negative impact on mental health. Accordingly, considering mental health issues as regular part of the injury rehabilitation process seems indicated. Basic psychological need support seems to be a crucial factor in supporting athletes' well-being. By creating a basic need-supporting climate, clubs and federations could make an important contribution to the mental health of their athletes.

APPENDIX

ORGANIZATIONAL SUPPORT SURVEY

1. Athletes' mental health is important to my club/federation.

2. My club/federation recognizes signs of poor mental health.
3. My club/federation reacts effectively to signs of poor mental health.
4. In my club/federation, I know where to get help when my psychological well-being is low.
5. Overall, I am satisfied with how my club/federation handles mental health.
6. In my club/federation, good performance/development is valued.
7. My club/federation promotes cohesion.
8. In my club/federation, one can participate and have a say in decision-making.
9. My club/federation offers legal and financial advice to athletes.
10. My club/federation trains athletes in (social) media use.
11. My club/federation provides sports psychology support.
12. How much does your club do to promote mental health?
13. How much does your national federation do to promote mental health?

Items 1–5 = mental health support

Items 6–8 = basic need support

Items 9–11 = additional support

TRANSPARENCY STATEMENT

We reported how we determined the sample size and reported all variables. We did not exclude any data or outliers.

DATA ACCESSIBILITY STATEMENT

This study is part of a three-year research project on mental health in competitive sports. The data will be made available upon completion of the project (12/2024) in a form that ensures the anonymity of the participants under this link <https://doi.org/10.17605/OSF.IO/8K2XJ>.

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COMPETING INTERESTS

The authors have no competing interests to declare.

AUTHOR CONTRIBUTIONS


Philipp Röthlin: conceptualization (lead), formal analysis (lead), funding acquisition (lead), investigation (supporting), writing – original draft (lead), writing – review and editing (supporting). Stephan Horvath: conceptualization (lead), formal analysis (supporting), writing – original draft (supporting), writing – review and editing (lead). Nadja Ackeret: conceptualization (supporting), investigation (lead), writing – review and editing (supporting). Claudio Peter: conceptualization (supporting), writing – review and editing (supporting). Daniel Birrer: conceptualization (supporting), writing – review and editing (supporting), supervision (lead).

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